Ajou University
in Tashkent

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OLIY TA'LIM, FAN VA INNOVATSIYALAR VAZIRLIGI

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Speech for the conference

Distinguished colleagues, esteemed guests, dear professors and researchers,

It is my great honor to welcome you to Ajou University in Tashkent for this Republican Scientific and Practical Conference, “Human and Artificial Intelligence Collaboration in Higher Education: The Future of Education.”

We gather today at a moment when the question is no longer *whether* artificial intelligence will shape higher education, but *how* we, as educators and researchers, choose to shape that collaboration ourselves. Universities that engage this question thoughtfully, critically, rigorously, and with their students’ futures in mind will define what higher education becomes in the coming decade. That is precisely the spirit in which we open this conference.

Ajou University in Tashkent was established in Tashkent in 2020 as a branch of a leading South Korean university, and from the outset, our mission has been to build a bridge between international academic standards and the needs of our region. Today, across our nine faculties, that mission continues to grow. This conference itself reflects that ambition: our sessions today span Pedagogy, Architecture, Information Technology, and Computer and Electrical Engineering four fields where the dialogue between human expertise and artificial intelligence is advancing faster than almost anywhere else in science.

This is not the first time Ajou university in Tashkent has opened its doors to the broader scientific community. Over the past academic year alone, we hosted two international conferences – “Smart Technologies and Innovative Approaches in Research: Building a Digital Future” and “Emerging Trends in the Green Economy” welcoming more than thirty scholars from abroad, including colleagues from Korea, the United States, Germany, Iran, Malaysia, Indonesia, India, Kazakhstan, and Tajikistan. Today’s gathering builds on that same commitment to open, cross-border scientific exchange.

I would also like to note that our university’s own scientific journal, the *Advanced Journal of University Science and Creative Innovations (AJOU SCI)*, has recently been indexed in Index Copernicus, in addition to its existing recognition by the Higher Attestation Commission in the fields of pedagogy and philology. We see this conference, and the papers that will be presented here, as future contributions to that same growing body of research.

Colleagues, the theme we have chosen is deliberately broad, because the questions it raises touch every one of us: How do we preserve the value of human judgment, mentorship, and critical thinking as intelligent systems take on more of the analytical work in our classrooms and laboratories? How do we train the next generation of engineers, architects, and IT specialists to work *with* these tools rather than be replaced by them? And how do our own institutions need to change in curriculum, in research methodology, in how we measure scientific productivity to meet this moment?

I am confident that the discussions in our Architecture, IT, and Computer and Electrical Engineering sections today will offer real, practical answers to these questions - not abstract speculation, but research grounded in the work our faculties are already doing.

On behalf of Ajou University in Tashkent, I want to thank every participant who has joined us today, those presenting research, those here to engage in discussion, and our colleagues who traveled to be with us. Your presence here is itself a statement: that the future of education will be shaped not by technology alone, but by the researchers and institutions willing to study it seriously.

I now declare this Republican Scientific and Practical Conference officially open, and I wish all of us a productive, thoughtful, and forward-looking day of discussion.

Thank you.

SECTION 1

HUMAN AND ARTIFICIAL INTELLIGENCE COLLABORATION IN HIGHER EDUCATION: INNOVATIVE PEDAGOGY AND DIGITAL EDUCATIONAL TECHNOLOGIES

* * *

1-SHO‘BA

OLIY TA'LIMDA INSON VA SUN’IY INTELLEKT HAMKORLIGI: INNOVATSION PEDAGOGIKA VA RAQAMLI TA’LIM TEXNOLOGIYALARI

MEHNATNI MUHOFAZA QILISHNI O‘QITISH JARAYONIDA SUN’IY INTELLEKT TEXNOLOGIYALARIDAN FOYDALANISH IMKONIYATLARI

Abduraxmanova Azoda Djo‘rayevna[1], Solixov Murod Botir o‘g‘li[2]
[1]Islom Karimov nomidagi Toshkent davlat texnika universiteti “Hayot faoliyati xavfsizligi” kafedrasi t.f.d.professor
[2]“Crafers” M.Ch.J fabrikasi Mehnat muhofazasi va texnika xavfsizligi muhandisi
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Annotatsiya. *Mazkur tezisda mehnatni muhofaza qilishni o‘qitish jarayonida sun’iy intellekt texnologiyalaridan foydalanish imkoniyatlari tahlil qilingan. Xodimlarga mehnat xavfsizligi talablarini an’anaviy nazariy tushuntirish bilan bir qatorda, sun’iy intellekt yordamida xavfli ishlab chiqarish vaziyatlarini vizual modellashtiruvchi videomateriallar va tasvirlarni yaratish imkoniyatlari yoritilgan. Taklif etilayotgan yondashuv xodimlarning xavf-xatarlarni amaliy vaziyatlar orqali yaxshiroq anglashiga, xavfsizlik talablariga mas’uliyatli munosabatini shakllantirishga hamda o‘qitishdan keyingi bilimlarini qayta baholashga qaratilgan. Mazkur texnologiyalardan samarali foydalanish inson omili bilan bog‘liq xatolarni kamaytirish va ishlab chiqarishdagi baxtsiz hodisalar xavfini pasaytirishga xizmat qilishi mumkin. Sun’iy intellekt mehnatni muhofaza qilish mutaxassisining o‘rnini bosuvchi vosita emas, balki uning faoliyatini qo‘llab-quvvatlovchi zamonaviy texnologik yordamchi sifatida qaraladi.*

Kalit so‘zlar: *sun’iy intellekt, mehnatni muhofaza qilish, mehnat xavfsizligi, xodimlarni o‘qitish, instruktaj, xavfsizlik bo‘yicha trening, vizual modellashtirish, raqamli texnologiyalar, ishlab chiqarish xavfsizligi, baxtsiz hodisalarning oldini olish.*

Abstract. *This thesis analyzes the possibilities of using artificial intelligence technologies in occupational health and safety training. Along with traditional theoretical instruction, the study highlights the potential of using artificial intelligence to create video materials and visual models that simulate hazardous situations in the workplace. The proposed approach is aimed at improving employees’ understanding of occupational risks through practical visual scenarios, developing a more responsible attitude toward safety requirements, and reassessing employees’ knowledge after training. The effective application of these technologies can contribute to reducing human-related errors and lowering the risk of workplace accidents. Artificial intelligence should not be considered a replacement for occupational health and safety specialists, but rather as a modern technological tool that supports and improves their professional activities.*

Keywords: *artificial intelligence, occupational health and safety, occupational safety, employee training, safety instruction, safety training, visual modeling, digital technologies, workplace safety, accident prevention.*

Bugungi kunda ishlab chiqarish korxonalarida xodimlarning hayoti va sog‘lig‘ini muhofaza qilish, xavfsiz mehnat sharoitlarini ta’minlash hamda ishlab chiqarishdagi baxtsiz hodisalarning oldini olish mehnatni muhofaza qilish tizimining muhim yo‘nalishlaridan biri hisoblanadi. Mehnat xavfsizligini ta’minlashda texnik, tashkiliy va sanitariya-gigiyenik chora-

tadbirlar bilan bir qatorda xodimlarni mehnatni muhofaza qilish bo‘yicha sifatli va tizimli o‘qitish alohida ahamiyatga ega.

O‘zbekiston Respublikasida xodimlarni mehnatni muhofaza qilish bo‘yicha o‘qitish, ularga yo‘l-yo‘riq berish, bilimlarini tekshirish, malakasini oshirish va qayta tayyorlash masalalari O‘zbekiston Respublikasi Vazirlar Mahkamasining 2025-yil 24-dekabrdagi 819-son qarori bilan tartibga solingan. Mazkur qaror bilan tasdiqlangan nizomga muvofiq xodimlarni mehnatni muhofaza qilish bo‘yicha o‘qitish tarkibiga kirish yo‘l-yo‘rig‘i va ish joyidagi yo‘l-yo‘riqlarni o‘tkazish, ish joyidagi stajirovka va bilimlarni tekshirish, shuningdek, xavfliligi yuqori bo‘lgan obyektlarda ishlaydigan xodimlarni o‘qitish va ularning bilimlarini tekshirish kabi jarayonlar kiradi. Shuningdek, mehnatni muhofaza qilish bo‘yicha ta’lim jarayonining mazmuni xodimlarning bajaradigan kasbiy faoliyatiga muvofiq bo‘lishi, o‘qitishda zamonaviy ta’lim texnologiyalari va o‘quv vositalaridan foydalanish imkoniyatlari hisobga olinishi belgilangan.[1]

Xodimlarni mehnatni muhofaza qilish bo‘yicha o‘qitishning asosiy maqsadi ularda ish jarayonida yuzaga kelishi mumkin bo‘lgan xavf va zararli omillarni to‘g‘ri aniqlash, xavfsiz ishlash usullarini qo‘llash, shaxsiy himoya vositalaridan to‘g‘ri foydalanish hamda favqulodda vaziyatlarda to‘g‘ri harakat qilish bo‘yicha zarur bilim va ko‘nikmalarni shakllantirishdan iborat. O‘qitishning yetarli darajada tashkil etilmasligi yoki xodim tomonidan berilgan xavfsizlik talablarining to‘liq o‘zlashtirilmasligi inson omili bilan bog‘liq xatolarning yuzaga kelish ehtimolini oshiradi. Natijada texnologik uskunalardan noto‘g‘ri foydalanish, xavfsizlik talablarini buzish, shaxsiy himoya vositalaridan foydalanmaslik yoki favqulodda vaziyatlarda noto‘g‘ri harakat qilish kabi holatlar ishlab chiqarishdagi jarohatlanish va baxtsiz hodisalar xavfini oshirishi mumkin. Shu sababli mehnatni muhofaza qilish bo‘yicha o‘qitish jarayonini zamonaviy axborot va raqamli texnologiyalar asosida takomillashtirish, xodimlarga xavfsizlik talablarini yanada tushunarli, ko‘rgazmali va amaliy shaklda yetkazish dolzarb masalalardan biri hisoblanadi.

An’anaviy mehnatni muhofaza qilish bo‘yicha o‘qitish jarayonida xodimlarga xavfsizlik qoidalari, yo‘riqnomalar va mavjud xavf-xatarlar asosan og‘zaki tushuntirish, yozma materiallar, taqdimotlar hamda suhbatlar orqali yetkazib kelinmoqda. Bunday yondashuv mehnat xavfsizligi bo‘yicha zarur nazariy bilimlarni shakllantirishda muhim ahamiyatga ega bo‘lsa-da, ayrim murakkab va xavfli vaziyatlarning xodim tomonidan to‘liq tasavvur qilinishida ma’lum cheklovlarga ega. Ayniqsa, ishlab chiqarishdagi baxtsiz hodisalar, texnologik uskunalardagi avariya holatlari, yong‘in, elektr toki bilan bog‘liq xavfli vaziyatlar yoki xodimning xavfsizlik talablarini buzishi natijasida yuzaga keladigan oqibatlarni oddiy og‘zaki tushuntirish orqali to‘liq tasavvur qildirish qiyin. Real baxtsiz hodisa va jarohatlanish holatlarini aks ettiruvchi videomateriallardan foydalanish esa ularning mavjudligi, tarqatilishi, etik jihatlari va boshqa cheklovlar sababli har doim ham maqsadga muvofiq yoki imkoniyatli bo‘lavermaydi.

Mazkur muammoni hal etishda sun’iy intellekt texnologiyalaridan foydalanish yangi imkoniyatlarni yuzaga keltiradi. Xususan, zamonaviy generativ sun’iy intellekt texnologiyalari yordamida mehnat xavfsizligi bo‘yicha o‘quv maqsadlariga moslashtirilgan videomateriallar, illyustratsiyalar, vaziyatli tasvirlar va taqdimot materiallarini yaratish mumkin. Bunda real ishlab chiqarish sharoitlariga yaqin bo‘lgan, biroq o‘quv jarayonida xavfsiz tarzda namoyish etiladigan turli xil xavfli vaziyatlarning vizual modellarini shakllantirish imkoniyati paydo bo‘ladi.

Masalan, xodimning himoya vositalarisiz ishlab chiqarish uskunasiga yaqinlashishi, aylanuvchi mexanizmga qo‘lning yaqinlashishi, elektr jihozlaridan noto‘g‘ri foydalanish,

yong‘in xavfining yuzaga kelishi yoki ish joyidagi tartibsizlik natijasida sodir bo‘lishi mumkin bo‘lgan hodisalarni sun’iy intellekt yordamida o‘quv videosi yoki grafik tasvir shaklida modellashtirish mumkin. Bunday materiallarda hodisaning sababi, xavf manbai, noto‘g‘ri xatti-harakat va uning ehtimoliy oqibatlarini ketma-ket ko‘rsatish orqali xodimga xavfsizlik talablarining amaliy ahamiyatini tushuntirish imkoniyati oshadi.

Shuningdek, sun’iy intellekt yordamida turli kasb va ish joylariga moslashtirilgan o‘quv materiallarini yaratish mumkin. Masalan, elektrchi, mexanik, operator, yuklovchi yoki ishlab chiqarish liniyasi xodimi uchun umumiy ma’lumotlardan tashqari aynan uning ish joyida uchrashi mumkin bo‘lgan xavfli vaziyatlarni aks ettiruvchi individual vizual materiallar ishlab chiqilishi mumkin.Bunday yondashuvning muhim jihati shundaki, xodim faqat xavfsizlik qoidasini eshitish yoki matn shaklida o‘qish bilan cheklanib qolmaydi, balki xavfli vaziyatning qanday yuzaga kelishi va xavfsizlik talablariga rioya qilinmaganda qanday oqibatlarga olib kelishi mumkinligini vizual ravishda kuzatadi. Natijada nazariy bilimlarni amaliy vaziyatlar bilan bog‘lash, xavfni anglash va xavfsiz xatti-harakatlarni shakllantirish jarayoni yanada samarali tashkil etilishi mumkin.

Shu nuqtai nazardan, sun’iy intellekt texnologiyalaridan mehnatni muhofaza qilishni o‘qitish jarayonida foydalanish an’anaviy o‘qitish usullarini to‘liq almashtirish emas, balki ularni zamonaviy vizual va interaktiv vositalar bilan boyitish imkonini beruvchi istiqbolli yo‘nalish sifatida qaralishi lozim.

Mehnatni muhofaza qilishni o‘qitish samaradorligini oshirish maqsadida sun’iy intellekt texnologiyalaridan foydalanib, xodimlar uchun ish joylarida yuzaga kelishi mumkin bo‘lgan xavfli vaziyatlarni vizual tarzda modellashtiruvchi o‘quv videomateriallarini yaratish va namoyish etish taklif etiladi. Bunda sun’iy intellekt yordamida ishlab chiqarish korxonasining mavjud texnologik jarayonlari, uskunalari va xodimlarning mehnat faoliyatiga moslashtirilgan turli xavfli vaziyatlarning ssenariylari ishlab chiqilishi mumkin. Taklif etilayotgan tizimda o‘qitish jarayoni bir necha bosqichda amalga oshiriladi. Dastlab xodimning mehnat faoliyatiga xos bo‘lgan asosiy xavf va zararli omillar aniqlanadi. Keyingi bosqichda ushbu xavflar bilan bog‘liq vaziyatlar sun’iy intellekt yordamida videomaterial, tasvir yoki taqdimot shaklida modellashtiriladi. Yaratilgan materiallarda xavfning yuzaga kelish sababi, xodimning noto‘g‘ri harakati, xavfsizlik talablarining buzilishi va buning ehtimoliy oqibatlari izchil namoyish etiladi. Tayyorlangan videomateriallar mehnatni muhofaza qilish bo‘yicha nazariy mashg‘ulotlar va yo‘l-yo‘riqlar jarayonida xodimlarga namoyish etiladi. Bunda og‘zaki tushuntirish va yozma yo‘riqnomalar vizual materiallar bilan to‘ldiriladi. Ayniqsa, xodim bevosita ishlaydigan uskuna yoki texnologik jarayonda yuzaga kelishi mumkin bo‘lgan xavfli holatlarni ko‘rgazmali tarzda namoyish etish uning xavfni real vaziyat sifatida tasavvur qilishiga yordam beradi.

O‘qitish jarayonining keyingi bosqichida xodimlarning olgan bilimlari qayta tekshirilishi taklif etiladi. Buning uchun o‘quv mashg‘ulotidan oldingi va keyingi test natijalarini taqqoslash, xavfsizlik talablarini tushunish darajasini aniqlash hamda xodim tomonidan yo‘l qo‘yilishi mumkin bo‘lgan xatolarni baholash mumkin. Bilim darajasi yetarli bo‘lmagan xodimlar uchun tegishli mavzular bo‘yicha takroriy o‘qitish tashkil etilishi maqsadga muvofiq. Mazkur yondashuv natijasida xodimlarning xavfsizlik talablariga oid nazariy bilimlarini amaliy vaziyatlar bilan bog‘lash imkoniyati oshadi. Xavfli vaziyatlarning vizual va ta’sirchan tarzda namoyish etilishi xodimlarda xavfsizlikka nisbatan yanada mas’uliyatli munosabat shakllanishiga, xavfning ehtimoliy oqibatlarini yaxshiroq anglashga va xavfsiz mehnat usullariga rioya qilish motivatsiyasining ortishiga xizmat qilishi kutiladi.

Shuningdek, o‘qitish natijalarini muntazam ravishda qayta baholash orqali xodimlarning bilimlaridagi kamchiliklarni o‘z vaqtida aniqlash va ularni bartaraf etish imkoniyati paydo bo‘ladi. Natijada inson omili bilan bog‘liq xatolarni kamaytirish, xavfsizlik qoidalarining buzilish holatlarini oldini olish hamda ishlab chiqarishdagi baxtsiz hodisalar xavfini pasaytirishga erishish mumkin. Shu bilan birga, mazkur tizimdan foydalanish natijasida mehnatni muhofaza qilish bo‘yicha o‘qitish jarayonining samaradorligini muntazam monitoring qilish va uni xodimlarning ehtiyojlariga mos ravishda takomillashtirib borish imkoniyati yaratiladi.

Xulosa qilib aytganda, sun’iy intellekt texnologiyalaridan mehnatni muhofaza qilishni o‘qitish jarayonida foydalanish xodimlarga xavfsizlik talablarini yanada tushunarli, ko‘rgazmali va ta’sirchan shaklda yetkazish imkonini beradigan istiqbolli yo‘nalishlardan biridir. Ayniqsa, ishlab chiqarishdagi xavfli vaziyatlarni sun’iy intellekt yordamida o‘quv videosi va vizual materiallar ko‘rinishida modellashtirish xodimlarning xavflarni yaxshiroq anglashiga hamda xavfsiz mehnat qoidalariga mas’uliyat bilan yondashishiga yordam berishi mumkin. Sun’iy intellekt asosida tashkil etilgan o‘qitish jarayonini xodimlarning bilimlarini qayta tekshirish va natijalarni tahlil qilish bilan birgalikda olib borish o‘qitish samaradorligini oshirish, bilimlardagi bo‘shliqlarni aniqlash va zarur hollarda takroriy o‘qitishni tashkil etish imkonini beradi. Buning natijasida inson omili bilan bog‘liq xatolarni kamaytirish va ishlab chiqarishdagi baxtsiz hodisalar xavfini pasaytirishga ko‘maklashish mumkin. Biroq sun’iy intellektni mehnatni muhofaza qilish sohasidagi mutaxassisning o‘rnini bosuvchi vosita sifatida emas, balki uning faoliyatini qo‘llab-quvvatlovchi zamonaviy texnologik yordamchi sifatida qarash lozim. AI tomonidan yaratilgan o‘quv materiallari va tavsiyalar malakali mehnatni muhofaza qilish mutaxassisi tomonidan tekshirilishi, amaldagi xavfsizlik talablari va korxonaning real ishlab chiqarish sharoitlariga muvofiqligi baholanishi zarur. Shu sababli sun’iy intellekt texnologiyalaridan to‘g‘ri, mas’uliyatli va samarali foydalanish orqali mehnatni muhofaza qilish bo‘yicha o‘qitishning zamonaviy, ko‘rgazmali va natijador tizimini shakllantirish hamda kelgusida ishlab chiqarishdagi baxtsiz hodisalar va jarohatlanishlarning oldini olishga xizmat qiluvchi qo‘shimcha imkoniyatlardan foydalanish mumkin.

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OILAVIY NODAVLAT MAKTABGACHA TA’LIM TASHKILOTLARIDA MAKTABGACHA YOSHDAGI BOLALARGA VAQT HAQIDAGI TASAVVURLARNI SHAKILLANTIRISH

Ashurova Mohigul Sodiq qizi
Maktabgacha ta'lim tashkilotlari direktor va mutaxassislarini qayta tayyorlash va ularning malakasini oshirish instituti doktoranti
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Annotatsiya. *Mazkur maqolada oilaviy nodavlat maktabgacha ta’lim tashkilotlarida maktabgacha yoshdagi bolalarda vaqt haqidagi tasavvurlarni shakllantirishning pedagogik asoslari yoritilgan. Vaqt tushunchasining bolalar tafakkuri rivojlanishidagi o‘rni, uni shakllantirishning metodik yo‘llari hamda oilaviy ta’lim muhitining imkoniyatlari tahlil qilingan. Shuningdek, bolalarda kun tartibi, sutka qismlari, hafta kunlari, fasllar va vaqt ketma-ketligi haqidagi tasavvurlarni rivojlantirish bo‘yicha amaliy tavsiyalar ishlab chiqilgan.*

Kalit so‘zlar: *vaqt tushunchasi, maktabgacha ta’lim, oilaviy nodavlat MTT, matematik tasavvurlar, kun tartibi, hafta kunlari, fasllar, bolalar tafakkuri.*

Maktabgacha yosh davri bolaning bilish jarayonlari jadal rivojlanadigan muhim bosqich hisoblanadi. Ushbu davrda bolalarda atrof-muhit haqidagi dastlabki tasavvurlar shakllanib, ular keyingi ta’lim bosqichlarida o‘zlashtiriladigan bilimlarning poydevorini yaratadi. Xususan, vaqt haqidagi tasavvurlarni shakllantirish bolalarning mantiqiy fikrlashi, voqealar ketma-ketligini anglash va kundalik faoliyatini rejalashtirish ko‘nikmalarini rivojlantirishda muhim ahamiyat kasb etadi.[1]

So‘nggi yillarda oilaviy nodavlat maktabgacha ta’lim tashkilotlari sonining ortishi bolalarni maktab ta’limiga sifatli tayyorlashda yangi imkoniyatlarni yaratmoqda. Mazkur ta’lim shakli individual yondashuv, oilaviy muhitga yaqin pedagogik sharoit hamda ta’lim-tarbiya jarayonining moslashuvchanligi bilan ajralib turadi.

Vaqt haqidagi tasavvurlarni shakllantirishning nazariy asoslari

Maktabgacha yoshdagi bolalarda vaqt haqidagi tasavvurlarni shakllantirish elementar matematik tasavvurlarni rivojlantirishning muhim tarkibiy qismlaridan biri hisoblanadi. Vaqt inson hayotining ajralmas qismi bo‘lib, barcha voqea-hodisalar aynan vaqt davomida sodir bo‘ladi. Biroq vaqt moddiy predmet emasligi, uni bevosita ko‘rish, ushlash yoki his qilishning murakkabligi sababli maktabgacha yoshdagi bolalar tomonidan o‘zlashtirilishi qiyin bo‘lgan tushunchalardan biri sanaladi. Shu bois bolalarda vaqt haqidagi dastlabki tasavvurlarni shakllantirish maxsus pedagogik yondashuvlarni talab etadi. Psixologik va pedagogik tadqiqotlarda qayd etilishicha, bolalar vaqtni dastlab o‘z hayotiy tajribalari va kundalik faoliyatlari orqali idrok eta boshlaydilar. Ular vaqtning davomiyligi, ketma-ketligi va qaytarilish xususiyatlarini asta-sekin anglab boradilar.[2]

[1] M.Jumayev. *Bolalarda boshlang‘ich matematik tushunchalarni rivojlantirish nazariyasi va metodikasi*. – T.: Ilm-Ziyo, 2013. – 45-bet.
[2] Lev Vygotsky. *Tafakkur va nutq*. – Moskva, 1999. – 86-bet.

Maktabgacha yoshdagi bolalarda vaqt haqidagi tasavvurlarni shakllantirish jarayoni ularning bilish faoliyati rivojlanishining umumiy qonuniyatlari bilan chambarchas bog‘liqdir. Dastlab bolalar ertalab, tushlik, kechqurun va tun kabi sutka qismlarini ajratishni o‘rganadilar. Keyinchalik ular hafta kunlari, oylar va fasllar haqidagi tushunchalarni o‘zlashtirib boradilar. Mazkur jarayon izchil, ketma-ket va tizimli ravishda tashkil etilgandagina samarali natijalar beradi. Vaqt tushunchalarining bosqichma-bosqich o‘zlashtirilishi bolalarda mantiqiy tafakkur, kuzatuvchanlik va sabab-oqibat bog‘lanishlarini tushunish qobiliyatini rivojlantiradi.[3]

Vaqt tasavvurlarining shakllanishi bolaning tafakkuri, diqqati, xotirasi va nutq rivojlanishi bilan uzviy bog‘liqdir. Bola “kecha”, “bugun”, “ertaga”, “avval”, “keyin”, “tez”, “sekin”, “uzoq”, “qisqa” kabi tushunchalarni faol nutqida qo‘llash orqali vaqt munosabatlarini anglay boshlaydi. Shu bilan birga, vaqt birliklarini o‘rganish bolalarning voqealarni ketma-ketlik asosida tasniflash, taqqoslash va umumlashtirish ko‘nikmalarini rivojlantirishga xizmat qiladi. Bu esa kelgusida matematik va mantiqiy fikrlashning shakllanishi uchun muhim asos yaratadi.[4]

Oilaviy nodavlat maktabgacha ta’lim tashkilotlarining imkoniyatlari

Bugungi kunda oilaviy nodavlat maktabgacha ta’lim tashkilotlari maktabgacha yoshdagi bolalarni har tomonlama rivojlantirishda muhim o‘rin egallamoqda. Ushbu ta’lim shaklining asosiy afzalliklaridan biri kichik guruhlar asosida faoliyat yuritishi bilan izohlanadi. Kichik guruhlarda pedagog har bir bolaning yosh va individual xususiyatlarini chuqur o‘rganish hamda ularga individual yondashish imkoniyatiga ega bo‘ladi. Natijada bolalarda vaqt haqidagi tasavvurlarni shakllantirish jarayoni samaraliroq tashkil etiladi.[5]

Oilaviy nodavlat maktabgacha ta’lim tashkilotlarida vaqt tushunchalarini rivojlantirishning eng muhim vositalaridan biri kun tartibi hisoblanadi. Muntazam ravishda bir xil vaqtda uyg‘onish, nonushta qilish, mashg‘ulotlarda ishtirok etish, sayr qilish va dam olish bolalarda vaqtning izchilligi va takrorlanishi haqidagi tushunchalarni shakllantiradi. Kun tartibiga rioya qilish natijasida bola muayyan faoliyatlarning qaysi vaqtda amalga oshirilishini tushunib boradi hamda vaqtni his qilish ko‘nikmasi rivojlanadi.[6]

Shuningdek, oilaviy muhit elementlaridan foydalanish ham katta pedagogik ahamiyatga ega. Tarbiyachi va ota-onalarning bolalar bilan vaqtga oid muntazam suhbatlar olib borishi ularda vaqt tushunchalarining mustahkamlanishiga yordam beradi. Masalan, “Bugun haftaning qaysi kuni?”, “Kecha qanday mashg‘ulot o‘tkazdik?”, “Ertaga qayerga boramiz?” kabi savollar bolalarda vaqt ketma-ketligini tushunish va vaqt birliklarini ongli ravishda qo‘llash imkonini yaratadi. Bundan tashqari, tabiatdagi mavsumiy o‘zgarishlarni kuzatish, bayramlar va muhim sanalarni eslab qolish ham vaqt haqidagi tasavvurlarni boyitadi.

Vaqt haqidagi tasavvurlarni shakllantirish metodlari. Maktabgacha yoshdagi bolalarda vaqt haqidagi tasavvurlarni rivojlantirishda turli pedagogik metod va vositalardan foydalanish muhim hisoblanadi. Jumladan, kuzatish, suhbat, hikoya qilish, amaliy mashqlar, didaktik o‘yinlar va ko‘rgazmali vositalar bolalarda vaqt tushunchalarini shakllantirishning samarali usullari hisoblanadi. Ayniqsa, rasmlar, kalendarlar, soat maketlari, vaqt chiziqlari va mavsumiy tablolar vaqt birliklarini aniqroq tasavvur qilish imkonini beradi.[7]

[3] Jean Piaget. *The Child's Conception of Time*. – London, 1969. – 53-bet.
[4] Z.A.Mixaylova. *Matematika v detskom sadu*. – Moskva, 2008. – 74-bet.
[5] N.F.Vinogradova. *Doshkolnaya pedagogika*. – Moskva, 2017. – 91-bet.
[6] O‘zbekiston Respublikasi Maktabgacha ta’limning davlat o‘quv dasturi “Ilk qadam”. – Toshkent, 2022.
[7] M.Jumayev. *Bolalarda boshlang‘ich matematik tushunchalarni rivojlantirish nazariyasi va metodikasi*. – T.: Ilm-Ziyo, 2013. – 112-bet.

Didaktik o‘yinlar bolalarda vaqt haqidagi bilimlarni mustahkamlashning eng samarali vositalaridan biridir. “Kun qismlarini top”, “Hafta kunlarini tartibga sol”, “Qaysi fasl?”, “Avval nima bo‘ladi?” kabi o‘yinlar bolalarda vaqtning ketma-ketligi va davomiyligi haqidagi tasavvurlarni rivojlantiradi. O‘yin faoliyati davomida bolalar vaqt birliklarini qiziqish bilan o‘zlashtiradilar va ularni amaliy vaziyatlarda qo‘llashni o‘rganadilar.[8]

Shuningdek, badiiy adabiyotlardan foydalanish ham vaqt tasavvurlarini rivojlantirishda muhim vosita hisoblanadi. Ertak, hikoya va she’rlar mazmunidagi voqealar ketma-ketligini aniqlash orqali bolalar vaqtning izchilligi va davomiyligini anglaydilar. Masalan, ertak qahramonlarining bir kun davomida bajargan ishlari yoki fasllarning almashinuvi tasvirlangan hikoyalar bolalarda vaqt haqidagi bilimlarning boyishiga xizmat qiladi.[9]

Xulosa

Xulosa qilib aytganda, oilaviy nodavlat maktabgacha ta’lim tashkilotlarida maktabgacha yoshdagi bolalarda vaqt haqidagi tasavvurlarni shakllantirish ularning intellektual, bilish va ijtimoiy rivojlanishida muhim ahamiyat kasb etadi. Vaqt tushunchalarini o‘zlashtirish bolalarning mantiqiy fikrlashi, nutqi, xotirasi va kuzatuvchanligini rivojlantirishga xizmat qiladi. Ushbu jarayonni samarali tashkil etish uchun kun tartibidan unumli foydalanish, didaktik o‘yinlar, amaliy mashqlar va ko‘rgazmali vositalarni keng qo‘llash, shuningdek, oilaviy muhit imkoniyatlaridan oqilona foydalanish zarur. Natijada bolalarda vaqt birliklari, voqealar ketma-ketligi, davomiylik va davriylik haqidagi dastlabki matematik tasavvurlar shakllanadi hamda ular maktab ta’limiga puxta tayyorlanadi.

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O‘ZBEK VA INGLIZ MEDIADISKURSIDA AYOLLAR NUTQIGA XOS KOLLOKATSIYALAR LINGVOPRAGMATIKASI

Abdullayeva Gulruxsoroy Azamatjon qizi
Qo‘qonDU doktoranti
gulruxsorabdullayeva1206@gmail.com
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Annotatsiya. *Mazkur tezisda mediadiskursda ayollar nutqiga xos kollokatsiyalarning lingvopragmatik xususiyatlari tadqiq etiladi. Ayollar nutqida qo‘llanadigan birikmalarning auditoriyaga ta’sir ko‘rsatish, kommunikativ maqsadni ifodalash, maslahat, ruhlantirish, qo‘llab-quvvatlash va undash kabi pragmatik vazifalari tahlil qilinadi. O‘zbek va ingliz mediadiskursi materiallari asosida baholovchi, maslahat va undov mazmunidagi kollokatsiyalarning kommunikativ xususiyatlari ochib beriladi. Shuningdek, verbal birliklarning vizual komponentlar bilan uyg‘unligi va ularning ayol obrazini shakllantirishdagi roli yoritiladi.*

Kalit so‘zlar: *ayollar nutqi, mediadiskurs, kollokatsiya, lingvopragmatika, kommunikativ strategiya, baholovchi birliklar, multimodallik.*

Аннотация. *В статье исследуются лингвопрагматические особенности коллокаций, характерных для женской речи в медиадискурсе. Анализируются их коммуникативные функции, связанные с воздействием на аудиторию, выражением совета, мотивации, поддержки и побуждения. На материале узбекского и английского медиадискурса выявляются особенности оценочных, советующих и побудительных коллокаций. Также рассматривается роль взаимодействия вербальных и визуальных компонентов в формировании образа женщины в медиакоммуникации.*

Ключевые слова: *женская речь, медиадискурс, коллокация, лингвопрагматика, коммуникативная стратегия, оценочные единицы, мультимодальность.*

Annotation. *This article examines the linguopragmatic features of collocations characteristic of women’s speech in media discourse. It analyzes their communicative functions in influencing the audience, expressing advice, motivation, support, and encouragement. Based on Uzbek and English media discourse, the study identifies the features of evaluative, advisory, and directive collocations. It also highlights the role of verbal and visual components in shaping the representation of women in media communication.*

Keywords: *women’s speech, media discourse, collocation, linguopragmatics, communicative strategy, evaluative units, multimodality.*

Mediadiskursda ayollar nutqining lingvopragmatik jihatlarini tadqiq etish, avvalo, nutqiy birliklarning faqat ma’no ifodalash vazifasini emas, balki ularning kommunikativ ta’sir, ijtimoiy munosabat, shaxsiy yondashuv va auditoriya bilan o‘zaro aloqani tashkil etishdagi rolini aniqlashni talab qiladi. Shu nuqtayi nazardan, ayollar nutqini birikmalar, maqol-matallar, baholovchi ifodalar, murojaat shakllari, maslahat, ogohlantirish, ruhlantirish va o‘zini namoyon qilish strategiyalari orqali tahlil qilish dolzarblik kasb etadi.

Pragmalingvistik tadqiqotlarda nutq faqat grammatik jihatdan tuzilgan gaplar majmuyi sifatida emas, balki ma’lum ijtimoiy vaziyatda muayyan maqsadga yo‘naltirilgan harakat sifatida

talqin qilinadi. J.Austin “How to Do Things with Words” (So‘zlar bilan qanday ishlar bajariladi) asarida til birliklari orqali inson faqat axborot bermasligi, balki va’da berish, ogohlantirish, undash, maslahat berish kabi nutqiy aktlarni ham amalga oshirishini asoslaydi. Bu qarash ayollar nutqini mediadiskursda tahlil qilishda muhim metodologik tayanch bo‘lib xizmat qiladi, chunki ayollar nutqida uchraydigan *“o‘zingizni qadrlang”, “hech qachon kamsitilishiga yo‘l qo‘ymang”, “o‘z imkoniyatingizga ishoning”* kabi birliklar oddiy gap emas, balki auditoriyaga ta’sir ko‘rsatuvchi pragmatik harakatdir.

Ingliz mediadiskursida ayollar nutqining pragmatik xususiyatlari auditoriyaga ta’sir ko‘rsatishga qaratilgan nutqiy aktlarda namoyon bo‘ladi. Emma Watsonning BMTdagi HeForShe nutqidagi *“step forward” (oldinga qadam tashlamoq), “be seen” (ko‘rinmoq, o‘z fikrini namoyon etmoq)* va *“take up this mantle” (bu mas’uliyatni o‘z zimmasiga olmoq)* birliklari auditoriyani faol harakat va mas’uliyatga undovchi pragmatik vositalardir. “Step forward” faol pozitsiyaga, “be seen” o‘z fikrini namoyon etishga, “take up this mantle” esa mas’uliyatni o‘z zimmasiga olishga undaydi.

P.Braun va S.Levinson tomonidan ishlab chiqilgan xushmuomalalik nazariyasida nutqiy muloqotda shaxsning ijtimoiy “yuzi”, ya’ni obro‘si, hurmati va muloqotdagi mavqeyi muhim o‘rin tutishi ta’kidlanadi. Ushbu yondashuv asosida mediadiskursdagi ayollar nutqida ehtiyotkorlik bilan fikr bildirish, maslahatni bevosita buyruq shaklida emas, balki xushmuomala tavsiya tarzida berish kabi xususiyatlarni izohlash mumkin. Masalan, *“ehtimol, bu qarorni yana bir bor o‘ylab ko‘rish foydali bo‘lar”, “nazdimda, vaziyatga shoshilmasdan yondashish to‘g‘riroq ko‘rinadi”, “bu masalada o‘zingizga biroz vaqt berishingiz kerakdir”, “bunday holatda avval ichki xotirjamlikni tiklab olish muhim bo‘lsa kerak”* kabi birliklar ayollar nutqida pragmatik yumshoqlik va kommunikativ ehtiyotkorlikni namoyon qiladi. P.Braun va S.Levinsonning “Politeness: Some Universals in Language Usage” (Xushmuomalalik: til qo‘llanishidagi ayrim universaliyalar) asari xushmuomalalik strategiyalarini tadqiq etishda asosiy manbalardan biri hisoblanadi.

Telegram: *“Sizni tushunaman. Balki hozir bu haqda keskin qaror qilmasdan, biroz vaqt berib ko‘rish kerakdir.”*

Bu yerda *sizni tushunaman* avval suhbatdoshning hissiy holatini tan oladi. Keyingi *balki* va *kerakdir* birliklari esa maslahatni yumshoq shaklda beradi. Shunday qilib, muallif to‘g‘ridan-to‘g‘ri ko‘rsatma berish o‘rniga suhbatdoshning holatini hisobga olgan holda ehtiyotkor tavsiya bildiradi.

Instagram: *“Men bu vaziyatda avval biroz tinchlanib olgan bo‘lardim. Keyin nima qilish haqida o‘ylasa ham bo‘ladi.”*

Bu misolda *bo‘lardim* va *bo‘ladi* shakllari buyruq ohangini yumshatadi. Muallif *“avval tinchlaning”* demaydi, balki o‘z tajribasi va qarashini namuna sifatida taklif qiladi. Shu sababli maslahat suhbatdoshga bosim qilmaydi.

Ingliz mediadiskursida Michelle Obama nutqida xushmuomalalik va kommunikativ ehtiyotkorlikni ifodalovchi birliklar kuzatiladi. Jumladan, *“I hope that all of you will reject the false comfort” (Barchangiz yolg‘on tasallini rad etishingizga umid qilaman)* va *“I hope that you will commit yourselves” (O‘zingizni bunga bag‘ishlashingizga umid qilaman)* konstruksiyalarida I hope that shakli bevosita buyruq o‘rniga umid-istakni ifodalab, murojaatni yumshatadi. Shuningdek, *“I think women, we check ourselves more” (Menimcha, ayollar o‘zlarini ko‘proq nazorat qiladilar)* jumlasidagi *I think* birligi fikrni qat’iy hukm emas, shaxsiy nuqtayi nazar sifatida taqdim etadi. Mazkur birliklar P. Braun va S. Levinsonning negative politeness

strategiyasi, ya’ni kommunikativ bosimni kamaytirish va adresatning “ijtimoiy yuzi”ni saqlash tamoyili asosida izohlanadi.

Mediadiskursdagi ayollar nutqini o‘rganishda metadiskurs nazariyasi ham alohida ahamiyatga ega. K.Haylend “Metadiscourse: Exploring Interaction in Writing” (Metadiskurs: yozma nutqda o‘zaro ta'sirni o‘rganish) asarida muallifning matn orqali o‘quvchi bilan aloqa o‘rnatishi, unga murojaat qilishi, fikrini yo‘naltirishi va munosabat bildirishi metadiskurs vositalari orqali amalga oshishini ko‘rsatadi. Bu yondashuv Instagram, Telegram, reklama va blog matnlarida ayollar nutqiga xos *“siz ham shunday o‘ylaysizmi?”, “izohlarda fikringizni yozing”, “o‘zingizni sevishni unutmang”* kabi birliklarni auditoriyani jalb etuvchi interfaol vosita sifatida tahlil qilishga imkon beradi. K.Haylend tadqiqoti yozma muloqotda muallif, matn va o‘quvchi o‘rtasidagi aloqani aniqlashga qaratilganligi bilan mediadiskurs tahlili uchun muhimdir.

Telegram: *Sizlarda ham shunaqa bo‘ladimi? Ba'zan kun bo‘yi hamma ishni qilib, kechqurun o‘zingizga vaqt ajratmaganingizni sezib qolasiz.*

Bu misolda *sizlarda ham shunaqa bo‘ladimi?* savoli muallif va auditoriya o‘rtasida umumiy tajriba yaratadi. *Ham* yuklamasi esa muallifning o‘z tajribasini auditoriya tajribasi bilan bog‘laydi. Natijada “men” va “siz” o‘rtasidagi masofa qisqarib, **yaqin va dialogik kommunikatsiya** yuzaga keladi.

Instagram: *Bu haqda siz nima deb o‘ylaysiz? Izohlarda yozib qoldiring, qiziq, sizning tajribangiz qanday.*

Bu yerda *siz nima deb o‘ylaysiz?* va *izohlarda yozib qoldiring* birliklari auditoriyani bevosita javob berishga undaydi. Muallif tayyor xulosani berib qo‘ymaydi, balki auditoriyaning shaxsiy tajribasi va fikrini muhim kommunikativ resurs sifatida ko‘rsatadi. Shu tariqa metadiskurs vositalari **interaktivlikni kuchaytiradi**.

Ingliz mediadiskursida ayollar nutqida “your voice matters” (fikringiz muhim), “you are not alone” (siz yolg‘iz emassiz), “let's make a difference” (birgalikda o‘zgarish qilaylik) kabi birliklar qo‘llanib, auditoriyani ruhlantirish, qo‘llab-quvvatlash va hamkorlikka chorlashga xizmat qiladi. Bunday birliklar orqali ayol muallif auditoriya bilan yaqin kommunikativ munosabat o‘rnatib, qo‘llab-quvvatlovchi va birdamlikka asoslangan nutq strategiyasini yuzaga keltiradi.

Ayollar nutqining mediadiskursdagi pragmatik xususiyatlarini faqat verbal birliklar bilan cheklab bo‘lmaydi. Chunki zamonaviy media matnlarida so‘z, rasm, rang, tana holati, kiyim, mimika va kompozitsiya birgalikda ma’no yaratadi. G.Kress va T.van Leven “Reading Images: The Grammar of Visual Design” (“Tasvirlarni o‘qish: vizual dizayn grammatikasi”) asarida vizual belgilar ham til kabi ma’no hosil qiluvchi semiotik tizim ekanini asoslaydi. Shu sababli ayollar nutqiga xos birikmalar tahlilida verbal ifoda bilan bir qatorda vizual obraz ham hisobga olinadi. Masalan, *“zamonaviy ayol”, “kuchli ayol”, “o‘z hayotining yaratuvchisi”, “kelajak bunyodkori”* kabi birliklar, ko‘pincha, faol, mustaqil, chiroyli, ijtimoiy muvaffaqiyatga erishgan ayol tasviri bilan birga beriladi. Bu esa lingvopragmatik tahlilni multimodal tahlil bilan bog‘lash zarurligini ko‘rsatadi. G.Kress va T.van Leven vizual dizayn ‘grammatikasi’ni zamonaviy kommunikatsiyani o‘qish vositasi sifatida tavsiflaydi. Mediadiskursda ayollar nutqiga xos birikmalar tahlili natijasida ularning oddiy nominativ birlik emas, balki muayyan kommunikativ maqsadga xizmat qiluvchi lingvopragmatik vosita ekani aniqlandi. Turli tillaridagi mediadiskursda ayol obrazi baholash, ruhlantirish, aniqlash hamda himoya qilish vazifalari orqali yoritilgani kuzatildi. Baholovchi birliklar orqali ayolning ijtimoiy mavqeyi, bilim, faollik va mas’uliyat bilan bog‘liq qiyofasi shakllantirilgan.

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AI-EMPOWERED TEACHING REFORM OF THE PROCUREMENT AND NEGOTIATION COURSE FROM THE PERSPECTIVE OF "UNDERGRADUATE EDUCATION FIRST AND FOUR RETURNS"

Bai Mingyuan
PhD Student, Bukhara State University
baimingyuan1997@163.com
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Abstract. *Guided by the Ministry of Education's policy framework of "Undergraduate Education First and Four Returns," this paper takes the Procurement and Negotiation course as the research subject, systematically analyzes its current teaching status, and designs reform pathways across five dimensions: objectives, content, mode, evaluation, and support mechanisms. Against the backdrop of AI's deep integration into business practice and higher education, this paper further explores how AI technologies can empower procurement and negotiation instruction. The aim is to enhance the course's practicality, interactivity, and value-orientation, while providing a replicable teaching reference for cultivating interdisciplinary procurement and negotiation talents.*

Keywords: *Undergraduate Education First; Four Returns; AI empowerment; Procurement and Negotiation; teaching reform*

1. Introduction

Undergraduate education constitutes the foundation of higher education, and its quality directly affects a nation's talent cultivation capacity and competitiveness. In 2018, the National Conference on Undergraduate Education in Higher Education Institutions in the New Era elevated undergraduate education to a strategic priority, proposing the principles of "Undergraduate Education First and Four Returns." This marked a pivotal shift in China's higher education from scale expansion to quality enhancement and connotative development. "Undergraduate Education First" establishes the central position of undergraduate education, while the "Four Returns" articulate a practical pathway for educational practices across four dimensions: returning to the essence of learning, returning to the fundamental duty of teaching, returning to the original mission of education, and returning to the pursuit of national rejuvenation.

Simultaneously, artificial intelligence technologies—particularly large language models and generative AI—are reshaping both the global business landscape and the ecology of higher education. The procurement and negotiation sector is undergoing profound transformation: AI-driven supplier screening, intelligent negotiation assistants, and automated contract review are becoming increasingly prevalent, imposing new demands on graduates' digital literacy and human–AI collaboration capabilities. The Ministry of Education's Digital Education Strategic Action Plan explicitly calls for deepening the exploration and practice of "AI + higher education." This dual transformation renders the teaching reform of the Procurement and Negotiation course both urgent and practically significant. This paper adopts the "Undergraduate Education First and Four Returns" framework, integrates AI-empowered teaching strategies, and

proposes a systematic reform plan. It aims to respond to national policy directives, align with the digital transformation of industry, and offer a transferable reference for the construction of practical courses in economics and management disciplines.

2. Methods

This study employs the "Undergraduate Education First and Four Returns" framework as its core theoretical lens, combined with literature review and instructional diagnosis to conduct a systematic examination of the current state of the Procurement and Negotiation course. "Undergraduate Education First" establishes the fundamental position of undergraduate education and requires universities to refocus all endeavors on talent cultivation. The "Four Returns" provide actionable principles for reform: returning to the essence of learning positions student learning as the primary task; returning to the fundamental duty of teaching emphasizes faculty commitment to instruction; returning to the original mission of education underscores the moral cultivation function of education; and returning to the pursuit of national rejuvenation aligns course content with national strategies and industrial frontiers.

In terms of AI integration, this study draws on three major directions of current AI applications in higher education—intelligent content generation and updating, human–AI collaborative teaching models, and learning analytics for personalized feedback—and incorporates them into each dimension of the course reform. Based on the above framework, this study designs a systematic reform pathway across five interconnected dimensions: course objectives, teaching content, pedagogical models, evaluation systems, and support mechanisms. Implementation priorities for each dimension are analyzed in detail.

3. Results

The reform pathway encompasses five interrelated dimensions. First, in terms of course objectives, a new digital literacy dimension is added to the traditional three-dimensional framework of knowledge, competence, and quality. This requires students to master mainstream AI tools applied in procurement and negotiation and to develop data-driven decision-making capabilities. At the knowledge level, the course incorporates AI applications in supply chain management, intelligent negotiation, and contract management alongside traditional content. At the competence level, multi-tiered professional competencies are articulated, including communication and negotiation, data analysis, risk management, and AI tool utilization. At the quality level, emphasis is placed on integrity, national commitment, and technological ethics. Three thematic threads—compliance and ethics, national strategy, and cultural confidence—are designed to integrate ideological and political education, with AI ethics and data security issues incorporated to achieve an organic integration of value orientation and professional instruction.

Second, in terms of teaching content, the course is modularized into five major components: foundational theory, strategic procurement, negotiation art, AI and digital procurement, and compliance and risk management. Each module incorporates cutting-edge industry cases, such as AI-assisted supplier evaluation and intelligent negotiation assistants in real business contexts. An AI-assisted case generation and updating mechanism is established, whereby instructors use generative AI tools to produce initial procurement and negotiation case drafts, which are subsequently refined with real-world enterprise data, ensuring both timeliness and authenticity. AI-driven virtual simulation projects are developed, including AI-powered negotiation simulation systems that enable students to complete the entire decision-making process from procurement needs analysis to contract signing.

Third, in terms of pedagogical models, a blended "teacher + student + AI" collaborative

teaching model is constructed. In the pre-class phase, students engage with AI learning assistants for theoretical preview and basic Q&A; the AI system automatically generates preview reports and feeds common student difficulties back to instructors. In the in-class phase, situational simulation and role-playing are employed, with AI virtual negotiation opponents providing real-time feedback and scenario evolution based on students' strategic choices. In the post-class phase, AI-assisted online platforms facilitate collaborative learning and extended tasks. In project-based learning, student teams utilize AI tools for data collection, solution generation, and strategy optimization, cultivating their capacity to solve complex problems through human–AI collaboration.

Fourth, in terms of evaluation systems, a comprehensive whole-process, multidimensional evaluation framework is established. Process-oriented assessment accounts for 60%–70% of the total grade, covering case study contributions, simulation negotiation performance, and project proposal quality. AI-assisted evaluation is introduced: the AI system automatically records students' decision-making paths and strategic choices in virtual simulations, generating competency growth trajectories and personalized evaluation reports. Participation scoring adopts a multi-party structure: instructors (40%), AI (40%), AI-assisted instructor (10%), and peer evaluation (10%).

Fifth, in terms of support mechanisms, faculty development includes AI competency training and enterprise practice programs. Institutional mechanisms recognize faculty investment in pedagogical innovation and AI tool application in performance evaluations. Platform support includes the construction of smart classrooms, negotiation simulation laboratories, and AI-powered virtual simulation platforms, with dedicated funding for teaching resource development.

4. Discussion

The reform pathways proposed in this study embody two core values. First, they translate the "Undergraduate Education First and Four Returns" policy principles into actionable teaching practices, effectively bridging macro-level policy directives with micro-level curriculum development. Second, they elevate AI technologies from mere auxiliary tools to integral components of the teaching system, forming a tripartite collaborative education model of "instructor-guided, student-driven, and AI-assisted" learning. This model addresses three critical questions: in the AI era, "returning to the essence of learning" means leveraging AI to enhance rather than undermine learning depth; "returning to the fundamental duty of teaching" requires faculty to evolve from knowledge transmitters to learning designers, delegating repetitive knowledge delivery to AI; and "returning to the original mission of education" and "returning to the pursuit of national rejuvenation" demand that the course, even as it leverages AI, steadfastly adheres to value orientation and the fundamental direction of serving national strategies.

Nevertheless, several practical challenges warrant attention during implementation. Disparities in faculty AI literacy may affect the balanced progress of reform; the construction and maintenance of AI systems require sustained financial investment; the transparency and fairness of AI-assisted evaluation algorithms need careful oversight; and students may become over-reliant on AI, potentially weakening their independent thinking abilities—a risk that should be mitigated through manual verification mechanisms in instructional design. Future efforts should establish school–enterprise collaborative mechanisms for co-constructing and sharing AI teaching resources, conduct specialized faculty training in AI literacy, and implement regular calibration and ethical review of AI evaluation systems to ensure that technological applications consistently serve educational goals rather than supplant them.

5. Conclusion

The "Undergraduate Education First and Four Returns" framework provides a clear value foundation for undergraduate curriculum reform, while AI technologies offer new implementation pathways. The reform framework constructed in this paper organically integrates policy imperatives, technological empowerment, and curriculum practice. It transforms course objectives from singular knowledge transmission to a three-dimensional integration of value orientation, competency development, and quality enhancement; shifts pedagogical models from instructor-dominated lectures to "teacher–student–AI" collaborative blended learning; and evolves evaluation methods from summative assessment to whole-process, multidimensional developmental evaluation. This reform not only contributes to cultivating well-rounded, professionally competent, and digitally literate interdisciplinary talents for the procurement and negotiation field but also offers a transferable theoretical reference and practical paradigm for the construction and reform of similar practice-oriented courses. The continued advancement of this reform requires sustained collaboration among educational administrators, instructors, and students, with ongoing optimization to truly strengthen the foundation of undergraduate education amid the wave of digital transformation and contribute meaningfully to the development of a strong higher education system.

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READING LITERARY TEXTS IN THE AGE OF ARTIFICIAL INTELLIGENCE: THE RELATIONSHIP BETWEEN TRADITIONAL AND DIGITAL INTERPRETATION

Begmatova Sokhiba Mustafoyevna
Associate professor (PhD) of Uzbekistan State
World Languages University
E-mail: s.begmatova@uzswlu.uz
https://doi.org/10.5281/zenodo.22875442

Abstract. *This article explores the relationship between traditional and AI-assisted approaches to literary interpretation and argues that they should not be regarded as competing methods. Rather, AI can complement humanistic reading by expanding the scale and speed of textual analysis while leaving contextualization, critical judgment, and interpretation to the human researcher. Recent research demonstrates both the potential and limitations of large language models in literary studies. AI can identify relevant textual patterns, but it may struggle with irony, historical semantics, cultural context, and the complexity of genuine close reading. Therefore, a complementary model combining computational exploration with human interpretation can provide a productive framework for literary studies in the digital age.*

Keywords: *artificial intelligence, literary interpretation, close reading, distant reading, large language models, literary studies, digital interpretation*

Literary studies have traditionally depended on the close and careful reading of texts. Scholars examine language, imagery, symbolism, narrative structure, characterization, historical context, and ideological meanings in order to develop interpretations of literary works. Such interpretation is not limited to identifying what a text says; it also involves considering how and why meaning is constructed. The development of digital humanities and artificial intelligence has introduced new possibilities for literary research. Computational tools can process large collections of texts and identify recurring words, themes, stylistic patterns, character relationships, and other features that may be difficult to observe through individual reading. Moretti (2013), for example, popularized the concept of “distant reading,” which shifts attention from individual texts toward larger literary systems and patterns.

The emergence of generative AI and large language models (LLMs) has further changed this landscape. Unlike earlier computational methods, LLMs can interact with researchers through natural language, summarize passages, compare interpretations, generate research questions, and identify potentially significant textual patterns. Recent research has begun to examine both the usefulness and the limitations of such tools in literary studies (Akazawa & Gius, 2025; Beaufoy & Kjar, 2026). The central question, therefore, is not whether AI should replace traditional literary interpretation, but how the two approaches can productively interact.

Traditional literary interpretation is closely associated with close reading, in which a relatively small section of a literary text is examined carefully. Attention may be given to individual words, metaphors, narrative voice, syntax, imagery, repetition, and ambiguity. Close reading is particularly valuable when the meaning of a text depends on subtle linguistic or stylistic choices.

However, literary scholarship has also developed approaches that move beyond the individual text. Digital humanities has introduced methods that allow researchers to investigate hundreds or thousands of works simultaneously. Moretti (2013) describes this approach as “distant reading,” emphasizing patterns and relationships that become visible when literature is examined at a larger scale. Similarly, Underwood (2019) demonstrates how computational analysis can contribute to the study of literary history and changing patterns across large bodies of fiction.

Digital interpretation, therefore, does not necessarily reject traditional reading. Instead, it changes the scale at which literary evidence can be examined. A researcher may first use computational methods to identify recurring patterns and then return to individual passages for close reading. This relationship suggests that traditional and digital interpretation can operate as complementary stages of literary research.

AI can assist literary scholars in several ways. First, it can help researchers identify textual patterns. For example, an AI system may examine the representation of a particular theme across numerous chapters or novels and identify passages that deserve closer attention.

Secondly, AI can support comparative analysis. Researchers can ask an AI system to compare representations of memory, identity, gender, childhood, technology, or other concepts across different literary works. Such comparisons can help formulate research questions and identify possible connections between texts.

Thirdly, AI can function as a hypothesis-generating tool. A researcher may ask an AI system to suggest possible interpretations of a recurring image or narrative pattern. These suggestions should not automatically be accepted as conclusions; instead, they can provide starting points for further investigation.

Recent research illustrates both the possibilities and limitations of this approach. Akazawa and Gius (2025) investigate the use of large language models in literary studies and demonstrate that AI-generated textual material can become an object of methodological reflection for literary scholarship.

More recent research by Beaufoy and Kjar (2026) is particularly relevant. Their study used an LLM to identify relationships between lighting and emotions in ninety French novels published between 1838 and 1928. The model was able to identify a substantial number of potentially relevant passages, demonstrating its usefulness for textual exploration. However, the researchers also found significant problems when the model attempted to produce convincing close readings, including difficulties with historical meanings, irony, sentiment, and causal interpretation. These findings indicate that AI can be highly useful for discovering evidence, but discovery and interpretation are not necessarily the same process.

Literary texts frequently contain ambiguity, irony, cultural references, historical meanings, and implicit relationships that cannot easily be reduced to patterns. AI systems may recognize linguistic similarities while misunderstanding their literary significance. One important limitation is context. The meaning of a word or image may change according to its historical period, cultural environment, genre, or position within a particular narrative. A contemporary AI system may interpret an older expression according to modern linguistic assumptions.

Another problem concerns irony and ambiguity. Literary authors often deliberately create contradictions between what a character says and what the narrative implies. Such meanings require careful attention to narrative context and literary convention.

AI may also produce interpretations that sound academically convincing but are insufficiently supported by textual evidence. Consequently, researchers need to verify AI-generated claims against the original literary text rather than treating AI output as authoritative. These concerns correspond to broader recommendations concerning the responsible use of AI in education and research. UNESCO emphasizes a human-centred approach in which AI should support rather than replace human intellectual agency.

A productive approach may therefore combine traditional close reading with AI-assisted digital analysis. Such a model can be described as a hybrid approach to literary interpretation.
The process may include five stages:

1. *Close reading:* The researcher initially examines the text and identifies important questions or themes.
2. *AI-assisted exploration:* AI tools are used to locate patterns, recurring concepts, linguistic similarities, or potentially relevant passages.
3. *Hypothesis formation:* The results are used to formulate or refine possible interpretations.
4. *Textual verification:* The researcher returns to the original text and checks whether the AI-generated observations are supported by textual evidence.
5. *Humanistic interpretation:* Historical, cultural, theoretical, and aesthetic dimensions are incorporated into the final interpretation.

This model recognizes that AI and human readers possess different strengths. AI can process large amounts of textual information rapidly, while human researchers can evaluate significance, interpret ambiguity, understand cultural context, and connect textual evidence with literary theory.

In that sense, AI should be understood not as an alternative to literary scholarship but as an additional research instrument. Its effectiveness depends largely on the researcher's ability to formulate appropriate questions, evaluate generated information, and maintain critical control over the interpretive process.

Artificial intelligence is creating new possibilities for literary interpretation by introducing computational approaches to the study of texts. Traditional close reading remains essential because literary meaning often depends on ambiguity, context, irony, symbolism, and culturally specific forms of expression. At the same time, AI-assisted methods can help scholars examine larger textual collections, identify patterns, compare works, and generate new research questions.

Recent research demonstrates that large language models can successfully support certain stages of literary investigation but cannot reliably reproduce the complexity of human close reading. Therefore, the most productive relationship between traditional and digital interpretation is not one of replacement but of complementarity. The future of literary studies may consequently depend on developing a balanced methodology in which AI expands the researcher’s analytical possibilities while human scholars retain responsibility for contextualization, critical evaluation, and the final construction of meaning. Such an approach can preserve the interpretive richness of literary studies while allowing the discipline to benefit from the analytical capacities of emerging digital technologies.

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FILOLOGIK TA’LIM YO‘NALISHI TALABALARINING INGLIZ TILIDA AKADEMIK YOZUV KOMPETENSIYASINI RIVOJLANTIRISHDA GENERATIV SUN’IY INTELELKT TEXNOLOGIYALARINING IMKONIYATLARIDAN FOYDALANISH

Bakiyeva Durdona Baxtiyarovna
Pedagogika fanlari bo‘yicha falsafa doktori (PhD) Guliston davlat pedagogika instituti o‘qituvchisi
bakiyevadurdona@gamil.com http://orcid.org/0009-0006-1416-9802
https://doi.org/10.5281/zenodo.22868188

Annotatsiya. *Mazkur maqolada O‘zbekiston oliy ta’lim tashkilotlarining filologik ta’lim yo‘nalishi talabalarning inglz tilida akademik yozuv kompetensiyasi sun’iy intellekt texnologiyalaridan foydalanib rivojlantirishning pedagogik va metodik imkoniyatlari tahlil qilinadi. Akademik yozuv kompetensiyasi bir qancha, grammatik jihatdan matnni to‘g‘ri tuzish, ilmiy fikrni izchil dalillar bilan ifodalash, manbalar bilan ishlash, akademik uslubga rioya qilish va yozma faoliyatini tanqidiy baholash kabi qobilyatlarni qamrab oladi. Generativ sun’iy intellekt texnologiyalari ushbu nuqtai nazardan olib qaraganda, akademik matnni tuzilmasini rejalashtirish, leksik va grammatik variantlarni tahlil qilish, tahrirlash va refleksiv faoliyatni tashkil etish kabi qo‘shimcha pedagogik imkoniyatlari yaratib beradi. Maqolada genrativ sun’iy intellekt texnologiylarining imkoniyatlaridan tayyor akademik matn tayyorlab beruvchi vosita sifatida foydalanmasdan, filologik ta’lim yo‘nalishi talabalarining mustaqil fikrlash kompetensiyasini rivojlantirish va akademik yozuv faoliyatida bosqichli qo‘llab-quvvatlashda foydalanish nazarda tutilgan. Shuningdek, maqolada sun’iy intellekt tomonidan yaratilgan har qanday axborotni tkshirish, matn yuzasidan talabalarni mualliflik ma’sulyatini saqlashga o‘rgatish, plagiatni oldini olish va akademik halollik tamoyillarini saqalb qilishga ham alaohida e’tibor qaratilgan. Natijada filologik ta’lim yo‘nalishi talabalarining ingliz tilida akademik yozuv kompetensiyasini genrativ sun’iy intellekt texnologiyalari asosida rivojlantirishning pedagogik-metodik imkoniyatlari tizimlashtiriladi.*

Kalit so‘zlar: *akademik yozuv, akademik yozuv kompetensiyasi, generative sun’iy intellekt, filologik ta’lim yo‘nalishi, ingliz tili, raqamli texnologiyalari, akademik halollik, tanqidiy fikrlash, refleksiya, mualliflik ma’sulyati.*

Abstract. *This article analyzes the pedagogical and methodological possibilities of developing English academic writing competence among students majoring in philology at higher education institutions in Uzbekistan through the use of artificial intelligence technologies. Academic writing competence encompasses a range of skills, such as constructing grammatically correct texts, expressing scholarly ideas with coherent arguments, working with sources, adhering to academic style, and critically evaluating one's own writing. From this perspective, generative AI technologies offer additional pedagogical opportunities, including planning the structure of academic texts, analyzing lexical and grammatical options, editing, and facilitating reflective practice. The article proposes using generative AI technologies not merely as tools to generate ready-made academic texts, but as a means to foster independent thinking*

and provide step-by-step support for students' academic writing processes. Furthermore, special attention is given to verifying AI-generated information, teaching students to maintain authorship responsibility for their texts, preventing plagiarism, and upholding principles of academic integrity. As a result, the pedagogical and methodological possibilities for developing academic writing competence in English among students specializing in philology—leveraging generative artificial intelligence technologies—are systematized.

Keywords: *academic writing, academic writing competence, generative artificial intelligence, philology specialization, English language, digital technologies, academic integrity, critical thinking, reflection, authorship responsibility.*

Kirish

Raqamli ta’lim texnologiylarining oliy ta’lim tizimiga integratsiyasi bugungi kunda ta’lim mazmuni va matodlarini qayta ko‘rib chiqishni taqazo etmoqda. O‘zbekiston sharoitida xorijiy tillarni, jumladan ingliz tilini professional darajada egallayotgan oliy ta’lim tashkilotlarining filologik ta’lim yo‘nalishi talabalarining akademik yozuv kompetensiyasini rivojlantirish oliy ta’limning muhim vazifalaridan biri sifatida namoyon bo‘lmoqda. Bo‘lajak filolog va ingliz tili mutaxasisi hisoblangan filologik ta’lim yo‘nalishi talabalari ilmiy maqola yozish, referat, tadqiqot loyihasi, tahliliy hisobot va boshqa akademik janrlarda o‘z fikrlarini ingliz tilida aniq, izchil va asoslanagan tarzda ifodalash qobilyatiga ega bo‘lishi lozim.

Akademik yozuv oddiy yozma nutqdan o‘zining tuzulishi, maqsadi, uslubi va dalillarga tayanishi bilan keskin farq qiladi. Akademik yozuv jarayonlarida talabalari mavzuni anglash, asosiy g‘oyani belgilash, fikrlarni mantiqiy ketma-ketlikda joylashtirish, dalillarni tanlash, manbalardan foydalanish, iqtibos keltirish, akademik leksikani hamda grammatikani konstruksiyalashtirish hamda tayyor matnni qayta ko‘rib chiqish kabi bir-biri bilan bog‘liq faoliyatlarni amalga oshiradi. Generativ sun’iiy intellekt texnologiyalarining sohaga kirib kelishi bilan mazkur jarayonda yangi pedagogik imkoniyatlari paydo bo‘ldi. ChartGPT, Grammarly, QuillBot va boshqa sun’iy intellekt texnologiyalari foydalanuvchilarga matn yaratish, fikrlarni shakllantirish, grammatikaga oid va uslubiy jihatdan xatolarni aniqlash, matnni xatolarini qayta ishlash va tahrirlash kabi faoliyatlarda yordam beradi. Biroq, ta’lim jarayonlarida genrativ sun’iy intellekt texnologiyalaridan foydalanishning faqat texnologik imkoniyatlari bilan cheklanib qolish o‘rinsiz. Sun’iy intellekt tomonidan yaratilgan axborotlarning aniqligini, tayyor matnga tayanib qolmaslik, mustaqil fikrni saqlab qolish,plagiat va akademik halollik bilan bog‘liq masalalarga e’tiborli bo‘lish, sun’iy intellekt texnologiylaridan foydalanishning pedagogik chegaralarini belgilash kabi talablar bajarilishi lozim. Shunday ekan generativ sun’iy intellekt texnologiylaridan akademik yozuv kompetensiyasini rivojlantirish jarayopnlarida foydalanishda, asosiy e’tiborni mazkur texnologiylarga emas, balki ulardan qanday pedagogik maqsadlar va metodik shartlar asosida foydalanishga qaratilishi lozim.

Akademik yozuv kompetensiyasi ko‘p kompoenentli jarayoni bo‘lib, u grammatika, leksik bilimlar bilan bir qatorda, akademik matnni rejalashtirish, mazmunan tashkil etish, argumentatsiya qilish, manbalardan foydalanish, tahririlash va refleksiya kabi qobilyatlarni o‘z ichiga oladi. Akademik yozuv kompetensiyasining tarkibiy qismlari sifatida akademik yozuvni tushunish va cheagralarini ajrata olish, asosiy g‘oyani shakllantirish, yozuv rejasini ishlab chiqish, dalillarni mantiqiy tashkil etish kabi komponentlarni ajratib ko‘rsatish mumkin:

Generativ sun’iy intellekt texnologiyalari filologik ta’lim yo‘nalishi talabalarining ingliz tilida akademik yozuv kompetensiyasini rivojlantirishda bir qator pedagogk imkoniyatlari taqdim

etadi. Talabalar tayyor matnni sun’iy intellektdan olmaydi aksincha, fikrlash va tahrirlash faoliyatini faollashtirgan holda o‘zlari matn yaratadi. Generativ sun’iy intellekt texnologiyalari g‘oya yaratishni qo‘llab quvvatlaydi. Talabalari akademik yozuvning dastlabki bosqichida mavzu bo‘yicha yetarli fikr ishlab chiqishda qiyinchilikka duch keladi. Sun’iy intellekt texnologiyalari muqobil nuqtai nazarni taklif qilib, muammoli savollarni shakllantiradi. Bunda yakuniy fikr talabaning o‘ziga tegishli bo‘lib qoladi.

Navbatdagi bosqichda ham talaba sun’iy intellektning tayyor rejasini qabul qilmasdan o‘z tadqiqot maqsadi va fikrlariga moslashtirishi lozim. Shuningdek, sun’iy intellekt talabalarning leksik va grammatik kompetensiyasini qo‘llab-quvvatlashi mumkin. Talaba mauyyan so‘zning akademik kontekstdagi qo‘llanilishi, sinonimik variantini yoki grammatik shakllarni tahlil qlishi mumkin. Talaba yozgan akademik matnidagi grammatik xatolarni aniqlash va sabalarini so‘rashi mumkin. Buning natijasida talaba xatolarni anglaydi va kelgusida ularni mustaqil tarzda bartarraf etishiga imkon beradi.

Akademik yozuvda faqat grammatik to‘g‘rilikka urg‘u berga holda argumentlarning mantiqiyligini e’tibordan chetda qoldirish mumkin emas. Bu o‘rinda talaba sun’iy intellekt texnologiylaridan yozgan paragrafidagi asosiy g‘oyani aniq ifodalanishi, dalil va xulosa o‘rtasidagi mantiqiy bog‘lanish, fikrlarning takroriyligini aniqlash kabi jarayonlarda foydalanishi mumkin. Akademik yozuv boshqa mualliflarning fikrlarini to‘g‘ridan-to‘g‘ri o‘zlashtirib olmasdan, ularni mazmunini saqalagan holda mustaqil qayta ifodalashni nazarda tutadi. Demak, g‘oyalarni mazmunini saqlagan holda qayta yozishda sun’iy intellekt texnologiylaridan foydalanish bu plagiatni yashirish vositasi emas, aksincha fikrlarni mazmunini saqlagan holda qayta qurish tamoyillarini o‘rganish vositasiga ham aylanishi lozim.

Generativ sun’iy intelelktdan akademik yozuvni rivojlantirishda foydalanishning eng muhim shartlaridan yana biri bu akademik halollikdir. Talaba SI matnni o‘z mahsuloti sifatida ko‘rsatmasligi, berilgan faktlarni, bibliografik ma’lumotlarni tekshirishi, mualliflik pozitsiyasini saqlashi,SI dan foydalanishi jarayonining shaffo ko‘rsatishi zarur. Filologik ta’lim yo‘nalishi talabalarining akademik yozuv kompetnsiyasini rivojlantirishda sun’iy intellekt texnologiylaridan foydalanishning amal qilinishi lozim bo‘lgan maqsadlilik, mustaqil faoliyatni saqlash, anqidiy baholash, manbalarni verifikatsiya qilish, akademik halollik, refleksiya.kabi pedagogik shartlari mavjud.

Xulosa qilib aytganda genrativ sun’iy intellekt texnologiyalari filologik ta’lim yo‘nalishi talabalarning akademik yozuv kompetensiyasini rivojlantirishda yangi pedagogik imkoniyatlarni yaratib beradi.Biroq, ularning pedagogik qiymati tayyor matn yaratish imkoniyatida emas, talabaning mustaqil fikrlash va yozuv jarayonini qo‘llab-quvvatlash imkoniyatlarida namoyon bo‘ladi. Shu nuqtai nazardan, generative sun’iy intellekt texnologiylaridan akademik yozuvni rivojlantirishda foydalanish “texnologiya markazli” emas, balki “ talaba kompetensiya markazli” yondashuv ustuvor bo‘lishi lozim.

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RAQAMLI TA’LIM MUHITIDA SUN’IY INTELLEKT TEXNOLOGIYALARIDAN FOYDALANISH ORQALI KIBERPEDAGOGIK KOMPETENSIYANI TAKOMILLASHTIRISH

Bekchonova Shoira Bazarbayevna
Yangi asr universiteti PhD, professor
https://doi.org/10.5281/zenodo.22868205

Annotatsiya. *Mazkur maqolada raqamli ta’lim muhitida sun’iy intellekt texnologiyalaridan foydalanish orqali kiberpedagogik kompetensiyani takomillashtirishning nazariy va metodik asoslari yoritilgan. Maqolada sun’iy intellekt, raqamli pedagogika, kiberxavfsizlik, raqamli etika va pedagogik faoliyatning o‘zaro integratsiyasi kiberpedagogik kompetensiyani rivojlantirishning muhim omili sifatida asoslangan. Sun’iy intellekt texnologiyalarining ta’lim mazmunini individuallashtirish, raqamli kontent yaratish, pedagogik diagnostika, baholash, tezkor teskari aloqa va ta’lim analitikasini tashkil etishdagi imkoniyatlari tahlil qilingan.*

Kalit so‘zlar: *raqamli ta’lim muhiti, sun’iy intellekt, kiberpedagogika, kiberpedagogik kompetensiya, raqamli pedagogika, AI savodxonligi, kiberxavfsizlik, raqamli etika, pedagogik dizayn, generativ sun’iy intellekt, ta’lim analitikasi, raqamli kompetensiya.*

KIRISH



Raqamli transformatsiya jarayonlarining jadallashuvi oliy ta’lim tizimida ta’lim mazmuni, pedagogik faoliyat va ta’lim oluvchilarning kasbiy kompetensiyalariga qo‘yiladigan talablarning tubdan o‘zgarishiga olib kelmoqda. Xususan, sun’iy intellekt (SI)

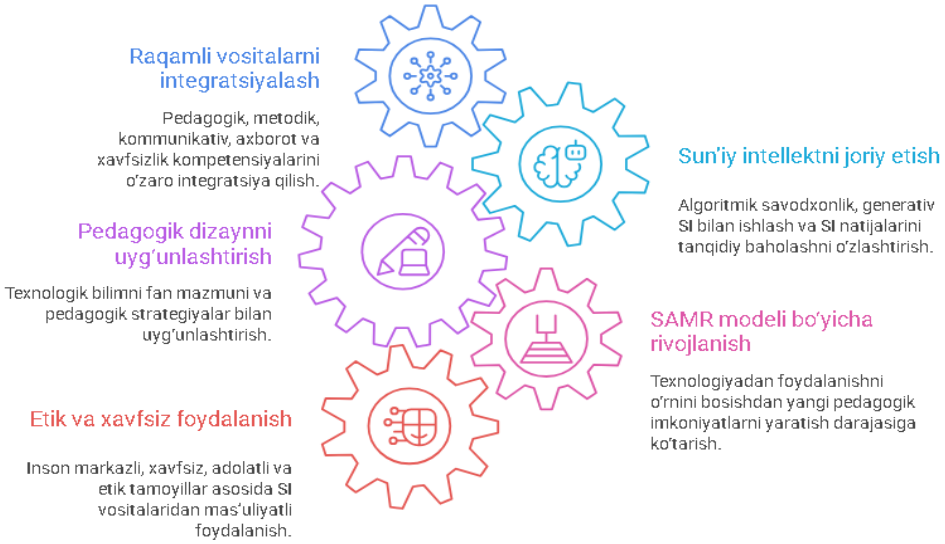
texnologiyalarining ta’lim jarayoniga jadal kirib kelishi o‘qitishning an’anaviy shakllarini takomillashtirish, ta’lim mazmunini individuallashtirish, o‘quv faoliyatini tahlil qilish hamda pedagogik qarorlarni ma’lumotlarga asoslangan holda qabul qilish uchun yangi imkoniyatlarni yuzaga keltirmoqda. Shu bilan birga, sun’iy intellekt vositalaridan samarali va mas’uliyatli foydalanish pedagogdan nafaqat raqamli vositalarni texnik jihatdan boshqarish, balki ularning pedagogik, axloqiy, xavfsizlik va metodik jihatlarini kompleks tushunishni talab etadi.

Bugungi raqamli ta’lim muhitida generativ sun’iy intellekt, adaptiv ta’lim tizimlari, intellektual tutorlar, avtomatlashtirilgan baholash vositalari, ta’lim analitikasi va tavsiya tizimlarining qo‘llanilishi pedagogik jarayonning barcha bosqichlariga ta’sir ko‘rsatmoqda. Mazkur texnologiyalar o‘quv materiallarini individuallashtirish, talabalarning ta’limiy ehtiyojlarini aniqlash, tezkor teskari aloqani ta’minlash va ta’lim natijalarini monitoring qilish imkonini beradi. Biroq sun’iy intellektdan foydalanish bilan bir qatorda akademik halollik, shaxsiy ma’lumotlarni himoya qilish, algoritmik xolislik, axborotning ishonchliligi, mualliflik huquqi va inson nazoratining saqlanishi kabi muammolar ham dolzarb ahamiyat kasb etmoqda. Shu sababli raqamli ta’lim muhitida SI texnologiyalaridan foydalanish masalasi faqat texnologik emas, balki kiberpedagogik muammo sifatida ham qaralishi lozim.

ADABIYOTLAR TAHLILI

Raqamli texnologiyalarning ta’lim jarayoniga integratsiyalashuvi bo‘yicha olib borilgan tadqiqotlar tahlili shuni ko‘rsatadiki, zamonaviy pedagogning kasbiy faoliyati raqamli vositalardan foydalanishning texnik ko‘nikmalari bilan cheklanib qolmaydi. Bu jarayon pedagogik, metodik, kommunikativ, axborot va xavfsizlik kompetensiyalarining o‘zaro integratsiyasini talab etadi. Shu jihatdan pedagoglarning raqamli kompetensiyasini tavsiflovchi xalqaro konsepsiyalar kiberpedagogik kompetensiyaning nazariy asoslarini belgilashda muhim metodologik manba bo‘lib xizmat qiladi[3].

Kiberpedagogik kompetensiyani shakllantirish bosqichlari



DigCompEdu konsepsiyasida pedagoglarning raqamli kompetensiyasi raqamli resurslarni tanlash va yaratish, raqamli pedagogika, baholash, ta’lim oluvchilarni jalb etish hamda ularning raqamli kompetensiyasini rivojlantirish kabi yo‘nalishlar orqali izohlanadi. Ushbu yondashuv raqamli texnologiyalardan foydalanishni texnik faoliyat emas, balki pedagogik jarayonning ajralmas komponenti sifatida talqin qilish imkonini beradi. Biroq sun’iy intellektning jadal rivojlanishi mazkur kompetensiya doirasiga algoritmik savodxonlik, generativ SI bilan ishlash,

SI natijalarini tanqidiy baholash, ma’lumotlar xavfsizligi va SI etikasi kabi yangi kompetensiyalarni kiritish zaruratini yuzaga keltirmoqda[6].

TPACK modeli doirasida texnologik, pedagogik va mazmuniy bilimlarning o‘zaro bog‘liqligi samarali raqamli ta’limni tashkil etishning muhim sharti sifatida qaraladi. Ushbu model nuqtayi nazaridan, sun’iy intellekt vositasining mavjudligi o‘z-o‘zidan ta’lim samaradorligini kafolatlamaydi; uning pedagogik qiymati texnologiyaning o‘quv mazmuni va tegishli pedagogik strategiya bilan qanchalik uyg‘unlashtirilganiga bog‘liq. Shu sababli SI texnologiyalaridan foydalanish kompetensiyasini shakllantirishda texnologik bilim bilan bir qatorda pedagogik dizayn va fan mazmunini uyg‘unlashtirish muhim hisoblanadi[5].

Raqamli texnologiyalarni ta’limga integratsiyalashning bosqichma-bosqich xususiyatini SAMR modeli orqali ham izohlash mumkin. Model texnologiyadan foydalanishni o‘rnini bosish, takomillashtirish, qayta loyihalash va yangi pedagogik imkoniyatlarni yaratish darajalari asosida tavsiflaydi. Sun’iy intellekt texnologiyalarining ta’limdagi imkoniyatlari ayniqsa yuqori bosqichlarda namoyon bo‘lib, individual ta’lim trayektoriyalarini yaratish, intellektual teskari aloqa, avtomatlashtirilgan tahlil va yangi turdagi o‘quv faoliyatlarini tashkil etish imkonini beradi. Bundan kelib chiqadiki, SI vositalaridan foydalanish kiberpedagogik kompetensiyaning texnologik komponenti bilan bir qatorda pedagogik-ijodiy komponentini ham rivojlantiradi.

So‘nggi yillarda sun’iy intellekt va ta’lim munosabatlariga bag‘ishlangan tadqiqotlarda generativ SI alohida ilmiy yo‘nalish sifatida shakllanmoqda. Tadqiqotchilar ChatGPT kabi generativ modellarni ta’lim jarayonida o‘quv materiallarini ishlab chiqish, individual maslahat berish, matnlarni tahlil qilish, savol va topshiriqlar yaratish hamda formativ baholashni qo‘llab-quvvatlash vositasi sifatida ko‘rib chiqmoqdalar. Biroq ushbu texnologiyalarning pedagogik imkoniyatlari bilan bir qatorda ularning noto‘g‘ri yoki ishonchsiz ma’lumot ishlab chiqarishi, akademik halollikka ta’siri va talabaning mustaqil fikrlashiga ehtimoliy ta’siri ham ilmiy munozaralarning muhim yo‘nalishiga aylangan[4].

UNESCO tomonidan ishlab chiqilgan “Guidance for generative AI in education and research” hujjatida generativ sun’iy intellektdan ta’lim va ilmiy tadqiqotlarda foydalanish inson markazli, xavfsiz, adolatli va etik tamoyillar asosida tashkil etilishi zarurligi ta’kidlanadi. Bu yondashuv kiberpedagogik kompetensiyaning mazmunini faqat texnologik foydalanish bilan chegaralamasdan, raqamli xavfsizlik, ma’lumotlar maxfiyligi, etik mas’uliyat va inson nazorati bilan birgalikda ko‘rib chiqishni talab etadi[8].

Sun’iy intellektning ta’limdagi rolini o‘rgangan xalqaro tadqiqotlarda SI texnologiyalarining ta’limni individuallashtirish, talabalarning ehtiyojlarini aniqlash va pedagogik qarorlarni qo‘llab-quvvatlashdagi imkoniyatlari qayd etilgan. Shu bilan birga, sun’iy intellekt savodxonligi, zamonaviy pedagog va talabaning yangi kompetensiya sohasi sifatida qaralmoqda. SI savodxonligi texnologiyadan foydalanish bilan bir qatorda uning ishlash tamoyillarini tushunish, natijalarini tanqidiy baholash, cheklovlarini anglash va undan mas’uliyatli foydalanishni ham nazarda tutadi[7].

METODIKA

Tadqiqotda raqamli ta’lim muhitida sun’iy intellekt texnologiyalaridan foydalanish orqali kiberpedagogik kompetensiyani takomillashtirishning pedagogik imkoniyatlarini aniqlashga yo‘naltirilgan kompleks metodik yondashuvdan foydalanildi. Tadqiqot metodologik jihatdan tizimli, kompetensiyaviy, kiberpedagogik va faoliyatga yo‘naltirilgan yondashuvlar integratsiyasiga asoslangan. Bu yondashuvlar sun’iy intellekt vositalarini ta’lim jarayoniga

texnik jihatdan joriy etish bilangina cheklanmasdan, ularning pedagogik maqsadga muvofiqligi, xavfsizligi, etikligi va ta’lim natijalariga ta’sirini kompleks baholash imkonini berdi.

Tadqiqotning asosiy obyekti raqamli ta’lim muhitida pedagogik faoliyatni amalga oshirish jarayoni, predmeti esa sun’iy intellekt texnologiyalaridan foydalanish asosida kiberpedagogik kompetensiyani takomillashtirish mazmuni, shakllari va metodik mexanizmlaridan iborat etib belgilandi.

Tadqiqotda quyidagi metodlardan foydalanildi: nazariy tahlil, qiyosiy tahlil, pedagogik kuzatish, so‘rovnoma, test, ekspert baholash, pedagogik tajriba-sinov va matematik-statistik tahlil. Nazariy tahlil orqali sun’iy intellekt, raqamli pedagogika, raqamli kompetensiya, SI savodxonligi va kiberpedagogik kompetensiyaga oid ilmiy qarashlar o‘rganildi. Qiyosiy tahlil asosida mavjud raqamli kompetensiya modellari va ularning sun’iy intellekt texnologiyalaridan foydalanish sharoitidagi imkoniyatlari taqqoslandi.

Kiberpedagogik kompetensiyaning rivojlanish darajasini aniqlash uchun uchta asosiy mezon belgilandi:

1. Motivatsion-kognitiv mezon - sun’iy intellekt va raqamli ta’lim texnologiyalarining pedagogik imkoniyatlarini anglash, ulardan foydalanishga motivatsiya, AI texnologiyalarining imkoniyatlari va cheklovlari haqidagi bilimlar;
2. Texnologik-amaliy mezon - SI vositalaridan ta’lim mazmunini yaratish, topshiriqlar ishlab chiqish, individual ta’limni tashkil etish, teskari aloqa va baholash jarayonlarida foydalanish ko‘nikmalari;
3. Kasbiy-faoliyat mezoni - SI texnologiyalaridan pedagogik maqsadga muvofiq, xavfsiz, etik va mas’uliyatli foydalanish, raqamli kommunikatsiyani tashkil etish hamda ta’lim jarayonini takomillashtirish qobiliyati.

Tajriba-sinov metodikasining mazmuni “aniqlash – shakllantirish – yakuniy baholash” bosqichlari asosida tashkil etildi. Dastlabki bosqichda ishtirokchilarning mavjud kiberpedagogik kompetensiya darajasi diagnostik vositalar orqali aniqlandi. Shakllantiruvchi bosqichda sun’iy intellekt vositalaridan foydalanishga yo‘naltirilgan amaliy mashg‘ulotlar, muammoli topshiriqlar, loyiha faoliyati, raqamli kontent yaratish va refleksiv faoliyat tashkil etildi. Yakuniy bosqichda dastlabki va yakuniy natijalar qiyosiy tahlil qilindi.

NATIJALAR VA MUHOKAMA

Tadqiqot natijalari raqamli ta’lim muhitida sun’iy intellekt texnologiyalaridan maqsadli foydalanish pedagoglarning kiberpedagogik kompetensiyasini rivojlantirish uchun sezilarli pedagogik imkoniyatlarga ega ekanligini ko‘rsatdi. Ayniqsa, SI vositalaridan faqat tayyor axborot olish vositasi sifatida emas, balki ta’lim mazmunini loyihalash, individual ta’limni tashkil etish, diagnostika, baholash, teskari aloqa va refleksiyani qo‘llab-quvvatlovchi pedagogik vosita sifatida foydalanish kompetensiyaning rivojlanishiga ijobiy ta’sir ko‘rsatishi aniqlandi[1.2].

Kiberpedagogik kompetensiyaning uchta komponenti bo‘yicha o‘zgarishlar kuzatildi. Motivatsion-kognitiv yo‘nalishda ishtirokchilarning sun’iy intellekt texnologiyalarining ta’limdagi imkoniyatlari haqidagi tasavvurlari kengaydi. Dastlab SI ko‘proq matn yaratish yoki ma’lumot izlash vositasi sifatida qabul qilingan bo‘lsa, metodik faoliyatdan so‘ng uning adaptiv ta’lim, individual topshiriqlar yaratish, baholash va pedagogik tahlildagi imkoniyatlari ham anglana boshlandi.

Texnologik-amaliy komponent bo‘yicha esa ishtirokchilarning AI vositalari bilan ishlash ko‘nikmalarida ijobiy dinamika qayd etildi. Xususan, pedagogik topshiriqlarni shakllantirish,

ta’lim materiallarini moslashtirish, turli darajadagi topshiriqlar yaratish, talabalarning ehtiyojlariga mos ta’lim resurslarini ishlab chiqish va tezkor teskari aloqa berishda sun’iy intellektdan foydalanish ko‘nikmalari rivojlandi.

Kasbiy-faoliyat komponentida kuzatilgan o‘zgarishlar ayniqsa muhim ahamiyatga ega bo‘ldi. Chunki kiberpedagogik kompetensiya faqat SI vositasidan foydalanish qobiliyati bilan belgilanmaydi. Pedagog uning natijalarini tanqidiy baholashi, noto‘g‘ri yoki ishonchsiz axborotni aniqlashi, shaxsiy ma’lumotlarning himoyasini ta’minlashi, akademik halollik talablariga rioya qilishi va texnologiyadan pedagogik maqsadga muvofiq foydalanishi lozim. Shu nuqtayi nazardan, tadqiqot natijalari kiberpedagogik kompetensiyaning texnologik va axloqiy komponentlari o‘zaro chambarchas bog‘liqligini ko‘rsatdi.

Tadqiqotda aniqlangan yana bir muhim jihat shundan iboratki, sun’iy intellekt texnologiyalaridan foydalanishning samaradorligi texnologiyaning o‘ziga emas, balki pedagogik dizayn sifatiga bog‘liq. Agar SI vositasi aniq didaktik maqsad, o‘quv natijasi va baholash mezonlari bilan bog‘lanmasa, uning qo‘llanilishi ta’lim sifatiga sezilarli qo‘shimcha qiymat bermasligi mumkin. Shu sababli SI texnologiyalarini kiberpedagogik model doirasida qo‘llashda “texnologiya - pedagogik maqsad - ta’lim mazmuni - xavfsizlik - baholash” o‘zaro bog‘liqligi ta’minlanishi zarur.

Shuningdek, tadqiqot natijalari kiberpedagogik kompetensiyani takomillashtirishda AI savodxonligi + raqamli pedagogika + kiberxavfsizlik + raqamli etika komponentlarining integratsiyasi muhimligini ko‘rsatdi. Mazkur komponentlardan birining yetishmasligi sun’iy intellektdan foydalanish samaradorligini pasaytirishi mumkin. Masalan, texnik jihatdan kuchli SI ko‘nikmalariga ega bo‘lgan, biroq axborot xavfsizligi yoki akademik halollik talablarini yetarli darajada bilmaydigan pedagogning faoliyatida muayyan xavflar yuzaga kelishi mumkin.

XULOSA

Tadqiqot natijalari asosida raqamli ta’lim muhitida sun’iy intellekt texnologiyalaridan foydalanish kiberpedagogik kompetensiyani takomillashtirishning istiqbolli pedagogik vositalaridan biri ekanligi aniqlandi. Sun’iy intellekt texnologiyalarining ta’lim jarayoniga integratsiyasi pedagogning texnologik faoliyatini takomillashtirish bilan bir qatorda uning pedagogik loyihalash, individual ta’limni tashkil etish, teskari aloqa berish, baholash va ta’lim jarayonini tahlil qilish imkoniyatlarini kengaytiradi.

Shu asosda kiberpedagogik kompetensiyani takomillashtirishning samarali modeli sifatida sun’iy intellekt savodxonligi → raqamli pedagogik dizayn → amaliy qo‘llash → kiberxavfsizlik va raqamli etika → monitoring va refleksiya ketma-ketligini taklif etish mumkin.

Kelgusidagi tadqiqotlarda ushbu metodikaning turli fan yo‘nalishlari, ta’lim bosqichlari va pedagogik faoliyat turlaridagi samaradorligini empirik jihatdan tekshirish, shuningdek, generativ sun’iy intellektdan foydalanishning uzoq muddatli pedagogik natijalarini aniqlash maqsadga muvofiq.

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SUN’IY INTELLEKT BILAN HAMKORLIKDA MENEJMENT TALABALARINING EKONOMETRIK KOMPETENTLIGINI INDIVIDUAL TA’LIM TRAYEKTORIYASI ASOSIDA RIVOJLANTIRISH

Bobonorova Qundizxan Quralbay qizi
O‘zbekiston davlat san’at va madaniyat instituti o‘qituvchisi
E - mail: qtolibayeva@gmail.com
https://doi.org/10.5281/zenodo.22870583

Annotatsiya. *Menejment yo‘nalishi talabalarining ekonometrik kompetentligini inson va sun’iy intellekt hamkorligiga tayangan individual ta’lim trayektoriyasi orqali rivojlantirish masalasi yoritilgan. Tizimli tahlil, qiyosiy tahlil, ilmiy manbalarni mazmuniy guruhlash va pedagogik modellashtirish asosida diagnostika, differensial topshiriq, sun’iy intellekt ko‘magi, dasturiy bajarish, ko‘p mezonli baholash, qayta aloqa va korreksiyani birlashtiruvchi model taklif etilgan. Natijada sun’iy intellektning tavsiya beruvchi va tahliliy imkoniyatlari o‘qituvchining metodik hamda ekspert nazorati bilan uyg‘unlashtirildi. Ushbu yondashuv talabaning individual ehtiyojiga mos topshiriqlarni tanlash, ekonometrik natijalarni izohlash va dalillarga asoslangan boshqaruv qarorini shakllantirishga xizmat qiladi.*

Kalit so‘zlar: *sun’iy intellekt, inson va sun’iy intellekt hamkorligi, ekonometrik kompetentlik, individual ta’lim trayektoriyasi, ta’lim analitikasi, diagnostik profil, differensial topshiriq, raqamli ta’lim, pedagogik nazorat.*

Abstract. *The development of management students’ econometric competence through an individual learning pathway based on human–artificial intelligence collaboration is examined. Systematic and comparative analysis, thematic grouping of scholarly sources, and pedagogical modelling were used to propose a model integrating diagnostics, differentiated tasks, AI support, software - based performance, multi - criteria assessment, feedback, and correction. The model combines the advisory and analytical capabilities of AI with the teacher’s methodological guidance and expert oversight. This approach supports the selection of tasks aligned with individual needs, the interpretation of econometric results, and evidence - based managerial decision - making.*

Keywords: *artificial intelligence, human–AI collaboration, econometric competence, individual learning pathway, learning analytics, diagnostic profile, differentiated task, digital education, pedagogical oversight.*

KIRISH

Oliy ta’limda sun’iy intellekt vositalarining kengayishi o‘quv mazmunini yetkazish usullarinigina emas, talabaning bilish faoliyati, o‘qituvchining metodik qarori va baholash jarayonini ham o‘zgartirmoqda. Ayniqsa, ekonometrika kabi nazariy bilim, hisoblash amaliyoti, dasturiy bajarish va iqtisodiy talqinni birlashtiradigan fanlarda sun’iy intellekt ma’lumotlarni tushuntirish, topshiriq variantlarini shakllantirish, xatolarni aniqlash va tezkor qayta aloqa berish imkonini yaratadi. Biroq uning pedagogik qiymati tayyor javob ishlab chiqarishida emas, balki talabaning mustaqil tahlilini kuchaytiradigan hamkor vosita sifatida tashkil etilishida namoyon bo‘ladi.

Menejment yo‘nalishi talabalari matematik - statistik tayyorgarligi, Excel va EViews kabi dasturlardan foydalanish tajribasi, natijalarni iqtisodiy izohlash hamda boshqaruv xulosasini shakllantirish qobiliyati jihatidan bir xil boshlang‘ich darajaga ega emas. Barcha talabaga mazmuni va murakkabligi bir xil topshiriq berilishi ayrim talabalar uchun ortiqcha yuklama, boshqalari uchun esa yetarli bo‘lmagan o‘quv chaqirig‘ini yuzaga keltiradi. Sun’iy intellekt yordamida o‘quv faoliyati haqidagi ma’lumotlarni tezkor qayta ishlash mumkin, ammo individual yo‘nalishni belgilash faqat algoritmik tavsiyaga topshirilsa, noto‘g‘ri xulosa, tarafkashlik, akademik halollik va shaxsiy ma’lumotlar xavfsizligi bilan bog‘liq muammolar paydo bo‘lishi ehtimoli mavjud [3].

Tadqiqotning maqsadi inson va sun’iy intellekt hamkorligiga tayangan holda menejment talabalarining ekonometrik kompetentligini individual ta’lim trayektoriyasi asosida rivojlantirishning pedagogik modelini asoslashdan iborat. Mazkur maqsad doirasida sun’iy intellekt va o‘qituvchi vazifalarini chegaralash, diagnostik profilni shakllantirish, differensial topshiriqlarni tanlash, dasturiy bajarish natijalarini baholash va trayektoriyani korreksiya qilish tartibi aniqlashtirildi.

TADQIQOT METODOLOGIYASI

Tadqiqot nazariy - metodik xususiyatga ega bo‘lib, unda tizimli tahlil, qiyosiy tahlil, ilmiy manbalarni mazmuniy guruhlash, funksional dekompozitsiya va pedagogik modellashtirish usullaridan foydalanildi. Tizimli tahlil ekonometrik kompetentlikning kognitiv, analitik - amaliy, interpretativ - prognostik va qaroriy - boshqaruv komponentlari o‘rtasidagi aloqalarni aniqlashga xizmat qildi. Qiyosiy tahlil raqamli vositalar hamda sun’iy intellekt xizmatlarining didaktik vazifalarini farqlash imkonini berdi. Funksional dekompozitsiya orqali diagnostika, tavsiya, bajarish, baholash, qayta aloqa va korreksiya jarayonlarida o‘qituvchi, talaba va sun’iy intellektning vazifalari ajratildi.

Ta’lim analitikasi o‘quv faoliyatida hosil bo‘ladigan ma’lumotlardan pedagogik qarorlarni aniqlashtirishda foydalanish imkonini beradi [1]. Adaptiv ta’lim bo‘yicha tadqiqotlarda boshlang‘ich tayyorgarlikni aniqlash, mazmunni individual ehtiyojga moslashtirish va muntazam qayta aloqa o‘zlashtirish samaradorligiga ta’sir qiluvchi omillar sifatida ko‘rsatiladi [2]. Individual ta’lim trayektoriyasi esa talaba uchun umumiy ta’lim maqsadini saqlagan holda topshiriq murakkabligi, bajarish sur’ati, metodik ko‘mak va tavsiya etiladigan resurslarni moslashtirishni anglatadi [6].

NATIJALAR VA MUHOKAMA

Nazariy - metodik tahlil natijasida inson va sun’iy intellekt hamkorligiga asoslangan siklik model ishlab chiqildi. Model diagnostik ma’lumotlarni yig‘ish, kompetentlik profilini shakllantirish, differensial topshiriqni tanlash, sun’iy intellekt ko‘magida faoliyatni bajarish, natijani ko‘p mezonli baholash, qayta aloqa berish va trayektoriyani korreksiya qilish bosqichlarini birlashtiradi. Jarayonning siklikligi har bir topshiriqdan keyin olingan natijani keyingi pedagogik qaror uchun yangi ma’lumot sifatida qo‘llashda namoyon bo‘ladi.

Diagnostik profil umumiy “biladi–bilmaydi” bahosi bilan cheklanmaydi. Unda talabaning ekonometrik tushunchalarni anglashi, ma’lumotlarni tayyorlashi, modelni tanlashi, dasturda hisoblashni bajarishi, statistik natijani tekshirishi, iqtisodiy talqin qilishi va boshqaruv qarorini asoslash imkoniyatlari alohida baholanadi. Masalan, talaba regressiya tenglamasini dastur orqali to‘g‘ri qurishi, biroq koeffitsiyentning iqtisodiy mazmunini noto‘g‘ri sharhlashi mumkin. Bunday vaziyatda unga qayta hisoblash topshirig‘i emas, natijani real boshqaruv muammosi bilan bog‘lashga yo‘naltirilgan savol va izohlash namunasi taqdim etilishi lozim.

Sun’iy intellekt diagnostika bosqichida talaba javoblaridagi takroriy xatolarni guruhlash, individual qiyinchiliklarni taxminiy aniqlash va o‘qituvchiga ko‘rib chiqish uchun profil loyihasini tayyorlash vazifasini bajaradi. Yakuniy diagnostik xulosa esa o‘qituvchi tomonidan tasdiqlanadi. Chunki algoritm talabaning javobini shakliy belgilarga ko‘ra to‘g‘ri baholashi, ammo iqtisodiy mantiq, kontekst yoki o‘ziga xos yechimni yetarli hisobga olmasligi mumkin. Shuning uchun sun’iy intellekt tavsiyasi pedagogik qarorning manbalaridan biri bo‘lib, uning o‘rnini bosmaydi.

Differensial topshiriqlarni shakllantirishda hamkorlik uch darajada tashkil etiladi. Boshlang‘ich darajadagi talaba uchun sun’iy intellekt qisqa tushuntirish, bosqichli yo‘riqnoma va sodda ma’lumotlar to‘plamini taklif etadi. O‘rta darajadagi talaba muqobil model yoki natijani talqin qilish bo‘yicha yo‘naltiruvchi savollar oladi. Yuqori darajadagi talaba esa ma’lumot manbasini mustaqil tanlaydi, bir nechta modelni solishtiradi va sun’iy intellekt bergan tavsiyani tanqidiy tekshiradi. Ushbu darajalar qat’iy guruh sifatida emas, diagnostik natijaga ko‘ra yangilanib turadigan o‘quv holati sifatida qaraladi [4].

Ekonometrik topshiriqni dasturiy bajarishda Excel ma’lumotlarni tozalash, dastlabki hisob - kitob va sodda vizuallashtirish uchun, EViews esa model parametrlarini baholash, statistik mezonlarni tekshirish va vaqtli qatorlarni tahlil qilish uchun qo‘llaniladi. Sun’iy intellekt ushbu dasturlarning o‘rnini egallamaydi; u buyruqlar ketma - ketligini tushuntirish, xato sababini izohlash, natijaga doir tekshiruv savollarini yaratish va bir nechta talqin variantini qiyoslashga yordam beradi. Raqamli vositani tanlashda funksiyalar soni emas, uning aniq o‘quv vazifasiga didaktik mosligi ustuvor hisoblanadi [7].

Masalan, korxonada xodimlar malakasini oshirish xarajatlari va mehnat unumdorligi o‘rtasidagi bog‘liqlikni o‘rganishda talaba avval ma’lumotlarning tuzilishi va sifatini tekshiradi, so‘ng modelni baholaydi va natijani boshqaruv nuqtayi nazaridan sharhlaydi. Sun’iy intellekt mumkin bo‘lgan omillarni eslatishi yoki talqin loyihasini taklif qilishi mumkin. Talaba esa ushbu tavsiyalarni tanlanma hajmi, model cheklovlari, statistik ahamiyat va iqtisodiy mantiq asosida tekshiradi. O‘qituvchi dalillarning yetarliligini baholab, yakuniy qayta aloqa beradi. Shu tariqa talaba sun’iy intellekt javobini ko‘chiruvchi emas, uni tekshiruvchi va asosli qarorga aylantiruvchi subyekt sifatida faoliyat yuritadi.

Ko‘p mezonli baholash hisoblashning texnik to‘g‘riligi, model tanlovining asoslanganligi, statistik natijalarni tushuntirish, prognoz noaniqligini hisobga olish, iqtisodiy talqin va boshqaruv tavsiyasini qamrab oladi. Sun’iy intellekt shakliy xatolarni va hisoblash bosqichidagi nomuvofiqliklarni tezkor ko‘rsatishi mumkin. O‘qituvchi esa talabaning sababiy mulohazasi, kontekstni hisobga olishi va qaror uchun keltirgan dalillarini ekspert sifatida baholaydi. Bunday vazifalar taqsimoti qayta aloqaning tezkorligini oshiradi va mazmuniy baholashda inson mas’uliyatini saqlaydi. Izoh hamda ko‘rsatmalarni qisqa, mantiqiy ketma - ketlikda va ortiqcha axborot yuklamasisiz taqdim etish o‘zlashtirishni qo‘llab - quvvatlaydi [5].

Modelni amalga oshirishda EKO - ADAPT raqamli o‘quv muhiti konseptual vosita sifatida qaraladi. Unda diagnostik natijalar, topshiriq variantlari, talabaning urinishlari, o‘qituvchi izohlari va korreksiya bo‘yicha tavsiyalar yagona trayektoriyada qayd etiladi. Sun’iy intellekt moduli mavjud ma’lumotlar asosida keyingi topshiriq va metodik ko‘mak variantlarini tavsiya qiladi; o‘qituvchi tavsiyani qabul qiladi, o‘zgartiradi yoki rad etadi. Bu tartib algoritmik qarorning tushuntirilishi va pedagogik nazoratning saqlanishini ta’minlaydi.

Inson va sun’iy intellekt hamkorligida etik me’yorlar modelning alohida sharti hisoblanadi. Talabaga qaysi bosqichlarda sun’iy intellektdan foydalanish mumkinligi, undan

olingan javobni qanday qayd etish va tekshirish lozimligi oldindan tushuntiriladi. Shaxsiy ma’lumotlar himoyalanadi, baholash uchun zarur bo‘lmagan ma’lumotlar tizimga kiritilmaydi. Sun’iy intellekt yaratgan izohlar birlamchi ilmiy manba sifatida qabul qilinmaydi, muhim xulosalar ishonchli adabiyotlar va hisoblash natijalari bilan tasdiqlanadi. UNESCO tavsiyalarida ham inson markaziyligi, xavfsizlik, shaffoflik va mas’uliyatli foydalanish ta’limdagi generativ sun’iy intellektning muhim tamoyillari sifatida belgilangan [3].

Taklif etilgan modelning ilmiy ahamiyati ekonometrik kompetentlikni rivojlantirishda sun’iy intellekt imkoniyatlarini alohida texnik vosita sifatida emas, diagnostika va korreksiyani bog‘lovchi pedagogik hamkorlik komponenti sifatida talqin qilishidadir. Amaliy ahamiyati esa bir mavzu doirasida turli tayyorgarlikka ega talabalar uchun mazmunni emas, topshiriq murakkabligi, mustaqillik darajasi va yordam hajmini moslashtirish imkonini berishida ko‘rinadi. Mazkur yondashuv o‘qituvchining takroriy texnik tekshiruvlarga sarflaydigan vaqtini qisqartirib, murakkab talqin va boshqaruv qarorlarini muhokama qilishga ko‘proq e’tibor qaratishiga yordam beradi.

XULOSA

Inson va sun’iy intellekt hamkorligiga asoslangan individual ta’lim trayektoriyasi menejment talabalarining ekonometrik kompetentligini ularning joriy ehtiyoji va faoliyat natijalariga muvofiq rivojlantirish imkonini beradi. Diagnostika, differensial topshiriq, sun’iy intellekt ko‘magi, dasturiy bajarish, ko‘p mezonli baholash, qayta aloqa va korreksiyaning yagona siklda tashkil etilishi o‘quv jarayonining moslashuvchanligini ta’minlaydi.

Sun’iy intellekt tezkor tahlil, tavsiya va tushuntirish vazifalarini bajarishi, o‘qituvchi esa maqsadni belgilash, mazmuniy baholash, etik nazorat va yakuniy pedagogik qaror uchun mas’ul bo‘lishi lozim. Talaba sun’iy intellekt natijasini tanqidiy tekshirishi, dasturiy hisoblash bilan solishtirishi va iqtisodiy dalillar asosida mustaqil xulosa chiqarishi kerak. Shu shartlar bajarilganda sun’iy intellekt tayyor javob manbai emas, ekonometrik fikrlash va boshqaruv qarorini rivojlantiruvchi hamkor vositaga aylanadi.

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BO‘LAJAK O‘QITUVCHILARDA O‘QUV-BILUV MOTIVLARINI SHAKLLANTIRISH MUAMMOSI-TA’LIMNING AJRALMAS QISMI SIFATIDA

Bozorov Vahobiddin Nuriddinovich
Buxoro davlat universiteti “Pedagogika” kafedrasi 3-bosqich tayanch doktoranti
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Annotatsiya. *Mazkur maqolada bo‘lajak o‘qituvchilarda o‘quv-biluv motivlarini shakllantirish muammosi zamonaviy pedagogik ta’limning muhim tarkibiy qismi sifatida tahlil qilingan. O‘quv-biluv motivlarining mohiyati, ularning bo‘lajak pedagog shaxsining kasbiy shakllanishi, bilish faolligi va ta’lim samaradorligiga ta’siri ilmiy-pedagogik hamda psixologik yondashuvlar asosida yoritilgan. Shuningdek, o‘quv-biluv motivlarini rivojlantirishga ta’sir etuvchi ichki va tashqi omillar, pedagogik shart-sharoitlar hamda zamonaviy ta’lim texnologiyalarining motivatsion imkoniyatlari tahlil qilingan. Tadqiqot natijalariga ko‘ra, bo‘lajak o‘qituvchilarda barqaror o‘quv-biluv motivlarini shakllantirish ta’lim jarayonini shaxsga yo‘naltirilgan, interfaol va kompetensiyaviy yondashuvlar asosida tashkil etish, mustaqil ta’lim hamda refleksiv faoliyatni qo‘llab-quvvatlash orqali samarali amalga oshirilishi asoslab berilgan.*

Kalit so‘zlar: *bo‘lajak o‘qituvchi, o‘quv-biluv motivi, motivatsiya, kasbiy tayyorgarlik, pedagogik-psixologik xususiyatlar, bilish faolligi, ta’lim jarayoni, kompetensiyaviy yondashuv, interfaol metodlar, refleksiya, mustaqil ta’lim, pedagogik texnologiyalar.*

Аннотация. *В данной статье анализируется проблема формирования учебных мотивов у будущих учителей как важная составляющая современного педагогического образования. На основе научно-педагогического и психологического подходов рассматривается сущность учебных мотивов, их влияние на профессиональное формирование будущей педагогической личности, познавательную деятельность и эффективность обучения. Также анализируются внутренние и внешние факторы, влияющие на развитие учебных мотивов, педагогические условия и мотивационные возможности современных образовательных технологий. По результатам исследования обосновывается, что формирование устойчивых учебных мотивов у будущих учителей эффективно осуществляется путем организации образовательного процесса на основе личностно-ориентированного, интерактивного и компетентностного подходов, поддержки самостоятельного обучения и рефлексивной деятельности.*

Ключевые слова: *будущий учитель, образовательный мотив, мотивация, профессиональная подготовка, педагогико-психологические характеристики, познавательная деятельность, образовательный процесс, компетентностный подход, интерактивные методы, рефлексия, самостоятельное обучение, педагогические технологии.*

Abstract. *This article analyzes the problem of forming learning motives in future teachers as an important component of modern pedagogical education. The essence of learning motives, their impact on the professional formation of the future pedagogical personality, cognitive activity and educational effectiveness are covered on the basis of scientific-pedagogical and psychological approaches. Also, internal and external factors affecting the development of*

learning motives, pedagogical conditions and motivational capabilities of modern educational technologies are analyzed. According to the results of the study, it is justified that the formation of stable learning motives in future teachers is effectively implemented by organizing the educational process on the basis of person-oriented, interactive and competency-based approaches, supporting independent learning and reflective activity.

Keywords: *future teacher, educational motive, motivation, professional training, pedagogical and psychological characteristics, cognitive activity, educational process, competency-based approach, interactive methods, reflection, independent learning, pedagogical technologies.*

O‘quv-biluv motivatsiyasi talabaning bilim olishga bo‘lgan ehtiyoji, qiziqishi, intilishi hamda o‘zini rivojlantirishga yo‘naltirilgan ichki va tashqi omillar majmui sifatida namoyon bo‘ladi. Mazkur motivatsiya talabaning o‘quv faoliyatidagi faolligi, mustaqil ta’limga munosabati, kasbiy o‘sishga intilishi va ta’lim natijalarining samaradorligini belgilovchi muhim pedagogik omil hisoblanadi.

Respublikamizda oliy ta’lim jamiyatning muhim ijtimoiy instituti sifatida mamlakat taraqqiyoti, iqtisodiy barqarorligi va ijtimoiy farovonligini ta’minlashda strategik ahamiyat kasb etadi. Zamonaviy globallashuv sharoitida yuzaga kelayotgan murakkab va tezkor o‘zgarishlar oliy ta’lim tizimidan nafaqat mavjud yutuqlarni saqlab qolishni, balki doimiy ravishda takomillashib borishni, yangi talab va ehtiyojlarga moslashishni ham taqozo etmoqda. Oliy ta’lim oldida turgan dolzarb vazifalarni samarali hal etish pedagoglar, tadqiqotchilar hamda bo‘lajak mutaxassislardan nazariy va amaliy jihatdan yangicha yondashuvlarni, innovatsion g‘oyalarni hamda fanlararo integratsiyani keng joriy etishni talab qiladi.

Bugungi kunda oliy ta’lim tizimida kadrlar tayyorlash borasida erishilgan natijalarni xalqaro miqyosda e’tirof etish, ta’lim sifatini innovatsion yondashuvlar asosida yanada takomillashtirish, ilmiy-tadqiqot faoliyatining samaradorligini oshirish va uni yangi rivojlanish bosqichiga olib chiqish muhim strategik vazifalardan biri hisoblanadi. Mazkur jarayonlar ta’lim mazmunini modernizatsiya qilish, ilg‘or pedagogik texnologiyalarni joriy etish hamda bo‘lajak mutaxassislarning kasbiy kompetentligini rivojlantirish orqali oliy ta’lim tizimining raqobatbardoshligini ta’minlashga xizmat qiladi.

Oliy ta’lim muassasalari talabalari faoliyatini chuqur o‘rganish, ularning qiziqishlari, ehtiyojlari, intilishlari va kasbiy maqsadlarini hisobga olgan holda ta’lim jarayonini tashkil etish zamonaviy pedagogikaning muhim talablaridan biri hisoblanadi. Talabalarning individual xususiyatlariga mos ravishda o‘quv-biluv faoliyatini maqsadli yo‘naltirish o‘quv materiallarini samarali o‘zlashtirishga, mustaqil fikrlash ko‘nikmalarini rivojlantirishga hamda ta’lim sifatini oshirishga xizmat qiladi[10].

Mamlakatimizda oliy ta’lim tizimini izchil modernizatsiya qilish, uning sifat va samaradorligini oshirish hamda xalqaro standartlar darajasiga olib chiqish davlat siyosatining ustuvor yo‘nalishlaridan biri sifatida belgilangan. “O‘zbekiston – 2030” strategiyasida oliy ta’lim sohasini yanada takomillashtirish, ilg‘or pedagogik va raqamli texnologiyalarni joriy etish, ijtimoiy soha va iqtisodiyot tarmoqlari uchun raqobatbardosh kadrlar tayyorlashning ustuvor vazifalari belgilab berilgan[11].

[10] Yuldashev J.G‘., Usmonov S.A., 2006; Tolipov O‘.Q., Usmonboyeva M., 2005
[11] O‘zbekiston Respublikasi Prezidentining 2023-yil 11-sentabrdagi PF–158-son Farmoni

Oliy ta’lim muassasalari faoliyatini takomillashtirish, ilm-fan va ta’lim integratsiyasini kuchaytirish, yoshlarning intellektual salohiyatini rivojlantirish hamda ularning ilmiy izlanishlarga bo‘lgan qiziqishini oshirish borasida keng imkoniyatlar yaratilmoqda, bu jarayonlar xalqimizga xos bo‘lgan ilm-ma’rifatga intilish, bilim olish va o‘z ustida muntazam ishlash kabi qadriyatlarning zamonaviy ta’lim tizimida yanada mustahkamlanishiga xizmat qilmoqda[12].

Bugungi kunda bo‘lajak mutaxassislar sog‘lom va mazmunli hayot kechirish, egallagan kasbi bo‘yicha munosib mehnat faoliyatini yo‘lga qo‘yish, jamiyat oldidagi mas’uliyatini anglash hamda shaxsiy va kasbiy kamolotga erishishga intilmoqdalar. Ushbu maqsadlarga erishishda ta’lim muhim omil sifatida namoyon bo‘lib, yoshlarning bilim, ko‘nikma va kompetensiyalarini rivojlantirishning asosiy vositasi hisoblanadi. Zamonaviy ta’lim tizimi oldida bo‘lajak mutaxassislarni nafaqat nazariy bilimlar bilan qurollantirish, balki ularda kasbiy faoliyatga nisbatan barqaror qiziqish va motivatsiyani shakllantirish vazifasi ham dolzarb ahamiyat kasb etadi.

Talabalarning kelajak kasbiga bo‘lgan qiziqishini kuchaytirish, o‘quv mashg‘ulotlari samaradorligini oshirish hamda ularni o‘z sohasining yetuk va fidoyi mutaxassisi sifatida tayyorlash pedagogdan yuksak kasbiy kompetentlik, pedagogik mahorat, innovatsion fikrlash va chuqur ilmiy-metodik tayyorgarlikni talab etadi. Ayniqsa, axborot-kommunikatsiya texnologiyalari jadal rivojlanayotgan, ta’lim transformatsiyasi ta’siri tobora ortib borayotgan globallashuv sharoitida talabalarning o‘quv-biluv motivatsiyasini shakllantirish va rivojlantirish murakkab pedagogik jarayon sifatida namoyon bo‘lmoqda.

Mazkur jarayonda talabalarning yosh va individual xususiyatlarini hisobga olish, ularning ehtiyoj va qiziqishlarini aniqlash, zamonaviy pedagogik texnologiyalar hamda psixologik yondashuvlardan samarali foydalanish muhim ahamiyatga ega. Chunki o‘quv-biluv motivatsiyasining yuqori darajada shakllanishi talabalarning bilimlarni puxta egallashi, mustaqil ta’lim faoliyatini rivojlantirishi va kelgusidagi kasbiy muvaffaqiyatining muhim omillaridan biri hisoblanadi.

Oliy ta’limda tahsil olayotgan, talabalar uchun o‘quv-biluv motivi, o‘z maqsadiga erishishi uchun muhim va dolzarb bo‘lgan faktorlardan biridir. Bilamizki, darslarni samarali tashkil etish va dars davomida talabalarning faolligini ta'minlash uchun avvalo ta'lim oluvchilardagi o‘quv–biluv motivlarini inobatga olish yoki ularning fanga bo‘lgan qiziqishlarini shakllantirish zarurdir. Bunga asosiy sabab ulardagi o‘quv – biluv motivlari, umuman, motivlar faoliyatning tayanch asosini tashkil etishidadir. Motivlar– didaktik jarayonining asosiy harakatlantiruvchi kuchi hisoblanadi. Harakatlantiruvchi motivlarni o‘rganish, to‘g‘ri qo‘llash va ularni ta’lim jarayonida to‘g‘ri qo‘llay olish pedagogik faoliyat mazmunining asosiy mohiyatini belgilaydi. O‘rganilganlik darajasiga ko‘ra, shu kngacha motiv va uning nazariy mazmun va mohiyati yuzasidan ko‘plab ilmiy tadqiqotlar olib borilgan. Mazkur muammo uzoq yillar davomida pedagog olimlar tomonidan respublikamiz va xorijda keng tadqiq etilgan[13].

Jumladan, E.V.Sinitsina. mashhur rus olimi motivlar muammosi, ayniqsa, talabalardagi ijtimoiy xulq motivlari borasida katta, keng qamrovli tadqiqotlar olib borib, shu narsani aniqlaganki, har bir odam o‘ziga xos tarzda u yoki bu vaziyatni idrok qilish va baholashga moyil bo‘ladi.[14] Rus psixologlari orasida motivlar masalasi A.N.Leontev, L.I.Bojovich va boshqalar

[12] O‘zbekiston Respublikasining “Ta’lim to‘g‘risida”gi Qonuni, 2020; “Oliy ta’lim tizimini 2030-yilgacha rivojlantirish konsepsiyasi”, 2019

[13] Leontyev, A. N. (1977). *Activity, Consciousness and Personality*. Moscow: Progress Publishers.

[14] Sinitsina. “Психофизиологические характеристики учебной мотиватsii студентов”,РФ 2004.194-196-betlar

tomonidan o‘rganilgan. A.N.Leontev XX asrning 40- yillarida talabalarda motivatsiya masalalarini ta'kidlar ekan, bu jarayon unda motivlar ierarxiyasi tarkib topishi bilan bog‘liqligini uqtirgan.[15]N.T.Norqulova o‘z tadqiqotida kelajakda talaba yoshlar kommunikativ muvaffaqiyati hamda kasbiy komponentligini belgilab beruvchi o‘quv-biluv motivini shakllantirish bo‘yicha o‘z amaliy tavsiyalarini bergan.[16]\

Ijtimoiy psixologiya rivojlanishiga salmoqli hissa qo’shgan olim Yu.Platonovning yozishicha, insonga ta’sir eta bilish, samarali boshqarish, eng avvalo, uning xulq-atvori va faoliyatini boshqarib turuvchi motiv mexanizmlarini tushunish, anglash orqali amalga oshadi. Faqatgina insonni nima, qanday kuch harakatga undashini bilish orqaligina uning xulq-atvorini boshqaruvchi samarali shakl va usullarni ishlab chiqish mumkin.[17]

Undan tashqari talabalarning o‘quv biluv motivlarini oshirish haqida yana bir qator olimlar tadqiqot olib borishgan. Masalan, Abraham Maslow o‘zining nazariyasi orqali bo‘lajak pedagoglar motivatsiyani rivojlantirish va ularni ta’lim jarayonlariga jalb qilish yo‘llari haqida ish olib borgan. Ed Deci va Richardyan o‘zlarining “O‘z-o‘ziga motivatsiya” nazariyalari (Self Determination Theory) orqali ichki va tashkiliy motivatsiya ishlab chiqarish usullarini o‘rganishgan. Bular bilan bir qatorda, Carol Dweck o‘zining “O‘sish fikri” (Growth Mindset) asari orqali talabalarning muvaffaqiyatga erishishida rag‘batlantirish hamda motivlarini shakllantirish masalalarini ilmiy asoslab bergan. Bu olimlarning tadqiqotlari va ilmiy izlanishlarining barchasi usullar va strategiyalar asosida isbotlangan.

Ilmiy adabiyotlarda motiv atamasiga turlicha mazmundagi ta'riflar keltirilgan bo‘lib, ularning ayrimlarini havola qilamiz.

Aleksey Leontyev fikriga ko‘ra, motiv — bu shaxs faoliyatini vujudga keltiruvchi hamda uni muayyan maqsad sari yo‘naltiruvchi ichki omildir. Olim motivni ehtiyojlarning predmetlashgan shakli sifatida talqin qiladi va inson faoliyatining mazmuni hamda yo‘nalishini aynan motiv belgilashini ta'kidlaydi[18].

Sergey Rubinshteyn motivni shaxsning ichki psixologik holati bilan bog‘liq bo‘lgan, uning xatti-harakati va faoliyatini boshqaruvchi omil sifatida izohlaydi. Uning fikricha, motiv insonning ehtiyojlari, qiziqishlari, qadriyatlari va maqsadlari bilan uzviy bog‘liqdir[19].

Abraham Maslow motivatsiyani inson ehtiyojlarini qondirishga yo‘naltirilgan ichki intilish sifatida tavsiflaydi. Olim ishlab chiqqan ehtiyojlar ierarxiyasiga ko‘ra, shaxsning yuqori darajadagi bilim olish, o‘zini rivojlantirish va o‘z salohiyatini namoyon etishga bo‘lgan ehtiyojlari ham motivatsiyaning muhim manbalaridan hisoblanadi[20].

Edward L. Deci va Richard M. Ryan motivatsiyani ichki va tashqi motivatsiyaga ajratib o‘rganadilar. Ularning nazariyasiga ko‘ra, shaxsning mustaqilligi, kompetentligi va ijtimoiy aloqadorligi ta'minlangan taqdirda ichki motivatsiya kuchayadi va o‘quv faoliyati samaradorligi ortadi[21].

Mazkur manbalar tahlili shuni ko‘rsatadiki, motiv shaxs faoliyatini boshlovchi, yo‘naltiruvchi va qo‘llab-quvvatlovchi ichki psixologik omil bo‘lib, u ta'lim jarayonida

[15] A.N.Leontev “ Umumiy psixologiya “278-bet,Toshkent -2009
[16] Norkulova N.T. Yoshlar ma’naviяtida affiliatsiя motivatsiяsi psixologiяsi. – T.: «Fan va Texnologiya», 2015. 107-b.
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[18] **Leontyev, A. N. (1977).** *Activity, Consciousness, and Personality*. Englewood Cliffs, NJ: Prentice-Hall.
[19] **Rubinshteyn, S. L. (2003).** *Osnovy obshchey psixologii* (Asosiy umumiy psixologiya). Sankt-Peterburg: Piter.
[20] **Maslow, A. H. (1954).** *Motivation and Personality*. New York: Harper & Brothers.
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talabaning o‘quv-biluv faoliyati, qiziqishi, faolligi hamda o‘z oldiga qo‘ygan maqsadlariga erishishida muhim ahamiyat kasb etadi.

Xulosa qilib aytganda, bo‘lajak o‘qituvchilarda o‘quv-biluv motivlarini shakllantirish ta’lim jarayonining ajralmas tarkibiy qismi bo‘lib, u pedagogik ta’lim sifatini oshirish hamda raqobatbardosh pedagog kadrlarni tayyorlashning muhim omillaridan biri hisoblanadi. O‘quv-biluv motivi talabaning bilimlarni ongli va faol o‘zlashtirishi, mustaqil fikrlashi, ijodiy yondashuvi, kasbiy o‘zini rivojlantirishga intilishi hamda uzluksiz ta’limga bo‘lgan ehtiyojini shakllantirishda muhim o‘rin tutadi.

Tahlillar shuni ko‘rsatadiki, o‘quv-biluv motivlarining rivojlanishi shaxsning ichki ehtiyojlari, qiziqishlari va kasbiy qadriyatlari bilan bir qatorda ta’lim jarayonining didaktik jihatdan to‘g‘ri tashkil etilishi, zamonaviy pedagogik texnologiyalar, interfaol metodlar, refleksiv faoliyat hamda ijobiy pedagogik muhit bilan ham bevosita bog‘liqdir. Shu bois bo‘lajak o‘qituvchilarning motivatsiyasini rivojlantirishda psixologik va pedagogik omillarning o‘zaro uyg‘unligini ta’minlash muhim ilmiy-amaliy ahamiyat kasb etadi.

Bugungi kunda oliy pedagogik ta’lim tizimida bo‘lajak o‘qituvchilarda barqaror o‘quv-biluv motivlarini shakllantirish kompetensiyaviy yondashuv, shaxsga yo‘naltirilgan ta’lim, raqamli ta’lim texnologiyalari va mustaqil ta’limni qo‘llab-quvvatlash orqali yanada samarali tashkil etilishi mumkin. Mazkur yondashuvlar talabalarning bilish faolligini oshirish, kasbiy kompetensiyalarini rivojlantirish hamda kelajakdagi pedagogik faoliyatiga nisbatan mas’uliyatli munosabatni qaror toptirishga xizmat qiladi.

Demak, bo‘lajak o‘qituvchilarda o‘quv-biluv motivlarini shakllantirishni ta’limning ajralmas qismi sifatida tizimli tashkil etish, uni zamonaviy pedagogik va psixologik yondashuvlar bilan boyitish hamda ta’lim amaliyotiga izchil joriy etish pedagogik ta’lim samaradorligini oshirishning muhim shartlaridan biri hisoblanadi.

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THE ORIGIN OF THE KOREAN LANGUAGE AND ITS RECOGNITION AS A LANGUAGE

Egamberdiyeva Farangiz Jaxongir qizi
Ajou university in Tashkent
https://doi.org/10.5281/zenodo.22896997

Abstract. *This article examines the historical roots of the Korean language, the process of its formation, and its recognition as an official language. It aims to present the emergence of Korean from a historical, linguistic, and cultural perspective, and to identify the social foundations behind its acceptance as a distinct language. The article also considers the current status of Korean-language study in Uzbekistan and the legal framework supporting it.*

Keywords: *Korean language, Hangeul script, King Sejong, history of language, Uzbekistan–Korea cooperation, language policy.*

Introduction

Today, the Korean language has become one of the languages studied and actively used by millions of people not only on the Korean peninsula but across the world. It is the official language of both South Korea and North Korea, and it is also widely spoken among Korean diaspora communities in Japan, China, the United States, Russia, and Uzbekistan, among other countries. This is due not only to the historical and cultural value attached to the Korean language, but also to the growing global influence of the Republic of Korea through modern technology, art, and economic achievement.

Interest in the Korean language has grown sharply in recent years. In particular, the global spread of Korean popular culture (Hallyu) - K-pop music, Korean television dramas, cinema, cuisine, and contemporary lifestyle - has brought the language onto the international stage. The introduction of the TOPIK (Test of Proficiency in Korean) examination, along with scholarships and study opportunities created for international students in South Korea, has further strengthened the language's position among world languages.

Korean is also being actively studied in Uzbekistan today. Language centers and academic departments have been established as part of official cooperation, and educational exchange programs have been launched. This article presents an analytical account of the historical roots of the Korean language, the process of its emergence, the formation of its writing system, and its recognition as an official language, while also addressing the current position of Korean-language study in Uzbekistan.

Literature Review and Theoretical Background

Leading scholarship on the history of the Korean language, notably Ki-Moon Lee and S. Robert Ramsey's A History of the Korean Language, divides its development into three principal periods: Old Korean (from antiquity to roughly the tenth century, culminating in the unification of the peninsula under Silla), Middle Korean (the tenth to sixteenth centuries, spanning the Goryeo dynasty and the early Joseon period), and Modern Korean (from the seventeenth century to the present). This periodization reflects not only phonological and grammatical change but also fundamental shifts in the writing system used to record the language.

Before the creation of Hangeul, Korean was written primarily through several systems based on Chinese characters: idu (吏讀), used in official documents to represent Korean

grammatical markers using Chinese characters; hyangchal (鄕札), used to record early Korean poetry (hyangga); and gugyeol (口訣), a system of auxiliary marks used to aid the reading of Chinese texts according to Korean grammar. Because all of these systems were complex and accessible mainly to the literate aristocracy, the broader population remained largely illiterate a central factor motivating King Sejong‘s creation of a simpler, more accessible writing system.

Korean linguistics has also long debated the language's genetic origins. The Altaic hypothesis, proposed in the early twentieth century by scholars such as G. J. Ramstedt, sought to group Korean together with the Turkic, Mongolic, and Tungusic languages within a single language family; however, because the shared features cited may equally result from prolonged language contact rather than common descent, most linguists today treat this hypothesis with caution. An alternative view, increasingly favored in the field, treats Korean as a language isolate, unrelated to other known language families. At the same time, the typological similarities between Korean and Japanese including SOV word order, agglutinative morphology, and vowel harmony remain a distinct area of ongoing research, though such similarities are generally understood to reflect typological resemblance rather than proven genetic relatedness.

Methods

This study draws on historical documents, linguistic sources, scholarly literature on the development of the Korean language, and materials on Korean history. In particular, it examines dialectal differences among the ancient kingdoms of Goguryeo, Baekje, and Silla, the creation of the Hangeul writing system in the fifteenth century, and the process by which Korean became consolidated as a modern language. The study of Korean-language education and development in Uzbekistan is based on an analysis of official regulatory and legal documents.

Results

There is no single, universally agreed scholarly account of the precise origin of the Korean language. Most linguists classify it as belonging to its own distinct language family; some scholarship links it to the Altaic language family, while other perspectives note typological similarities with Turkic and Japanese.

The creation of Hangeul by King Sejong in 1443 marked a turning point in the development of the Korean language. Where Chinese characters (hanja) had previously served as the primary writing system for Korean, Hangeul phonetically based and structured close to actual pronunciation — spread rapidly among the population and enabled widespread literacy.

During the early twentieth century, under Japanese occupation, the Korean language was banned and Japanese was made compulsory; however, following Korea's liberation in 1945, Korean was restored as the official language. Today, Korean remains the official and primary means of communication in both South and North Korea.

Attention to the Korean language has been steadily increasing in Uzbekistan. Under Decree No. 538-F of the Cabinet of Ministers of the Republic of Uzbekistan, dated 2 July 2018, cooperation memoranda were signed between the Agency of External Labor Migration under the Ministry of Employment and Labor Relations and the Korea Human Resources Development Institute; as a result, the first "Korean–Uzbek Korean Language Center" opened at Tashkent Law College on 28 November 2018. Presidential Resolution No. PQ-5117, dated 19 May 2021, further established measures to bring the study and teaching of foreign languages, including Korean, to a new level.

In practical terms, the institutional foundation for Korean-language education in Uzbekistan is considerably broader. A Korea Education Center has operated in Tashkent since

1992, making it one of the earliest foreign-language education centers established during the years of independence. Dedicated Korean Language and Culture Centers have been established at Uzbekistan State World Languages University and Samarkand State Institute of Foreign Languages, while the Korean Language Faculty at Fergana branch of Korea International University enrolls more than 100 students specializing in the language. In addition, higher education institutions such as the Tashkent branch of Korea's Inha University, operating since 2014, further reflect the institutional depth of educational cooperation between the two countries (O‘zbekiston va Koreya Respublikasi ta'lim sohasidagi hamkorlik, 2022).

Progress can also be seen in the formal recognition of Korean-language proficiency: a number of Uzbek universities, including Namangan State University, officially accept the TOPIK II certificate among the recognized international language certificates alongside certificates for English, German, French, and Chinese. This indicates that Korean-language proficiency now carries practical weight in academic credit-transfer and admissions processes.

Furthermore, the study of Korean in Uzbekistan is not a recent or isolated phenomenon; it also rests on a distinct historical foundation. Following the forced Soviet-era resettlement of 1937, the ethnic Korean diaspora relocated to Uzbekistan (known as Koryo-saram) formed a long-established Korean community in the country, and a Korean national cultural center was among the first ethnic cultural centers founded in the republic, established in 1989. In this sense, Korean language and culture already had a social foundation in Uzbekistan well before the more recent influence of Hallyu.

Discussion

The recognition of Korean as an independent language has played an important role in preserving the national identity of the Korean people. Hangeul is valued not only as an easily learned writing system but also as cultural heritage - in 1997, the Hunminjeongeum Haerye was inscribed on the UNESCO Memory of the World Register. The growing international interest in Korean, driven in particular by popular culture and technological development, has further popularized the language.

The study of Korean in Uzbekistan is linked to expanding social, economic, and cultural cooperation between the two countries. Korean-language departments operate at Uzbekistan's higher education institutions, and specialists with Korean-language proficiency increasingly gain opportunities to work abroad reflecting the language's cultural as well as practical economic significance.

The recognition of Korean as an official language has also been reinforced through dedicated national observances. In South Korea, Hangeul Day (한글날) is celebrated as a public holiday every 9 October, marking the promulgation of the Hunminjeongeum and reflecting the official recognition of the writing system as cultural heritage of national significance. In North Korea, the same event is commemorated on 15 January as Chosŏn'gŭl Day. The existence of such official observances illustrates that the language is valued not merely as a means of communication but as a national symbol honored at the level of state policy.

At the same time, it would be inaccurate to speak of a single, unified standard form of Korean: since the division of the Korean peninsula in 1945, two distinct official standards have developed Pyojun-eo (표준어) in South Korea and Munhwa-eo (문화어) in North Korea. These two varieties differ in vocabulary, certain pronunciation features, and orthographic conventions, even though their grammatical foundation remains largely shared. This illustrates that the

recognition of a language as "official" is not a static process but an ongoing one, shaped by continuing political and social circumstances.

Survey findings on students' motivations for choosing to study Korean are also noteworthy: among respondents, 32.07% cited "interest in Korea and Korean culture," 23.5% cited direct "interest in the Korean language," 20.6% cited a desire to "study in Korea," and 12.9% cited "employment at a Korean company" as their primary motivation (Saidova, 2024). These findings suggest that interest in learning Korean today extends beyond cultural fascination alone and is closely tied to practical motivations connected to education and labor migration - a factor that should be taken into account when planning language centers and university programs.

Conclusion

The Korean language is recognized as a language with a long history and a distinctive phonetic and grammatical structure. Its development and attainment of official status have directly influenced the cultural and social progress of the Korean people. Today, Korean is internationally recognized and widely studied. Future research would benefit from comparative analysis of Korean alongside other languages and from continued refinement of Korean-language teaching methodology. In particular, deeper linguistic analysis of the divergence between the South and North Korean standard varieties, broader empirical research into the motivations and outcomes of Korean-language learners in Uzbekistan, and the application of digital and AI-based tools to foreign-language instruction in Korean represent promising directions for future study.

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ИНТЕРАКТИВНЫЕ ТЕХНОЛОГИИ И ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ В РАЗВИТИИ РЕЧЕВОЙ КОМПЕТЕНЦИИ УЧАЩИХСЯ 5-Х КЛАССОВ (НА ПРИМЕРЕ ШКОЛ С УЗБЕКСКИМ ЯЗЫКОМ ОБУЧЕНИЯ)

Ергашева Эльвира Владимировна
Докторант (PhD) кафедры методики преподавания русского языка и литературы,
Ташкентский государственный педагогический университет имени Низами, г.
Ташкент, Республика Узбекистанelviraergasheva@gmail.com
E-mail: elviraergasheva@gmail.com
https://doi.org/10.5281/zenodo.22875469

Аннотация: *В данной статье рассматриваются методические аспекты развития речевой компетенции учащихся 5-х классов узбекских школ в процессе обучения русскому языку с использованием интерактивных подходов. На основе синергии традиционной педагогической методики и технологий искусственного интеллекта (ИИ) анализируется практический комплекс урока по теме «Школа и образование».*

Продемонстрировано, как ИИ-инструменты ускоряют усвоение лексики, работу с паремиологическим материалом, моделирование ситуативных диалогов и написание диктантов, обеспечивая индивидуализацию обучения и эффективное преодоление языкового барьера.

Ключевые слова: *речевая компетенция, учащиеся 5-х классов, русский язык как неродной, искусственный интеллект, интерактивные занятия, узбекская школа, инновационная педагогика.*

Abstract. *This article examines the methodological aspects of developing speech competence of 5th-grade students in Uzbek schools during Russian language lessons using interactive approaches. Based on the synergy of traditional pedagogical methods and Artificial Intelligence (AI) technologies, a practical lesson complex on the topic "School and Education" is analyzed. It is demonstrated how AI tools accelerate vocabulary acquisition, work with proverbs, dialogue modeling, and dictation writing, ensuring individualization of learning and effective overcoming of language barriers.*

Keywords: *speech competence, 5th-grade students, Russian as a non-native language, artificial intelligence, interactive activities, Uzbek school, innovative pedagogy.*

1. ВВЕДЕНИЕ

В современных условиях цифровизации образования перед учителем русского языка в классах с узбекским языком обучения стоит задача переориентации учебного процесса с формального заучивания грамматических правил на развитие активной речевой компетенции — способности
пятиклассников свободно и грамотно выражать свои мысли в различных коммуникативных ситуациях.

Как справедливо подчеркивал Е. И. Пассов, «обучение говорению должно строиться как процесс, максимально приближенный к реальному общению, где главным ориентиром выступает решение коммуникативных задач» [1, с. 35].

В эпоху цифровой трансформации важным партнером педагога в организации интерактивных занятий становится искусственный интеллект (ИИ).

По мнению С. Рассела и П.Норвига, «системы искусственного интеллекта способны адаптироваться к индивидуальным потребностям обучающегося, предоставляя мгновенную обратную связь и оптимизируя траекторию усвоения материала» [2, с. 48]. Интеграция ИИ в учебный процесс позволяет трансформировать традиционные наработки урока (словарную работу,паремии, диалоговые конструкции, диктанты) в высокоинтерактивную языковую среду, что особенно важно для учащихся младшего подросткового возраста (5 класс).

2. МЕТОДОЛОГИЯ И ПРАКТИЧЕСКИЕ НАРАБОТКИ УРОКА В СИМБИОЗЕ С ИИ

Развитие речевой компетенции учащихся 5-х классов узбекских структурных подразделений строится по принципу постепенного усложнения: от базовой лексической единицы — к фреймовым конструкциям и связному монологическому высказыванию на основе интерактива. Ниже представлена структура методического комплекса по теме «Школа и школьная жизнь» с алгоритмами интеграции технологий искусственного интеллекта.

Блок 1. Двуязычный лексико-семантический комплекс Накопление базового словарного запаса опирается на принципы сопоставительной лингвистики и наглядности, заложенные в фундаментаных лексикографических трудах [3].

Основные понятия и учебные принадлежности: Болалар боғчаси — Детский сад;Мактаб — Школа;Синф — Класс;Дарс —Урок; Синфхона — Классная комната; Ўқитувчи — Учитель; Ўқувчи — Ученик; Навбатчи — Дежурный;Бадантарбия — Физкультура;Дарс жадвали — Расписание уроков; Эълон — Объявление;Деворий газета — Стенгазета;Бўр — Мел; Латта — Тряпка; Харита — Карта; Қўнғироқ — Звонок;Тўгарак — Кружок; Синф журнали — Классный журнал; Кўрсаткич — Указка;Танаффус— Перемена; Имтиҳон — Экзамен;Баҳо —Оценка. Ўқув қуроллари (Учебные принадлежности): *

Китоб — Книга; Кундалик — Дневник; Қоғоз — Бумага; Чизғич — Линейка; Учирғич — Ластик; Ўткирлагич — Точилка; Дарслик — Учебник; Луғат — Словарь; Алифбе — Азбука; Мақтов ёрлиғи — Похвальный лист; Байроқ — Флаг; Кутубхона — Библиотека; Кутубхоначи — Библиотекарь; Китобхон — Читатель; Ўқув зали — Читальный зал; Китоб жавони — Книжный шкаф; Қалам — Карандаш; Сиёҳ — Чернила; Ручка — Ручка;Қаламдон — Пенал;Ҳарф— Буква;Сўз — Слово; Гап тузмоқ — Составитьпредложение; Рақам — Цифра, число;Ёзув — Письмо; Хато — Ошибка;Ўзбек тили — Узбекский язык; Ўзбек адабиёти — Узбекская литература.

Тиниш белгилари (Знаки препинания):

Нуқта — Точка;Вергул — Запятая;Қўштирноқ — Кавычки; Сўроқ белгиси — Вопросительный знак; Ундов белгиси — Восклицательный знак; Икки нуқта — Двоеточие; Нуқтали вергул — Точка с запятой;Кўп нуқта — Многоточие; Тире — Тире;Қавс —Скобки.

Применение ИИ: Для перевода пассивного лексического запаса классического словаря [3] в активную речь пятиклассников используются ИИ-генераторы графических образов (Midjourney, DALL-E), создающие интерактивные визуальные карточки. Алгоритмы платформ Quizizz/ Kahoot на основе ИИ автоматически генерируют геймифицированные адаптивные тесты на соотнесение узбекско-русских эквивалентов.

Блок 2. Отработка паремиологического материала

Включение малых фольклорных форм (пословицы) способствуют лингвокультурологическому развитию учащихся 5-х классов и формированию правильного интонационного рисунка речи [4, с. 112].

Ilmni mehnatsiz egallab bo‘lmas. —Без труда не овладеешь наукой.
Umr yashasang —umr o‘rgan. —Век живи —век учись.
Bilim —kuch. —Знания —сила.
Dunyoni quyosh yoritadi, insonni esa bilim. — Мир освещается солнцем, а человек —знаниями.

Применение ИИ: Ученики запрашивают у диалоговой языковой модели примеры коротких сказочных или жизненных ситуаций, в которых употребительна та или иная пословица, что формирует у детей навык контекстного использования фразеологизмов.

Блок 3. Ситуативно-диалоговое моделирование

Развитие диалогической речи учащихся 5-х классов строится через отработку
игровых коммуникативных моделей.

Диалог №1: Учебная ситуация в классе
— Здравствуй!
— Здравствуйте!
— У тебя есть книга?
— Да, есть.
— Что у тебя на парте?
— У меня тетрадь, ручка и линейка.
— Где твойрюкзак ?
—Под партой.

Диалог №2: Беседа о школьных интересах
—Привет!
—Привет!
— Что тебе нравится в школе?
— Мне нравится читать книги в библиотеке.
— Какой твой любимый школьный предмет?
— Мой любимый предмет —литература.

Применение ИИ: Использование ИИ-ботов с голосовым интерфейсом. Ученик ведет устный интерактивный диалог с виртуальным персонажем, который подстраивается под уровень 10–11 лет и в реальном времени мягко подсвечивает ошибки в согласовании родов имен существительных и падежных окончаний.

Блок 4. Монологическая речь и связный текст. Текст для заучивания, интерактивного анализа и пересказа: «Я учусь в школе бокса имени Баходира Джалолова. Здание школы четырёхэтажное. Классы просторные и светлые. На первом этаже здания расположены библиотека, столовая, спортзал и учительская. Кабинеты для учеников находятся на втором этаже. Наш класс тоже находится на этом этаже. В нашем классе 30 учеников. В углу класса написаны их фамилии и имена. Слева от двери висит стенгазета нашего класса. Рядом с ней — расписание уроков и список дежурных учеников. Дежурный ученик приходит в школу пораньше. Он вытирает доску тряпкой, готовит мел, приводит класс в порядок. Ученики нашего класса стараются учиться только на "хорошо" и "отлично". Многие из них награждены похвальными грамотами. Мы особенно любим такие предметы, как узбекский язык, литература, математика, история. Учителя, которые преподают

эти предметы, проводят уроки очень интересно».

Блок 5. Контроль письменной речи (Мини-диктант)

Текст мини-диктанта:

«Мы идём в школу ранним утром. В классе я сижу со своими друзьями. Учитель проводит урок интересно. На перемене мы играем. Книга, тетрадь и ручка —мои друзья. Школа —храм знаний».

Применение ИИ: Интегрированные модули оптического распознавания текста (OCR) на базе ИИ позволяют учителю мгновенно сканировать письменные работы пятиклассников, автоматически группируя типичные орфографические ошибки класса для последующей точечной интерактивной проработки.

3. ВЫВОДЫ

Сотрудничество педагога и систем искусственного интеллекта в рамках проведения интерактивных занятий по русскому языку в 5-х классах с узбекским языком обучения позволяет:

1. Индивидуализировать процесс освоения лексического и грамматического материала с учетом интерферирующего влияния родного языка учащихся [5, с. 45];

2. Полностью снять психологический барьер при говорении благодаря интерактивным диалогам с нейросетевыми тренажерами;

3. Повысить динамику уроков и вовлеченность пятиклассников, органично сочетая фундаментальные печатные пособия и передовые цифровые ИИ-инструменты.

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INTEGRATING AI AND DIGITAL TECHNOLOGIES IN HIGHER EDUCATION: A MULTI-DIMENSIONAL SYNTHESIS OF PEDAGOGICAL FRAMEWORKS, STUDENT ENGAGEMENT, AND ETHICAL IMPERATIVES

Shukhrat Shernazarovich Eshankulov
Jizzakh State Pedagogical University
https://doi.org/10.5281/zenodo.22870768

Abstract. *The rapid integration of artificial intelligence (AI) and digital technologies is fundamentally reshaping the landscape of higher education (HE). This article synthesizes contemporary research to examine the transformative potential and systemic challenges of AI-driven systems. Drawing on evidence from systematic literature reviews, quasi-experimental studies, and multi-stakeholder analyses, the paper evaluates the impact of AI on learning efficiency, student autonomy, and engagement. Key theoretical frameworks, such as the AI Literacy Heptagon, the PMAISE model, and the Llama-ARCS framework, are analyzed to provide a structured approach to curriculum development and instructional design. Findings indicate that AI-driven adaptive learning systems can improve academic performance by 15–25% and engagement by up to 40%. However, these gains are mediated by technology proficiency and pedagogical design. Furthermore, the article addresses critical concerns regarding algorithmic bias, digital neocolonialism, and the preservation of human interaction. The synthesis concludes that successful AI integration requires a holistic approach that balances technological affordances with ethical governance and culturally responsive pedagogy.*

Introduction

Artificial intelligence (AI) has emerged as a transformative force in higher education, reshaping instructional delivery, administrative processes, and the nature of literacy itself. Societal participation now increasingly depends on "AI Literacy" (AIL), defined as the competency to critically evaluate, collaborate with, and utilize AI technologies across various contexts. As universities are tasked with preparing students for an AI-driven future, the focus has shifted from standard, one-size-fits-all instruction to personalized, student-centered paradigms.

The integration of AI tools, including generative AI (GenAI) and adaptive learning systems, offers unprecedented opportunities to foster self-directed learning (SDL) and student autonomy. By providing tailored guidance and real-time feedback, these technologies function within the "Zone of Proximal Development" (ZPD), scaffolding learners as they move toward mastery. However, the landscape is characterized by a "implementation gap" where only a minority of students report that AIL is explicitly addressed in their curricula. Furthermore, the rapid adoption of AI has surfaced significant anxieties regarding equity, data privacy, and the potential displacement of human mentorship.

This article provides a comprehensive synthesis of recent academic findings to explore the intersection of AI and digital technologies in HE. It analyzes how these systems impact student engagement and learning outcomes, while also interrogating the ethical and cultural dimensions of "digital neocolonialism" that threaten to marginalize non-Western knowledge

systems. Through this synthesis, the paper aims to provide a roadmap for the sustainable and ethical adoption of AI in academic settings.

Methods

The findings synthesized in this article are derived from a systematic analysis of current research literature (2020–2025) focusing on AI applications in higher education. The underlying methodologies of the source materials include:

1. **Systematic and Integrative Literature Reviews:** Several sources utilized PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to analyze global publication trends, technological characteristics, and implementation strategies. These reviews examined hundreds of articles to identify core dimensions of AI literacy and patterns in student engagement.
2. **Quasi-Experimental Designs:** Quantitative evidence was gathered from studies using propensity score matching (PSM) and difference-in-differences (DID) models to compare AI-driven instruction against traditional methods. These studies typically involved undergraduate cohorts in diverse fields, ranging from Political Science to Laboratory Safety.
3. **Technical and Framework Validation:** Research included the development and pilot testing of novel systems, such as the Llama-ARCS framework (AI-VR integration) and the AI Literacy Heptagon. Technical validation measured metrics like interaction latency and system stability.
4. **Qualitative Multi-Stakeholder Analysis:** In-depth interviews and thematic coding were employed to uncover the perspectives of students, faculty, administrators, and policymakers regarding the opportunities and risks of AI adoption.
5. **Critical Interpretive Analysis:** Zero-shot prompt testing across Global North and Global South contexts was used to surface patterns of cultural bias and racial underrepresentation in GenAI outputs.

Results

The synthesized research highlights significant trends in the impact, literacy requirements, and ethical challenges associated with AI in higher education.

Academic Performance and Learning Efficiency

Evidence across multiple studies confirms that AI-driven adaptive learning systems significantly enhance educational outcomes. Quantitative findings report academic performance gains of 15–25% and improvements in learner engagement by up to 40%. In a 16-week intervention in a Political Science course, the experimental group using a ChatGPT-based strategy significantly outperformed the control group in learning efficiency and knowledge mastery. These gains are attributed to real-time feedback and the system's ability to reduce "cognitive load" by tailoring task complexity to individual needs.

Student Engagement and Interaction

AI technologies influence engagement through three primary dimensions: cognitive, behavioral, and emotional. Systems such as chatbots and adaptive tutoring provide "interactive scaffolding," which fosters deep learning and task clarity. Research indicates that "online learning interactions" (learner-to-learner, learner-to-instructor, and learner-to-content) have a positive, significant direct impact on self-regulated learning. Furthermore, technology proficiency acts as a critical mediator; students with higher technological adeptness benefit more from these interactions, leading to better academic outcomes.

AI Literacy and Curricular Integration

The "AI Literacy Heptagon" provides a seven-dimensional framework for understanding required competencies: technical, applicational, critical thinking, ethical, social, integrational, and legal. While STEM fields (Science, Technology, Engineering, and Mathematics) currently lead in adoption (47%), the framework suggests that all disciplines must establish a "Beginner level" baseline of AIL. Notably, curriculum mapping shows that while technical programs focus on skills and application, humanities programs emphasize ethical reasoning and social impact.

Systemic and Ethical Concerns

Despite positive performance metrics, stakeholders express "shared anxieties" about AI integration. Primary concerns include:

- **Perpetuation of Bias:** GenAI often reflects "Western curriculum ideologies," inaccurately oversimplifying global realities, such as seasonal variations or cultural representations of wealth.
- **Digital Divide and Neocolonialism:** High subscription costs for advanced AI tools create structural barriers for institutions in the Global South, potentially widening the achievement gap.
- **Loss of Human Interaction:** Instructors and parents worry that over-reliance on AI may diminish the "personal touch" and mentorship essential for holistic growth.
- **Language Marginalization:** Many indigenous languages remain underrepresented in major AI models, which can accelerate "language erosion".

Discussion

The results underscore a "paradigm shift" where AI systems no longer just support instruction but co-define the "epistemic structures of learning".

Pedagogical Mediation and the PMAISE Model

The effectiveness of AI is contingent upon its alignment with "interactive pedagogies" like flipped classrooms and project-based learning. The PMAISE model (Pedagogical Mediation of AI for Student Engagement) suggests that teaching methods act as "converters," translating the technical affordances of AI into meaningful student engagement. For instance, AI-generated feedback is most effective when it promotes metacognitive awareness and is embedded within structured teacher-student dialogues.

Supporting Self-Directed Learning (SDL) and Autonomy

AI-powered systems support the "Self-Determination Theory" (SDT) by meeting learners' needs for autonomy and competence. By allowing students to control their learning speed and set personalized goals, these tools foster internal motivation. However, there is a risk of "over-dependency," which can inadvertently weaken cognitive abilities if students use AI to find answers rather than engaging deeply with the material. Therefore, AI must complement rather than replace human instruction.

Addressing Digital Neocolonialism

To mitigate the neocolonial tendencies of AI, research advocates for an "Inclusive AI Design Framework". This includes "liberatory design methods" that center non-Western epistemologies and the "decentralization of AI hubs" to incorporate local voices and data sovereignty. At the classroom level, "human-centric prompt engineering" is proposed as a vital skill, empowering educators to contextualize prompts to reflect local cultural settings and specific educational needs.

Legal and Regulatory Knowledge (LRK)

A significant finding in recent literature is the emergence of LRK as a standalone dimension of AI literacy. With the introduction of the EU AI Act and fragmented global regulations, HE institutions must prepare students to navigate "cross-jurisdictional inconsistencies". A literate individual must now understand not only the ethical implications of AI but also the legal responsibilities associated with data privacy (e.g., GDPR) and copyright.

Conclusion

The integration of AI and digital technologies in higher education offers a "blended future" where technological efficiency and human agency can coexist. AI-driven adaptive systems have proven their capacity to enhance learning outcomes and foster student autonomy across diverse disciplines. However, the success of these integrations is not guaranteed by the technology itself but is mediated by technological proficiency, institutional readiness, and thoughtful pedagogical design.

Universities must move beyond fragmented, tool-centric implementations and adopt institutional frameworks that prioritize ethical governance and AI literacy. Addressing the digital divide and neocolonial biases is essential to ensure that AI serves as an instrument for global equity rather than a vehicle for Western hegemony. Future research should prioritize longitudinal studies to assess the long-term impacts of AI on critical thinking and career readiness. Ultimately, the goal of AI in higher education is to foster human-AI partnerships that enhance the quality, accessibility, and pedagogical integrity of the learning experience.

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STEAM ZAMONAVIY TA’LIM METODOLOGIYASI KOMPETENSIYALARNI RIVOJLANISHINING AHAMIYATI

Fayzulloyeva Sadoqat Furqat qizi
Osiyo Xalqaro Universiteti doktoranti.
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Annotatsiya*. Ushbu maqolada STEAM zamonaviy ta’lim metodologiyasining mazmun-mohiyati, uning ta’lim jarayonidagi o‘rni hamda o‘quvchilarda XXI asr kompetensiyalarini rivojlantirishdagi ahamiyati yoritilgan. Shuningdek, fanlararo integratsiya, amaliy faoliyat, tanqidiy va ijodiy fikrlash, muammolarni hal etish, hamkorlikda ishlash hamda raqamli kompetensiyalarni shakllantirishda STEAM yondashuvining afzalliklari tahlil qilingan. Maqolada ushbu metodologiyani ta’lim amaliyotiga joriy etishning samarali usullari va kutilayotgan natijalari ilmiy-nazariy jihatdan asoslab berilgan.*

Kalit so‘zlar: *STEAM ta’limi, zamonaviy ta’lim metodologiyasi, kompetensiya, fanlararo integratsiya, tanqidiy fikrlash, ijodkorlik, innovatsion ta’lim, raqamli kompetensiyalar, muammoli ta’lim, XXI asr ko‘nikmalari.*

Abstract*. This article examines the essence of the STEAM modern educational methodology, its role in the educational process, and its importance in developing 21st-century competencies among learners. It highlights the advantages of the STEAM approach in promoting interdisciplinary integration, practical learning, critical and creative thinking, problem-solving, collaboration, and digital competencies. The article also provides a theoretical analysis of effective strategies for implementing the STEAM methodology in educational practice and discusses its expected outcomes in improving the quality and effectiveness of education.*

Keywords: *STEAM education, modern educational methodology, competencies, interdisciplinary integration, critical thinking, creativity, innovative education, digital competencies, problem-solving, 21st-century skills.*

STEAM yondashuvini universitet ta’limida joriy etishni asoslash va uning kasbiy tayyorgarlikdagi ahamiyatini aniqlash imkonini beradi. STEAM ta'limining tarixiy konteksti. 20-asr oxirida Qo‘shma Shtatlarda STEM ta’limining paydo bo‘lishi fan, texnologiya va muhandislik kabi sohalarda yuqori malakali mutaxassislarning yetishmasligiga javob edi. STEMning yuksalishining sabablaridan biri an’anaviy ta’lim tizimi talabalarni texnologik inqilob haqiqatlariga tayyorlay olmasligini anglash edi. Dastlab, STEM san’atni o‘z ichiga olmagan; ammo, oxir-oqibat, bu sohalardagi real muammolarni samarali hal qilish uchun ijodkorlikni rivojlantirish muhimligi ma’lum bo‘ldi. Natijada, fan, texnologiya, muhandislik, matematika va san’atni o‘zida birlashtiruvchi STEAM konsepsiyasi ishlab chiqildi. Ushbu model innovatsion fikrlash, dizayn hamda murakkab texnik yechimlarni vizuallashtirishga ko‘maklashuvchi usul sifatida san’atning ahamiyatiga alohida urg‘u beradi.

STEAM ta’limi konsepsiyasining ildizlari qadimgi davrlarga borib taqaladi. Turli sivilizatsiyalarning tarixiy ma’lumotlarini tahlil qilish shunga o‘xshash ta’lim yondashuvlarining qo‘llanilganiga oid ko‘plab misollarni ko‘rsatadi. Shunisi e’tiborga loyiqki, qadimgi dunyoda Aristotel va Platon kabi taniqli mutafakkirlar tanqidiy fikrlashni rivojlantirishni faol ravishda qo‘llab-quvvatlaganlar.

Xitoyda san’at va arxitektura sohasidagi ta’limda STEAM ta’limiga o‘xshash tamoyillar qo‘llanilgani, bu esa talabalarga nafaqat nazariy asoslarni o‘zlashtirish, balki egallangan bilimlarni ijodiy jarayonda bevosita qo‘llash imkonini bergani qayd etiladi.

G. Yakman Rene Dekartni STEAM ta’limi rivojlanishiga turtki bergan dastlabki mutafakkirlardan biri sifatida ko‘rsatib o‘tadi.Dekart o‘z asarlarida barcha fanlar shu qadar bir-biri bilan bog‘liqki, ularni bir vaqtning o‘zida o‘rganish, birini boshqasidan ajratishdan ko‘ra ancha osonroq degan fikrni ilgari surgan.

STEAM yondashuvi (fan, texnologiya, muhandislik, san’at, matematika) — turli sohalardagi bilimlarni integratsiyalashni rag‘batlantiradigan va amaliyotga yo‘naltirilgan o‘rganishni rag‘batlantiradigan ta’limni modernizatsiya qilishning zamonaviy tendentsiyalari orasida muhim o‘rin tutadi. STEAM texnologiyasi — bu tabiiy fanlar, muhandislik, matematika va san’atni yagona ta’lim tizimiga integratsiyalashga asoslangan zamonaviy ta’lim metodologiyasi. Bu yondashuvning o‘ziga xos xususiyati nazariy ta’limni amaliy ko‘nikmalarni rivojlantirish bilan uyg‘unlashtirish, o‘quvchilarning olgan bilimlarini amaliyotda qo‘llashini ta’minlashdir. Bu STEAM ta'limining asosiy qiymatini tashkil etadi: amaliyotda sinovdan o‘tgan bilimlar alohida ahamiyatga ega.

STEAM usullarini qo‘llash ta’lim amaliyotida ilmiy tadqiqotlar, muhandislik ishlanmalari, matematik modellashtirish va zamonaviy texnologik yechimlardan foydalanish imkonini beradi va shu orqali innovatsion fikrlash va 21-asr kompetensiyalarini rivojlantirishga yordam beradi.

STEAM texnologiyasining tamoyillari.

S.Tabiiy fanlar biz har kuni duch keladigan tabiat qonunlarini tushuntiradi.

T. Texnologiya ilmiy bilimlarni amaliyotda sinab ko‘rish imkonini beradi

E. Muhandislik resurslar va materiallar bilan ishlashga yordam beradi hamda tajribalar o‘tkazish va atrof-muhitni yaxshilashni o‘rgatadi.

A. San’atni STEM (fan, texnologiya, muhandislik, matematika) ga integratsiya qilish ularni kengaytirishga, talabalarning ijodkorligi va intuitiv fikrlashini rag‘batlantirishga yordam beradi.

M. Matematika aniqlik, mantiqiy fikrlash va algoritmlarga amal qilish

STEAM texnologiyasining asosiy tamoyili turli fanlarni yagona loyiha yoki muammo doirasida o‘zaro bog‘lashdan iborat. O‘quvchilar bilimlarni alohida emas, balki bir-biri bilan uzviy bog‘liq holda o‘zlashtiradilar. Bu yondashuv nazariy bilimlarni amaliyot bilan uyg‘unlashtirish imkonini beradi.

STEAM ta'limida o‘quvchilar bilimlarni tajribalar, laboratoriya ishlari, loyihalar, modellashtirish va konstruktorlik faoliyati orqali egallaydilar. Bu jarayon ularning nazariy bilimlarini real hayotdagi vaziyatlarda qo‘llash ko‘nikmalarini rivojlantiradi.

O‘quvchilarga hayotiy muammolar taqdim etiladi va ular ushbu muammolarni mustaqil yoki jamoa bilan birgalikda hal qilish yo‘llarini izlaydilar. Bu tamoyil tanqidiy fikrlash, tahlil qilish va qaror qabul qilish ko‘nikmalarini rivojlantiradi.

STEAM texnologiyasida ta'limning asosiy usullaridan biri loyihalar asosida o‘qitishdir. O‘quvchilar muayyan loyiha ustida ishlash davomida tadqiqot olib boradilar, mahsulot yaratadilar va natijalarini taqdim etadilar.

O‘quvchilar turli ma'lumotlarni tahlil qilish, dalillarni baholash, muqobil yechimlarni solishtirish va eng maqbul qarorni tanlashni o‘rganadilar. Bu esa ularning mustaqil fikrlash qobiliyatini oshiradi.

STEAM ta'limida raqamli texnologiyalar, dasturlash, robototexnika, 3D modellashtirish, sun'iy intellekt elementlari va boshqa zamonaviy vositalardan keng foydalaniladi. Bu o‘quvchilarning raqamli kompetensiyalarini rivojlantiradi.

STEAM yondashuvi o‘quvchilarni kuzatish, tajriba o‘tkazish, gipoteza ilgari surish, ma'lumotlarni tahlil qilish va ilmiy xulosalar chiqarishga o‘rgatadi. Natijada ularda ilmiy-tadqiqot kompetensiyalari shakllanadi. STEAM ta'limining barcha faoliyatlari real hayotdagi muammolar va kasbiy faoliyat bilan bog‘lanadi. Bu o‘quvchilarda olingan bilimlarning amaliy ahamiyatini anglashga hamda kelajak kasbiga ongli ravishda tayyorgarlik ko‘rishga yordam beradi. STEAM texnologiyasining tamoyillari o‘quvchilarda fanlararo bilimlarni shakllantirish, amaliy faoliyatni rivojlantirish, tanqidiy va kreativ fikrlashni qo‘llab-quvvatlash, jamoada ishlash hamda raqamli kompetensiyalarni rivojlantirishga xizmat qiladi. Ushbu tamoyillar asosida tashkil etilgan ta'lim jarayoni o‘quvchilarni XXI asrning murakkab muammolarini hal qila oladigan, innovatsion fikrlovchi va raqobatbardosh mutaxassis sifatida shakllantirishga zamin yaratadi.

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РАЗРАБОТКА СИСТЕМЫ ПРОБЛЕМНЫХ ЗАДАНИЙ ДЛЯ ФОРМИРОВАНИЯ РЕЧЕЭТИКЕТНЫХ И КОММУНИКАТИВНО-ПРАГМАТИЧЕСКИХ УМЕНИЙ БУДУЩИХ УЧИТЕЛЕЙ РУССКОГО ЯЗЫКА

Файзиева Зарина Рауф кизи
Независимый исследователь Гулистанского государственного университета
https://doi.org/10.5281/zenodo.22875495

Аннотация. *В статье рассматривается проблема разработки системы проблемных заданий для формирования речеэтикетных и коммуникативно-прагматических умений будущих учителей русского языка. Актуальность исследования обусловлена противоречием между требованиями к профессиональной коммуникативной подготовке педагога и преобладающим в практике вузовского обучения репродуктивным подходом к освоению речевого этикета, не обеспечивающим развития более сложных прагматических умений. Цель статьи — разработать систему проблемных заданий, направленную на формирование указанных умений. В исследовании использованы методы теоретического анализа и синтеза литературы, сравнительно-сопоставительный анализ, педагогическое моделирование, систематизация и научное обобщение. Определена структура исследуемых умений, включающая речеэтикетный и коммуникативно-прагматический блоки. Разработана четырёхкомпонентная дидактическая модель формирования умений средствами проблемных заданий, предложена типология заданий (этикетно-ситуативные, интерпретационные, стратегические) с примерами и методическими комментариями, а также трёхуровневая система критериев их оценки. Полученные результаты могут быть использованы при проектировании практических занятий и оценочных средств в системе подготовки будущих учителей русского языка; перспективы исследования связаны с экспериментальной апробацией предложенной системы заданий.*

Ключевые слова: *речевой этикет, коммуникативно-прагматические умения, проблемное обучение, проблемные задания, будущие учителя русского языка, критерии оценки.*

Введение

Профессиональная деятельность учителя русского языка по своей сути является деятельностью коммуникативной: эффективность обучения во многом определяется не только глубиной предметных знаний педагога, но и его способностью выстраивать речевое взаимодействие с учащимися, коллегами и родителями в соответствии с нормами речевого этикета и требованиями конкретной коммуникативной ситуации. Владение речевым этикетом и более широкими коммуникативно-прагматическими умениями составляет неотъемлемую часть профессиональной компетентности педагога-словесника.

Под речевым этикетом в данной статье понимается система устойчивых формул речевого общения (приветствие, обращение, просьба, извинение, благодарность, прощание и др.), отбор которых регулируется социальными нормами и ситуацией общения. Коммуникативно-прагматические умения трактуются более широко — как

умения адекватно интерпретировать коммуникативную ситуацию и намерение собеседника, выбирать и обосновывать речевую стратегию, в том числе в нестандартных, не предусмотренных этикетными формулами ситуациях (педагогический конфликт, нестандартный вопрос ученика, эмоционально напряжённое общение с родителем).

Несмотря на очевидную профессиональную значимость данных умений, анализ практики подготовки будущих учителей русского языка показывает, что работа над речевым этикетом нередко ограничивается заучиванием готовых формул без их применения в вариативных, приближенных к реальности ситуациях, а развитие более сложных коммуникативно-прагматических умений вообще остаётся за рамками целенаправленной методической работы. В результате студенты способны воспроизвести этикетную формулу в учебном задании, но испытывают затруднения при её уместном применении в живом, не шаблонном педагогическом общении.

Эффективным средством преодоления данного противоречия может стать использование проблемных заданий — заданий, моделирующих реальную коммуникативную ситуацию и требующих от студента самостоятельного анализа, выбора и обоснования речевого решения, а не воспроизведения заданного образца. Именно проблемный, а не репродуктивный характер задания позволяет одновременно работать как над усвоением этикетных формул, так и над развитием более широких прагматических умений — гибкости, уместности, способности к речевой импровизации в нетиповой ситуации.

Вопросы речевого этикета достаточно подробно разработаны в отечественной лингвистике и методике (Н.И. Формановская и др.), однако преимущественно в описательном ключе — как система норм, подлежащих усвоению, без акцента на технологию их практического освоения через проблемные формы работы. Вопросы коммуникативно-прагматических умений рассматриваются в рамках теории речевых актов и коммуникативной компетенции (Дж. Остин, Дж. Сёрль, М. Канале, М. Свейн), но также не находят последовательного методического воплощения именно в виде системы проблемных заданий, ориентированной на подготовку учителя русского языка. Таким образом, на стыке методики речевого этикета и теории коммуникативно-прагматических умений существует методическая лакуна, требующая разработки целостной системы проблемных заданий.

Цель статьи — разработать систему проблемных заданий, направленную на формирование речеэтикетных и коммуникативно-прагматических умений будущих учителей русского языка.

Для достижения цели поставлены следующие задачи:

1. определить структуру и содержание речеэтикетных и коммуникативно-прагматических умений, необходимых будущему учителю русского языка;
2. обосновать дидактический потенциал проблемных заданий для формирования данных умений;
3. разработать типологию и систему проблемных заданий, дифференцированных по типу формируемого умения;
4. определить критерии и показатели оценки уровня сформированности речеэтикетных и коммуникативно-прагматических умений.

Методы исследования

Для решения поставленных задач использовался комплекс теоретических методов, соответствующих характеру исследования.

1. Метод теоретического анализа и синтеза научной литературы

Изучены работы по трём направлениям: (1) теория речевого этикета и нормы речевого общения (Н.И. Формановская и др.); (2) теория речевых актов и модели коммуникативной компетенции (Дж. Остин, Дж. Сёрль, М. Канале, М. Свейн), раскрывающие природу прагматического компонента общения; (3) исследования по технологии проблемного обучения в дидактике (А.М. Матюшкин, М.И. Махмутов и др.), определяющие принципы конструирования проблемных заданий. Сопоставление данных направлений позволило выявить точки их пересечения и сформировать теоретическую основу разрабатываемой системы заданий.

Критерии отбора источников:

- тематическое соответствие одной из трёх указанных областей;
- научная авторитетность (труды признанных авторов теории речевого этикета, теории речевых актов и проблемного обучения, публикации в рецензируемых изданиях);
- актуальность (приоритет публикациям последних 10–15 лет по методике преподавания при сохранении классических трудов по фундаментальным теориям независимо от даты издания);
- применимость к контексту подготовки будущего учителя русского языка;
- методологическая полнота (наличие чёткого определения понятий и/или описания методических механизмов).

2. Метод сравнительно-сопоставительного анализа

Использовался для сопоставления традиционных репродуктивных заданий по освоению речевого этикета (заучивание формул) с проблемными заданиями, моделирующими вариативные коммуникативные ситуации, — с целью выявления дидактических преимуществ последних.

3. Метод педагогического моделирования

Применялся для разработки системы проблемных заданий, включающей целевой, содержательный, процессуальный и оценочно-результативный компоненты.

4. Метод систематизации и классификации

Использовался при разработке типологии проблемных заданий (по типу формируемого умения) и критериев оценки уровня сформированности речеэтикетных и коммуникативно-прагматических умений.

5. Метод научного обобщения

Применялся на заключительном этапе для формулирования выводов о дидактическом потенциале разработанной системы заданий.

Результаты исследования

3.1. Структура речеэтикетных и коммуникативно-прагматических умений будущего учителя русского языка

На основе анализа теоретических источников в структуре исследуемых умений выделены два взаимосвязанных, но различных по природе блока.

Блок речеэтикетных умений включает:

- умение адекватно выбирать формулу речевого этикета (приветствие, обращение, просьба, извинение, благодарность, прощание) в соответствии с ситуацией и статусом собеседника;
- умение варьировать степень официальности этикетной формулы (например, различать обращение к ученику, родителю, коллеге, администрации);
- умение распознавать нарушение этикетных норм в речи собеседника и корректно реагировать на него.

Блок коммуникативно-прагматических умений включает:

- умение интерпретировать коммуникативное намерение собеседника, в том числе при косвенном выражении (ирония, намёк, имплицитная просьба);
- умение выбирать и обосновывать речевую стратегию в нестандартной, не предусмотренной этикетной формулой ситуации (конфликт, эмоционально напряжённое общение, неожиданный вопрос);
- умение корректировать собственное речевое поведение по ходу взаимодействия в зависимости от реакции собеседника.

Принципиальное различие между блоками заключается в степени алгоритмизируемости умения: речеэтикетные умения опираются на относительно устойчивый, конечный набор формул, тогда как коммуникативно-прагматические умения требуют от студента самостоятельного речевого конструирования в условиях неопределённости. Это различие определяет необходимость дифференцированного подхода к конструированию проблемных заданий (раздел 3.3).

3.2. Дидактическая модель формирования умений средствами проблемных заданий

Разработанная модель включает четыре компонента:

5. Целевой компонент — формирование речеэтикетных и коммуникативно-прагматических умений через решение проблемных коммуникативных задач, приближенных к реальной педагогической практике.
6. Содержательный компонент — система проблемных заданий, дифференцированных по типу формируемого умения (этикетные, интерпретационные, стратегические — см. 3.3) и по уровню сложности (от заданий с частичной неопределённостью до заданий с полностью открытым решением).
7. Процессуальный компонент — этапы работы с заданием: (а) анализ коммуникативной ситуации; (б) выявление этикетной нормы и/или прагматической проблемы; (в) генерация и обсуждение вариантов речевого решения; (г) обоснование выбранного варианта; (д) рефлексия и сравнение с альтернативными решениями.
8. Оценочно-результативный компонент — критерии и уровневые показатели (раздел 3.4).

Отличие проблемного задания от традиционного этикетного упражнения заключается в том, что студенту не предлагается единственно верный образец («скажите фразу прощания учителю»), а моделируется ситуация с вариативным, контекстуально обусловленным решением, требующая обоснования выбора.

3.3. Типология проблемных заданий

На основе разработанной модели выделены три типа проблемных заданий, соответствующие структуре умений (3.1).

Тип 1. Этикетно-ситуативные задания

(направлены на формирование речеэтикетных умений в условиях вариативности, а не простого воспроизведения формулы)

Пример 1. «Вы впервые ведёте урок в новом для себя классе. Сформулируйте три варианта приветствия — для урока во 2 классе, в 7 классе и на родительском собрании. Объясните, какими параметрами ситуации обусловлено различие формул».

Пример 2. «Ученик опоздал на урок без объяснения причины. Предложите два варианта реплики учителя: (а) если опоздание единичное; (б) если ученик опаздывает систематически. Обоснуйте выбор степени строгости и формы обращения».

Пример 3. «Коллега-учитель публично указал вам на ошибку в проведении урока в присутствии завуча. Сформулируйте уместную этикетную реакцию, сохраняющую профессиональное достоинство и не провоцирующую конфликт».

Методический комментарий. При обсуждении заданий данного типа преподавателю важно акцентировать не «правильность» конкретной формулы, а критерии, по которым она признаётся уместной (статус, возраст, степень официальности обстановки, наличие свидетелей коммуникации).

Тип 2. Интерпретационные задания

(направлены на развитие умения распознавать коммуникативное намерение, в том числе выраженное косвенно)

Пример 1. «Ученица на вопрос учителя «Ты выполнила домашнее задание?» отвечает: «А Маша вчера вообще не пришла на урок». Определите коммуникативное намерение, стоящее за этим ответом, и предложите два варианта реакции учителя».

Пример 2. «Родитель пишет учителю: «Странно, что именно у вас в классе столько детей не успевает». Определите, какой косвенный речевой акт реализован в этом высказывании, и сформулируйте ответ, учитывающий это намерение».

Пример 3. «На уроке ученик иронично произносит: «Ну конечно, опять контрольная, прям не дождёшься». Опишите возможные коммуникативные намерения за этой репликой (протест, попытка снять напряжение, провокация) и предложите различающиеся реакции учителя для каждого случая».

Методический комментарий. Данный тип заданий целесообразно строить как задания с заведомо неоднозначным решением: цель — не найти «единственно верную» интерпретацию, а сформировать у студента навык рассмотрения нескольких гипотез о намерении собеседника перед выбором ответной реакции.

Тип 3. Стратегические задания

(направлены на формирование умения выбирать и корректировать речевую стратегию в нестандартной, конфликтной или эмоционально напряжённой ситуации)

Пример 1. «Между двумя учениками на уроке возник спор, переходящий во взаимные оскорбления. Опишите пошаговую речевую стратегию учителя по деэскалации конфликта с конкретными речевыми формулами на каждом этапе».

Пример 2. «Родитель в личной беседе эмоционально обвиняет учителя в необъективном оценивании ребёнка. Постройте стратегию ответа, включающую этап признания эмоции собеседника, этап аргументации и этап предложения конструктивного решения».

Пример 3. «В ходе урока ученик задаёт провокационный вопрос, не относящийся к теме, с целью отвлечь класс. Предложите стратегию реакции учителя, которая

одновременно (а) не проигнорирует ученика грубо, (б) вернёт внимание класса к теме урока».

Методический комментарий. При работе с заданиями данного типа продуктивно использовать ролевое разыгрывание решения в малых группах с последующим сравнением предложенных стратегий — это позволяет студентам увидеть вариативность допустимых решений и критерии их эффективности.

3.4. Критерии и показатели оценки уровня сформированности умений

Критерий	**Высокий уровень**	**Средний уровень**	**Низкий уровень**
Речеэтикетный (уместность формулы)	Самостоятельно подбирает и варьирует этикетную формулу с учётом всех параметров ситуации	В целом верно подбирает формулу, но не варьирует её при изменении ситуации	Использует одну шаблонную формулу независимо от ситуации
Интерпретационный (распознавание намерения)	Самостоятельно выявляет несколько возможных намерений собеседника и выбирает адекватную реакцию	Распознаёт намерение лишь при прямом выражении, испытывает затруднения при косвенном	Не учитывает скрытое намерение, реагирует только на буквальное содержание реплики
Стратегический (гибкость реагирования)	Самостоятельно выстраивает многошаговую стратегию, корректирует её по ходу взаимодействия	Применяет одну стратегию, затрудняется в её корректировке	Не способен предложить рабочую стратегию в конфликтной/нестандартной ситуации

Предложенная система критериев может использоваться как инструмент текущей диагностики в процессе обучения, так и как основа для последующей экспериментальной апробации разработанной системы заданий.

Обсуждение

Полученные результаты позволяют соотнести предложенную систему проблемных заданий с существующими исследованиями и определить её теоретическую и практическую значимость.

Разработанное разграничение речеэтикетных и коммуникативно-прагматических умений в целом согласуется с традицией отечественной лингвистики, рассматривающей

речевой этикет как относительно устойчивую систему норм (Н.И. Формановская), однако дополняет её за счёт включения более широкого, динамического слоя умений — интерпретации косвенных речевых актов и стратегического реагирования в нестандартных ситуациях, описываемых в теории речевых актов (Дж. Остин, Дж. Сёрль) и моделях коммуникативной компетенции (М. Канале, М. Свейн). Если в традиционной методике речевой этикет и прагматика чаще рассматриваются как самостоятельные, слабо связанные между собой аспекты подготовки, то предложенная типология заданий (этикетно-ситуативные, интерпретационные, стратегические) показывает их дидактическую взаимосвязь: переход от относительно алгоритмизируемых этикетных умений к умениям самостоятельного речевого конструирования может быть выстроен как единая, постепенно усложняющаяся линия проблемных заданий.

Сопоставление с исследованиями по технологии проблемного обучения (А.М. Матюшкин, М.И. Махмутов) показывает, что общедидактический потенциал проблемного задания — погружение в ситуацию с неопределённостью, требующую самостоятельного решения, — в большинстве работ рассматривается на материале предметных дисциплин (математика, естественные науки), но крайне редко применяется к материалу речевого этикета и прагматики. Предложенная система заданий восполняет этот пробел, демонстрируя, что принципы проблемного обучения применимы не только к предметному, но и к коммуникативно-речевому содержанию подготовки будущего учителя-словесника.

Практическая значимость разработанной системы заключается в том, что предложенные типы заданий и критерии оценки могут быть непосредственно использованы преподавателями вузов при проектировании практических занятий по дисциплинам речеведческого и методического циклов, а также при разработке фондов оценочных средств, ориентированных на деятельностный, а не только знаниевый результат подготовки. Представленные примеры заданий могут служить основой для расширения банка заданий применительно к иным типовым педагогическим ситуациям (взаимодействие с администрацией, дистанционное общение с родителями и др.).

Вместе с тем необходимо указать на ограничения настоящего исследования. Разработанная система проблемных заданий и критериев оценки представлена на теоретико-методическом уровне и не апробирована экспериментально на конкретной выборке студентов. Это не позволяет говорить о статистически подтверждённой эффективности предложенной системы, а лишь о её теоретической обоснованности и дидактическом потенциале, выявленном на основе анализа литературы и педагогического моделирования.

Перспективы дальнейшего исследования связаны с опытно-экспериментальной апробацией разработанной системы заданий в реальном образовательном процессе — с формированием контрольной и экспериментальной групп, применением предложенных критериев для диагностики исходного и итогового уровня сформированности умений, а также со статистической проверкой значимости различий между группами. Дополнительным направлением может стать расширение банка проблемных заданий и его адаптация к различным этапам подготовки будущего учителя русского языка — от начальных курсов до педагогической практики.

Заключение

В исследовании обоснована актуальность формирования речеэтикетных и коммуникативно-прагматических умений будущих учителей русского языка и показана ограниченность традиционного, репродуктивного подхода к их развитию, опирающегося преимущественно на заучивание готовых этикетных формул. На основе теоретического анализа определена структура исследуемых умений, включающая два взаимосвязанных блока — речеэтикетный и коммуникативно-прагматический, различающихся степенью алгоритмизируемости.

Разработана четырёхкомпонентная дидактическая модель формирования данных умений средствами проблемных заданий, включающая целевой, содержательный, процессуальный и оценочно-результативный компоненты. На её основе предложена типология проблемных заданий, включающая этикетно-ситуативные, интерпретационные и стратегические задания, а также трёхуровневая система критериев и показателей оценки сформированности соответствующих умений.

Совокупность полученных результатов представляет собой целостную теоретико-методическую основу, которая может быть использована преподавателями высшей школы при проектировании практических занятий и оценочных средств в рамках подготовки будущих учителей русского языка.

Теоретический характер настоящего исследования составляет его основное ограничение и одновременно определяет направление дальнейшей работы: необходима экспериментальная апробация предложенной системы заданий в реальном образовательном процессе с участием контрольной и экспериментальной групп для эмпирического подтверждения её педагогической эффективности.

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OLIY TA’LIMDA QADRYATLI MUHITNI SHAKLLANTIRISH MEXANIZIMLARI

G‘aybullayev Quvonchbek G‘olibjon O‘g‘li
Buxoro davlat universiteti Pedagogika kafedrasi
1-bosqich tayanch doktoranti
https://doi.org/10.5281/zenodo.22870831

Annotatsiya. *Mazkur maqolada oliy ta’lim muassasalarida qadriyatli muhitni shakllantirishning pedagogik va tashkiliy mexanizmlari yoritilgan. Qadriyatli muhit talabalarning ma’naviy-axloqiy rivojlanishi, ijtimoiy faolligi, fuqarolik mas’uliyati hamda umuminsoniy va milliy qadriyatlarga hurmatini shakllantirishning muhim pedagogik omili sifatida talqin etiladi. Tadqiqotda oliy ta’lim jarayonida qadriyatli muhitni shakllantirishning mazmuni, tamoyillari, subyektlari va samarali pedagogik vositalari tahlil qilinadi. Shuningdek, professor-o‘qituvchi va talaba o‘rtasidagi hamkorlik, ta’lim mazmunini qadriyatlar bilan uyg‘unlashtirish, interfaol metodlardan foydalanish, ma’naviy-ma’rifiy tadbirlarni tizimli tashkil etish hamda ta’lim muassasasida ijobiy psixologik-pedagogik muhit yaratish mexanizmlari asoslab beriladi. Qadriyatli muhitni takomillashtirishda monitoring, baholash va tahlil mexanizmlaridan foydalanish talabalarning qadriyatli kompetensiyalarini rivojlantirishning muhim sharti sifatida ko‘rsatiladi.*

Kalit so‘zlar: *Qadriyat, qadriyatli muhit, oliy ta’lim, aksiologik yondashuv, ma’naviy-axloqiy tarbiya, umuminsoniy qadriyatlar, talaba shaxsi, pedagogik muhit, ta’lim-tarbiya, qadriyatli kompetensiya.*

Аннотация. *В статье рассматриваются педагогические и организационные механизмы формирования ценностной среды в учреждениях высшего образования. Ценностная среда рассматривается как важный педагогический фактор духовно-нравственного развития студентов, формирования их социальной активности, гражданской ответственности, уважения к национальным и общечеловеческим ценностям. В исследовании анализируются содержание, принципы, субъекты и эффективные педагогические средства формирования ценностной среды в образовательном процессе высшего образования. Особое внимание уделяется сотрудничеству между преподавателями и студентами, интеграции ценностей в содержание образования, использованию интерактивных методов, системной организации духовно-просветительских мероприятий, а также созданию позитивной психолого-педагогической среды в образовательном учреждении.*

Ключевые слова: *ценности, ценностная среда, высшее образование, аксиологический подход, духовно-нравственное воспитание, национальные ценности, общечеловеческие ценности.*

Annotation. *This article examines the pedagogical and organizational mechanisms for developing a value-based environment in higher education institutions. A value-based environment is considered an important pedagogical factor in students’ spiritual and moral development, social activity, civic responsibility, and respect for national and universal human values. The study analyzes the content, principles, subjects, and effective pedagogical tools for developing a value-based environment within the higher education process. Particular attention*

is paid to cooperation between teachers and students, integration of values into educational content, the use of interactive methods, systematic organization of spiritual and educational activities, and the creation of a positive psychological and pedagogical environment within higher education institutions.

Keywords: *values, value-based environment, higher education, axiological approach, spiritual and moral education, national values, universal human values, student personality.*

KIRISH

Bugungi globallashuv va axborot-kommunikatsiya texnologiyalari jadal rivojlanayotgan sharoitda yoshlarning ma’naviy-axloqiy qiyofasini shakllantirish, ularda milliy va umuminsoniy qadriyatlarga hurmatni qaror toptirish hamda ijtimoiy mas’uliyatni rivojlantirish oliy ta’lim tizimining muhim vazifalaridan biri hisoblanadi. Oliy ta’lim muassasasi nafaqat talabalarga kasbiy bilim va ko‘nikmalar beradigan maskan, balki ularning dunyoqarashi, hayotiy pozitsiyasi, axloqiy qarashlari va qadriyatlar tizimi shakllanadigan muhim ijtimoiy-pedagogik muhit sifatida namoyon bo‘ladi.

Qadriyatli muhitni shakllantirish jarayoni ta’lim va tarbiyaning o‘zaro uzviyligini ta’minlash, ta’lim mazmuniga milliy va umuminsoniy qadriyatlarni singdirish, professor-o‘qituvchilar va talabalar o‘rtasida samarali hamkorlikni yo‘lga qo‘yish hamda talabalarning ijtimoiy-ma’naviy faoliyatini qo‘llab-quvvatlashni nazarda tutadi. Bunday muhitda talaba ta’lim jarayonining passiv ishtirokchisi emas, balki o‘z qadriyatlarini anglaydigan, mustaqil fikrlaydigan va ijtimoiy mas’uliyatni his qiladigan faol shaxs sifatida shakllanadi.

Oliy ta’limda qadriyatli muhitni shakllantirishning samaradorligi, avvalo, uning tizimli va maqsadli tashkil etilishiga bog‘liq. Bunda ta’lim mazmuni, pedagogik yondashuvlar, o‘qitish metodlari, ma’naviy-ma’rifiy tadbirlar, talabalarning o‘zini o‘zi boshqarish faoliyati, mentorlik va ijtimoiy hamkorlik kabi omillarning o‘zaro uyg‘unligi muhim ahamiyat kasb etadi.

ADABIYOTLAR SHARHI VA NAZARIY ASOS

Oliy ta’limda qadriyatli muhitni shakllantirish masalasi zamonaviy pedagogikaning shaxsga yo‘naltirilgan, aksiologik va kompetensiyaviy yondashuvlari bilan bevosita bog‘liq. Qadriyatli muhit deganda ta’lim oluvchining ma’naviy-axloqiy rivojlanishi, ijtimoiy faolligi, mustaqil fikrlashi va ijobiy qadriyatlarni o‘zlashtirishiga imkon beradigan pedagogik, psixologik va ijtimoiy shart-sharoitlar majmui tushuniladi. Pedagogik manbalarida ham ta’lim va tarbiyaning uzviyligi, milliy va umuminsoniy qadriyatlarni yoshlar ongiga singdirish shaxs kamolotining muhim sharti sifatida ko‘rsatiladi. Pedagogik nuqtayi nazardan, qadriyatli muhitning mazmuni ta’lim va tarbiyaning birligi bilan belgilanadi. Ilmiy-pedagogik manbalarda ham faqat bilim berishning o‘zi yetarli emasligi, ta’lim jarayoni ma’naviy-axloqiy tarbiya bilan uyg‘un tashkil etilishi zarurligi ta’kidlanadi. Shu sababli oliy ta’limda fanlarni o‘qitish jarayonini talabalarda mas’uliyat, halollik, adolat, insonparvarlik, vatanparvarlik, bag‘rikenglik va hamkorlik kabi qadriyatlarni shakllantirish bilan uyg‘unlashtirish muhimdir.

Oliy ta’lim muhitida qadriyatlarni shakllantirishda professor-o‘qituvchining shaxsiy namunasi alohida ahamiyatga ega. O‘qituvchining kasbiy madaniyati, talabaga hurmat bilan munosabati, pedagogik adolati va muloqot madaniyati talabaning qadriyatli qarashlariga bevosita ta’sir ko‘rsatadi. Shu bilan birga, talabaning o‘zini o‘zi boshqarishi, jamoaviy faoliyatda ishtirok etishi va ijtimoiy loyihalarda faol qatnashishi qadriyatlarni amaliy faoliyat orqali o‘zlashtirish imkonini beradi.

MUHOKAMA VA TAHLIL

Qadriyatli muhitning samaradorligini belgilovchi asosiy omillardan biri - **ta’lim mazmunining qadriyatlar bilan uyg‘unligi**dir. O‘quv fanlari mazmunida milliy va umuminsoniy qadriyatlarning aks ettirilishi talabalarga muayyan tushunchalarni nazariy jihatdan o‘zlashtirish imkonini beradi. Biroq qadriyatlarning barqaror shaxsiy e’tiqodga aylanishi uchun ularni amaliy faoliyat bilan bog‘lash zarur. Shu sababli muammoli vaziyatlar, munozaralar, loyihaviy faoliyat, keys-stadi, refleksiv topshiriqlar va jamoaviy ishlar kabi metodlardan foydalanish maqsadga muvofiqdir.

Ikkinchi muhim mexanizm - **professor o‘qituvchi va talaba o‘rtasidagi pedagogik hamkorlik**dir. Demokratik, hurmatga asoslangan va ochiq muloqotga yo‘naltirilgan pedagogik munosabat talabaning o‘z fikrini erkin ifodalashiga, boshqalarning qarashlarini hurmat qilishiga va ijtimoiy mas’uliyatni anglashiga sharoit yaratadi. O‘qituvchining shaxsiy namunasi ham bu jarayonda muhim tarbiyaviy vosita hisoblanadi. Adolatli baholash, akademik halollik, mas’uliyatli munosabat va pedagogik madaniyat talaba tomonidan bevosita kuzatiladigan va amaliy jihatdan o‘zlashtiriladigan qadriyatlar sifatida namoyon bo‘ladi.

Tahlil natijalariga ko‘ra, **talabalarning faol ishtiroki** qadriyatli muhitni shakllantirishning muhim shartlaridan biridir. Talabalar turli ijtimoiy loyihalar, volontyorlik faoliyati, ilmiy va ijodiy to‘garaklar, talabalar tashkilotlari hamda ma’naviy-ma’rifiy tadbirlarda faol qatnashganda qadriyatlar nazariy tushunchadan amaliy tajribaga aylanadi. Bunda talabaning tashabbus ko‘rsatishini va mustaqil qaror qabul qilishini qo‘llab-quvvatlanishi lozim.

Xulosa va tavsiyalar

Oliy ta’limda qadriyatli muhitni shakllantirish talabalarning ma’naviy-axloqiy, ijtimoiy va kasbiy rivojlanishini ta’minlashning muhim pedagogik shartlaridan biridir. Tadqiqotning nazariy tahlili shuni ko‘rsatadiki, qadriyatli muhitni shakllantirish jarayoni faqat ma’naviy-ma’rifiy tadbirlar bilan cheklanmasdan, balki ta’lim mazmuni, pedagogik munosabatlar, talabalar faoliyati va oliy ta’lim muassasasining umumiy ijtimoiy-madaniy muhitini qamrab oluvchi yaxlit tizim sifatida tashkil etilishi lozim. Tahlillar asosida oliy ta’limda qadriyatli muhitni shakllantirishning asosiy mexanizmlari sifatida qadriyatlarni ta’lim mazmuniga integratsiya qilish, interfaol va muammoli ta’lim metodlaridan foydalanish, talabalarning ijtimoiy-ma’naviy faoliyatini qo‘llab-quvvatlash, mentorlik va hamkorlik tizimini rivojlantirish, refleksiv faoliyatni tashkil etish hamda monitoring va baholash tizimini joriy etish belgilandi. Umuman olganda, oliy ta’limda qadriyatli muhitni shakllantirish uzluksiz, tizimli va monitoringga asoslangan pedagogik jarayon bo‘lib, uning samaradorligi ta’lim, tarbiya, ijtimoiy faoliyat va pedagogik hamkorlikning o‘zaro uyg‘unligiga bog‘liq.

Tavsiyalar

1. **Oliy ta’lim muassasalarida qadriyatli muhitni shakllantirishning yaxlit konsepsiyasini ishlab chiqish** va uni ta’lim-tarbiya jarayonining barcha bosqichlariga izchil joriy etish.
2. **O‘quv fanlari mazmuniga qadriyatlar komponentini integratsiya qilish**, bunda milliy va umuminsoniy qadriyatlarni kasbiy tayyorgarlik bilan uzviy bog‘lash.
3. **Professor-o‘qituvchilarning aksiologik va pedagogik kompetensiyalarini rivojlantirish**, ular uchun qadriyatli ta’lim va tarbiya metodlariga bag‘ishlangan seminar va treninglarni tashkil etish.
4. **Talabalarning faol ishtirokini kuchaytirish** maqsadida ijtimoiy loyihalar, munozaralar, volontyorlik faoliyati, ijodiy va ilmiy tadbirlarni tizimli ravishda tashkil etish.

5. **Mentorlik tizimidan samarali foydalanish**, mentorlarni talabalarning shaxsiy, ma’naviy va ijtimoiy rivojlanishini qo‘llab-quvvatlovchi subyekt sifatida faol jalb etish.
6. **Qadriyatli muhit monitoringi tizimini joriy etish** va talabalarning qadriyatli kompetensiyalari, ijtimoiy faolligi hamda ma’naviy-axloqiy rivojlanishidagi o‘zgarishlarni muntazam tahlil qilib borish.

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O‘QUVCHILARDA VITAGEN FAOLIYATINI TAKOMILLASHTIRISHNING METODIK TUZILMASI

Kazakova Dilnoza Qobil qizi
Buxoro davlat universiteti, Pedagogika kafedrasi 3-bosqich doktoranti
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Annotatsiya. *Mazkur maqolada o‘quvchilarda vitagen faoliyatini takomillashtirishning metodik tuzilmasi, uning mazmun-mohiyati hamda ta’lim jarayonidagi pedagogik ahamiyati yoritilgan. Vitagen faoliyat o‘quvchilarning hayotiy tajribasi, mavjud bilim va ko‘nikmalarini ta’lim jarayoni bilan uyg‘unlashtirish, shuningdek, shaxsiy rivojlanish va ijtimoiy faolligini oshirish vositasi sifatida tahlil etilgan. Maqolada o‘quvchilarning individual tajribasini aniqlash, uni pedagogik jihatdan faollashtirish, amaliy faoliyatga yo‘naltirish va natijalarni refleksiv baholashga asoslangan metodik tuzilma taklif etiladi.*

Kalit so‘zlar: *vitagen faoliyat, o‘quvchi, hayotiy tajriba, metodik tuzilma, ta’lim jarayoni, pedagogik texnologiya, shaxsiy rivojlanish, interfaol metodlar, mustaqil fikrlash, refleksiya, hayotiy kompetensiya, ta’lim motivatsiyasi, ijodiy faoliyat.*

Аннотация. *В статье раскрываются методологическая структура, сущность и педагогическая значимость активизации «витагенной деятельности» (деятельности, основанной на жизненном опыте) учащихся в рамках образовательного процесса. Витагенная деятельность рассматривается как средство интеграции жизненного опыта, имеющихся знаний и умений учащихся в образовательный процесс, а также как фактор личностного развития и социальной активности. Предлагается методологический подход, включающий выявление индивидуального опыта учащихся, его педагогическую актуализацию, направление в русло практической деятельности и рефлексивную оценку результатов.*

Ключевые слова: *витагенная деятельность, учащийся, жизненный опыт, методологическая структура, образовательный процесс, педагогическая технология, личностное развитие, интерактивные методы, самостоятельное мышление, рефлексия, жизненная компетентность, учебная мотивация, творческая деятельность.*

Abstract. *This article outlines the methodological structure, essence, and pedagogical significance of enhancing "vitagenic activity" (activity based on life experience) among students within the educational process. Vitagenic activity is analyzed as a means of integrating students' life experiences and existing knowledge and skills with the educational process, as well as fostering personal development and social engagement. The article proposes a methodological framework based on identifying students' individual experiences, activating them pedagogically, channeling them into practical activities, and conducting a reflective assessment of the outcomes.*

Keywords: *vitagenic activity, student, life experience, methodological structure, educational process, pedagogical technology, personal development, interactive methods, independent thinking, reflection, life competence, educational motivation, creative activity.*

Kirish. Bugungi kunda global ta'lim tizimi o‘zgarishlarni, yangi pedagogik texnologiyalarni, metodologiyalarni va o‘quvchilar uchun samarali ta'lim berish usullarini joriy

etishni talab qilmoqda. Har bir davlatda ta'lim tizimining sifati va samaradorligini oshirish maqsadida zamonaviy ta'lim metodlari va usullariga alohida e'tibor qaratilmoqda. O‘zbekiston Respublikasi ta'lim tizimi ham o‘zgarishlar jarayonida bo‘lib, ilg‘or pedagogik texnologiyalarni, shu jumladan, vitagenlashtirilgan ta'lim muhitini ta'lim jarayoniga joriy etishga qaratilgan chora-tadbirlarni amalga oshirmoqda.Ta`lim jarayonida innovatsion pedagogik texnologiyalardan samarali foydalanish va amaliyotga joriy etish bugungi kunning muhim vazifalaridan biridir. O‘quvchilarning fikr doirasi, ongi va dunyoqarashini o‘stirish, ularni erkin tinglovchidan erkin ishtirokchiga aylantirmoq nihoyatda muhimdir. O‘qituvchi darsda boshqaruvchi o‘quvchilar esa, ishtirokchiga aylanmog‘i lozim. Ana shu vazifani uddalashda vitagelashtirilgan faoliyat ko‘p qirrali samara beradi.

Asosiy qism. Ta’lim sohasida innovatsion ta’lim texnologiyalariga asoslangan holda dars o‘tish zarurati hozirgi kunda dolzarbdir. Zamonaviy o‘qituvchilar o‘zlarining kasbiy faoliyatida ham an’anaviy, ham innovatsion ta’lim texnologiyalaridan foydalanadilar. An’anaviy ta’lim tizimida o‘quvchi o‘qituvchi tomonidan berilgan bilimlarni o‘zlashtiirishi va takrorlashi kerak bo‘ladi. Innovatsion ta’lim texnologiyalariga asoslangan darslar jarayonida o‘quvchilar mavzuni tushunishlari va tasavvur qilishlarini osonlashadishu orqali ta’lim samaradorligi oshishiga olib keladi. Vitagenlashtirilgan ta’lim texnologiyalarining jadal rivojlanishi biologiyani o‘qitishda vitagenlashtirilgan ta’lim dasturlardan foydalanish ta’lim sifatini oshirish va o‘quvchilarning o‘quv faoliyatiga bo‘lgan qiziqishini oshirishga yordam beruvchi istiqbolli yondashuv hisoblanadi.

Vitagen texnologiya - o‘quvchilarning hayotiy tajribasidan foydalanishga asoslangan texnologiya. Vitagen-vita (lotincha) hayot, geneses-tug‘ilmoq (hosil bo‘lish) degan ma’noni anglatadi. Vitagen ta’lim texnologiyasi o‘qituvchi va o‘quvchilar o‘rtasida haqiqiy hamkorlik o‘rnatilishiga qaratilgan amaliy yo‘ldir. Vitagen- inson boshidan o‘tkazgan ya’ni, idrok xotirasi, hissiy xotira va xulqiy xotira bilan bog‘liq va uning uchun yetarlicha qiymatga ega bo‘lgan fikrlar, tuyg‘ular, harakatlar yig‘indisi desak mubolag‘a bo‘lmaydi. Vitagen texnologiya o‘quvchilarning hayotiy tajribalarini o‘rganishni yaxshilash shu bilan bir qatorda o‘qituvchi va o‘quvchilar o‘rtasida hamkorlik muhitini yaratishga qaratilgan jarayondir.

Shaxs boshidan kechirgan his-tuyg‘u va harakatlarni o‘zida mujassam etgan va uzoq muddatli xotira zaxiralari saqlanadigan vitagenik tajriba konseptsiyasi o‘quv jarayonida shaxsiy dolzarblik va qiymatning muhimligini ta’kidlaydi. Bu yondashuv asosida o‘quvchilarning bilim, ko‘nikma, malaka va kompetensiyalarini boyitadi va ta’lim mazmundorligini oshiradi.

Vitagen texnologiya - o‘quvchilarning hayotiy tajribasidan foydalanishga asoslangan texnologiyadir. Vitagen-vita (lotincha) hayot, geneses-tug‘ilmoq (hosil bo‘lish) degan ma’noni anglatadi. Vitagen ta’lim texnologiyasi o‘qituvchi va o‘quvchilar o‘rtasida haqiqiy hamkorlik o‘rnatilishiga qaratilgan amaliy yo‘l hisoblanadi. Vitagen-o‘quvchining idrok xotirasi, hissiy xotira va xulqiy xotira bilan bog‘liq bo‘lgan va uning uchun yetarlicha qiymatga yega bo‘lgan fikr va tuyg‘ular, harakatlar yig‘indisi hisoblanadi. Vitagen texnologiya o‘quvchining hayotiy tajribalarini o‘rganishni yaxshilash va o‘qituvchi va o‘quvchilar o‘rtasida hamkorlik muhitini yaratishga qaratilgan jarayondir.

Vitagenlashtirilgan ta'lim metodlari o‘quvchilarda o‘rganish motivatsiyasini oshirishda muhim rol o‘ynaydi. O‘quvchilarga bilimlarni interaktiv va amaliy usullar yordamida o‘rganishga imkon berish, ular orasida raqobatni va bir-biridan o‘rganishni kuchaytiradi. Sayfullaevning tadqiqotida o‘quvchilarning motivatsiyasini oshirishda vitagenlashtirilgan ta'lim metodlarining roli o‘rganildi. Tadqiqotda, o‘quvchilarni bir-biriga o‘rganish, bilim almashish va

yangi g‘oyalarni yaratishga undovchi metodlar, masalan, "debate", "rol o‘ynash" va "fikr almashish" metodlarining samarasini ko‘rsatdi. Sayfullaevning tadqiqoti shuni ko‘rsatdiki, vitagenlashtirilgan ta'lim o‘quvchilarda nafaqat bilim olishga, balki amaliyotda foydalanish va o‘z fikrlarini erkin ifodalashga yordam beradi.

Biologiya fani o‘qitish jarayonida vitagenlashtirilgan ta'limning qo‘llanilishi haqidagi amaliy tadqiqotlar ham mavjud. **Mansurov (2021)** tomonidan amalga oshirilgan tadqiqotda vitagenlashtirilgan ta'lim metodlarining biologiya darslarida qo‘llanilishi bilan bog‘liq tajribalar ko‘rib chiqilgan. Tadqiqotda, vitagenlashtirilgan ta'lim muhitida o‘quvchilar bilan laboratoriya ishlarini tashkil etish, dalillarga asoslangan tahlillarni bajarish, ekskursiyalar va tajriba ishlari o‘tkazish jarayonlari sinovdan o‘tkazilgan. Mansurovning tajribasi shuni ko‘rsatdiki, o‘quvchilar vitagenlashtirilgan ta'lim muhitida biologiya fanini o‘rganishda ancha faollashdilar va o‘rganilgan mavzularni real hayotdagi misollar bilan bog‘lashda o‘z bilimlarini amaliy qo‘llashni o‘rgandilar.

Inson vitagen tajribasini olish jarayonida o‘quvchilarning vitagen ta’limi tamoyillarini shakllantirish o‘quvchilar individualligining namoyon bo‘lishini to‘laqonli va o‘z hayotining yangi shakllarini, jamiyat rivojlanishiga (o‘zgarishiga) mos keladigan shakllarda namayon bo‘ladi va qo‘llab-quvvatlash samaradorligini belgilovchi omillarni aniqlashga asoslangan. Shuningdek, vitagen ta’lim texnologiyalaridan foydalangan holda o‘quvchilarni o‘qitish shakllari, usullari va vositalari aniqlangan. Vitagensiya jarayonining mohiyati hayotiy, hayotiy funktsiyalarni amalga oshirish uchun vositalar, mexanizmlarni, ya’ni vitagenik tajribani topish jarayoni bilan chambarchas bog‘liq jarayon hisoblanadi. Ularning o‘ziga xos xususiyati, o‘quv jarayonida foydalanishning afzalligi shundaki, ular o‘quvchining kognitiv jarayonlarini tabiiy ravishda tartibga soladi: faollashtiradi, qo‘llab-quvvatlaydi va kerakli darajada hayotiyligini saqlaydi.

Xulosa o‘quvchilarda vitagen faoliyatini takomillashtirish ta’lim jarayonini o‘quvchining hayotiy tajribasi, individual imkoniyatlari va amaliy ehtiyojlari bilan uzviy bog‘lashni taqozo etadi. Vitagen yondashuv asosida tashkil etilgan ta’lim o‘quvchilarning mavjud hayotiy tajribasini aniqlash, uni tizimlashtirish, pedagogik jihatdan faollashtirish va yangi bilimlarni o‘zlashtirish jarayonida undan samarali foydalanish imkonini beradi.O‘quvchilarning vitagen faoliyatini rivojlantirishda muammoli vaziyatlar, amaliy topshiriqlar, loyiha ishlari, interfaol metodlar, guruhli hamkorlik va refleksiv faoliyatdan foydalanish muhim ahamiyat kasb etadi. Bunday metodlar o‘quvchilarda mustaqil fikrlash, ijodkorlik, tashabbuskorlik, o‘z faoliyatini baholash hamda real hayotiy vaziyatlarda bilim va ko‘nikmalarini qo‘llash kompetensiyalarini shakllantirishga xizmat qiladi.Shuningdek, vitagen faoliyatni takomillashtirishning metodik tuzilmasi maqsadli, mazmuniy, jarayonli va natijaviy komponentlarning o‘zaro uyg‘unligiga asoslanishi maqsadga muvofiq. Mazkur tuzilma o‘quvchilarning individual tajribasini hisobga olish, ta’lim mazmunini hayotiy vaziyatlar bilan bog‘lash va o‘quvchilarning faol ishtirokini ta’minlash imkonini beradi. Natijada ta’limning amaliy yo‘nalishi kuchayib, o‘quvchilarning o‘z-o‘zini rivojlantirish, ijtimoiy moslashish va hayotiy kompetensiyalarini shakllantirish uchun qulay pedagogik sharoit yaratiladi.

Demak, vitagen faoliyatni takomillashtirish zamonaviy ta’limning shaxsga yo‘naltirilganlik tamoyilini amalga oshirishning samarali vositalaridan biri bo‘lib, o‘quvchi shaxsining intellektual, ijtimoiy va ijodiy salohiyatini rivojlantirishga xizmat qiladi.

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OLIY TA’LIM TIZIMINI RIVOJLANTIRISHDA SUN’IY INTELLEKTNING O‘RNI

Karimova Sidora Baxtiyorovna
assistent, Jizzax politexnika instituti
karimovasidora@gmail.com
https://doi.org/10.5281/zenodo.22875591

Annotatsiya. *Ushbu maqolada zamonaviy oliy ta’lim tizimini rivojlantirishda sun’iy intellekt texnologiyalarining o‘rni va amaliy ahamiyati tahlil qilingan. Raqamli texnologiyalarning jadal rivojlanishi natijasida ta’lim jarayoniga sun’iy intellektni joriy etish yangi pedagogik imkoniyatlarni yuzaga keltirmoqda. Maqolada sun’iy intellekt yordamida ta’lim jarayonini individuallashtirish, talabalar bilimini baholash, elektron ta’lim resurslarini yaratish, professor-o‘qituvchilar faoliyatini qo‘llab-quvvatlash, ilmiy-tadqiqot ishlarini samarali tashkil etish hamda oliy ta’lim muassasalarini boshqarish imkoniyatlari yoritilgan. Shuningdek, sun’iy intellektdan foydalanish jarayonida yuzaga keladigan akademik halollik, axborot xavfsizligi, shaxsiy ma’lumotlarni himoya qilish, texnologiyaga haddan tashqari bog‘lanib qolish kabi muammolar tahlil qilinib, ularni bartaraf etish bo‘yicha takliflar ishlab chiqilgan. Tadqiqot natijalari sun’iy intellekt oliy ta’lim tizimining samaradorligi va sifatini oshirishda muhim vosita bo‘lishi mumkinligini ko‘rsatadi.*

Kalit so‘zlar: *sun’iy intellekt, oliy ta’lim, raqamli ta’lim, innovatsion texnologiyalar, ta’lim sifati, raqamli kompetensiya, akademik halollik.*

Abstract. *This article analyzes the role and practical significance of artificial intelligence technologies in the development of the modern higher education system. The rapid development of digital technologies is creating new pedagogical opportunities by introducing artificial intelligence into the educational process. The article analyzes the role and practical significance of artificial intelligence technologies in the development of the aviation higher education system.The rapid development of digital technologies is creating new pedagogical opportunities by introducing artificial intelligence into the educational process.*

Keywords*: artificial intelligence, higher education, digital education, innovative technologies, quality of education, digital competence, academic integrity, e-learning.*

Kirish

Bugungi globallashuv va raqamlashtirish sharoitida ta’lim tizimi oldida zamonaviy mehnat bozori talablariga javob beradigan, mustaqil fikrlaydigan, raqamli texnologiyalardan samarali foydalana oladigan va innovatsion yondashuvlarga ega mutaxassislarni tayyorlash vazifasi turibdi. Ayniqsa, sun’iy intellekt texnologiyalarining rivojlanishi oliy ta’limning an’anaviy shakllarini qayta ko‘rib chiqishni talab qilmoqda.

Sun’iy intellekt — insonning muayyan intellektual faoliyatini kompyuter tizimlari yordamida modellashtirish va avtomatlashtirishga qaratilgan texnologiyalar majmuasidir. Bugungi kunda sun’iy intellekt matn yaratish, tarjima qilish, ma’lumotlarni tahlil qilish, tasvirlarni aniqlash, prognozlash va individual tavsiyalar berish kabi ko‘plab vazifalarni bajarishda qo‘llanilmoqda.

Oliy ta’lim tizimida ushbu texnologiyalardan foydalanishning ahamiyati shundaki, u ta’lim jarayonining samaradorligini oshirish bilan bir qatorda talaba va o‘qituvchi o‘rtasidagi ta’limiy munosabatlarni ham yangi bosqichga olib chiqishi mumkin. Shu sababli sun’iy intellektning oliy ta’limdagi imkoniyatlarini ilmiy jihatdan o‘rganish va undan foydalanishning samarali mexanizmlarini ishlab chiqish dolzarb masalalardan biridir.

O‘zbekistonda oliy ta’limni raqamlashtirish va sun’iy intellekt

O‘zbekistonda so‘nggi yillarda ta’lim tizimini raqamlashtirish, elektron ta’lim resurslarini kengaytirish va zamonaviy axborot-kommunikatsiya texnologiyalaridan foydalanishni rivojlantirishga katta e’tibor qaratilmoqda. Oliy ta’lim muassasalarida elektron ta’lim platformalari, masofaviy ta’lim, elektron kutubxonalar va raqamli boshqaruv tizimlarining kengayishi buning yaqqol misolidir.

Mazkur jarayonning keyingi bosqichi sifatida sun’iy intellekt texnologiyalaridan foydalanish alohida ahamiyat kasb etmoqda. Chunki sun’iy intellekt oddiy raqamlashtirishdan farqli ravishda mavjud ma’lumotlarni tahlil qilish, ulardan xulosa chiqarish va foydalanuvchiga mos tavsiya berish imkoniyatiga ega.

Oliy ta’limda SI texnologiyalarini joriy etish orqali talabalar faoliyati haqida katta hajmdagi ma’lumotlarni tahlil qilish, ta’limdagi muammolarni erta aniqlash va individual yondashuvni kuchaytirish mumkin. Bu esa ta’lim sifatini boshqarishning yangi mexanizmlarini shakllantirishga xizmat qiladi.

Sun’iy intellektning ta’lim jarayonidagi imkoniyatlari

Sun’iy intellektning oliy ta’limdagi eng muhim afzalliklaridan biri — **ta’limni individuallashtirish** imkoniyatidir. Har bir talabaning bilim darajasi, o‘zlashtirish tezligi va qiyinchilikka duch kelayotgan mavzulari turlicha bo‘lishi mumkin. SI asosidagi ta’lim tizimi ushbu farqlarni tahlil qilib, talabaga mos o‘quv materiallarini tavsiya qilishi mumkin.

Masalan, ma’lum bir mavzu bo‘yicha talabaning bilimida bo‘shliq mavjud bo‘lsa, tizim unga shu mavzuga oid qo‘shimcha material, mashq yoki tushuntirishni tavsiya etishi mumkin. Natijada ta’lim jarayoni “barcha uchun bir xil” yondashuvdan individual ta’lim modeliga yaqinlashadi.

Ikkinchi muhim yo‘nalish — **talabalar bilimini baholash**. Test topshiriqlarini avtomatik tekshirish, javoblarni tahlil qilish va o‘zlashtirish dinamikasini kuzatish orqali o‘qituvchining vaqtini tejash mumkin. Biroq SI vositalari tomonidan amalga oshirilgan baholash inson nazoratini to‘liq almashtirmasligi kerak. Yakuniy pedagogik qaror o‘qituvchining professional xulosasi asosida qabul qilinishi maqsadga muvofiq.

Uchinchi yo‘nalish — **o‘quv materiallarini tayyorlash**. O‘qituvchi sun’iy intellekt yordamida ma’ruza rejasi, nazorat savollari, test topshiriqlari va amaliy mashg‘ulotlar uchun dastlabki materiallarni ishlab chiqishi mumkin. Bu o‘qituvchining vaqtini tejaydi va ta’lim jarayonini tashkil etishni yengillashtiradi.

Sun’iy intellektning professor-o‘qituvchilar faoliyatidagi o‘rni

Sun’iy intellekt o‘qituvchining o‘rnini egallash emas, balki uning kasbiy faoliyatini qo‘llab-quvvatlash vositasi sifatida qaralishi kerak. O‘qituvchi SI yordamida katta hajmdagi ma’lumotlarni tezkor tahlil qilishi, dars uchun qo‘shimcha materiallar tayyorlashi va talabalar bilan individual ishlashga ko‘proq vaqt ajratishi mumkin.

Masalan, o‘qituvchi bir guruh talabalarining test natijalarini tahlil qilishda SI vositalaridan foydalanib, qaysi mavzularda o‘zlashtirish darajasi pastligini aniqlashi mumkin.

Shundan so‘ng keyingi mashg‘ulotlarda aynan shu mavzularga ko‘proq e’tibor qaratish imkoniyati paydo bo‘ladi.

Bundan tashqari, sun’iy intellekt xorijiy tillarni o‘rganish, akademik yozuvni rivojlantirish va mustaqil ta’limni tashkil etishda ham yordamchi vosita bo‘la oladi. Talabalar undan matnni tahlil qilish, grammatik xatolarni aniqlash, tushunarsiz tushunchalarni izohlash va qo‘shimcha savollar shakllantirishda foydalanishlari mumkin.

Ilmiy-tadqiqot faoliyatida sun’iy intellekt

Oliy ta’lim muassasasining asosiy vazifalaridan biri nafaqat mutaxassis tayyorlash, balki ilmiy tadqiqotlarni rivojlantirishdan iborat. Shu nuqtai nazardan, sun’iy intellekt ilmiy izlanishlarni samarali tashkil etish uchun ham katta imkoniyat yaratadi.Tadqiqotchi katta hajmdagi ilmiy adabiyotlarni saralash, muayyan mavzu bo‘yicha mavjud ilmiy qarashlarni tahlil qilish, ma’lumotlarni tizimlashtirish va statistik natijalarni qayta ishlashda SI vositalaridan foydalanishi mumkin.

Shu bilan birga, SI tomonidan yaratilgan yoki qayta ishlangan ma’lumotlarni tanqidiy tekshirish zarur. Chunki sun’iy intellekt ayrim holatlarda noto‘g‘ri, eskirgan yoki mavjud bo‘lmagan ma’lumotlarni ishonchli ko‘rinishda taqdim etishi mumkin. Shuning uchun ilmiy faoliyatda asosiy manbalarni tekshirish va ularga mustaqil murojaat qilish muhim hisoblanadi.

Sun’iy intellektdan foydalanish bilan bog‘liq muammolar

Sun’iy intellekt oliy ta’lim uchun katta imkoniyatlarni taqdim etishi bilan birga, ayrim xavflarni ham yuzaga keltiradi.

Birinchidan, **akademik halollik** masalasi dolzarb hisoblanadi. Talaba mustaqil bajarishi kerak bo‘lgan topshiriqlarni to‘liq SI yordamida tayyorlashi uning bilim va ko‘nikmalarini obyektiv baholashni qiyinlashtiradi.

Ikkinchidan, **shaxsiy ma’lumotlar xavfsizligi** masalasi mavjud. Talabalar va o‘qituvchilarga tegishli ma’lumotlarning turli SI platformalariga yuborilishi maxfiylik bilan bog‘liq muammolarni keltirib chiqarishi mumkin.

Uchinchidan, **raqamli kompetensiya** yetarli bo‘lmasa, SI vositalaridan noto‘g‘ri foydalanish ehtimoli ortadi. Foydalanuvchi SI bergan har qanday ma’lumotni tekshirmasdan qabul qilmasligi, uning imkoniyatlari va cheklovlarini yaxshi tushunishi kerak.

To‘rtinchidan, ta’lim jarayonida SI texnologiyalaridan ortiqcha foydalanish talabalarning mustaqil fikrlash, ijodkorlik va muammoni mustaqil hal qilish ko‘nikmalariga salbiy ta’sir ko‘rsatishi mumkin. Shu sababli texnologiya va inson omili o‘rtasida muvozanatni saqlash muhimdir.

Oliy ta’limda sun’iy intellektdan samarali foydalanish bo‘yicha takliflar

Oliy ta’lim tizimida sun’iy intellektdan samarali foydalanish uchun quyidagi yo‘nalishlarga e’tibor qaratish maqsadga muvofiq:

1. Oliy ta’lim muassasalarida sun’iy intellektdan foydalanish bo‘yicha aniq metodik va akademik qoidalarni ishlab chiqish.
2. Professor-o‘qituvchilar uchun sun’iy intellekt va raqamli pedagogika bo‘yicha malaka oshirish kurslarini tashkil etish.
3. Talabalarda SI vositalaridan mas’uliyatli foydalanish, axborotni tekshirish va tanqidiy fikrlash ko‘nikmalarini rivojlantirish.
4. Akademik halollik tamoyillarini kuchaytirish va SI vositalaridan foydalanishga oid shaffof talablarni joriy etish.

5. Shaxsiy va ta’limga oid ma’lumotlarni himoya qilish mexanizmlarini takomillashtirish.

6. Sun’iy intellektni o‘qituvchini almashtiruvchi emas, balki pedagogik faoliyatni qo‘llab-quvvatlovchi vosita sifatida rivojlantirish.

7. O‘zbekiston oliy ta’lim muassasalari uchun o‘zbek tilidagi sifatli SI va ta’lim resurslarini rivojlantirishga e’tibor qaratish.

Xulosa

Umuman olganda, sun’iy intellekt oliy ta’lim tizimini rivojlantirish uchun katta imkoniyatlarga ega bo‘lgan zamonaviy texnologiyalardan biridir. Undan oqilona foydalanish ta’lim jarayonini individuallashtirish, talabalar bilimini tahlil qilish, professor-o‘qituvchilar faoliyatini yengillashtirish, ilmiy-tadqiqot ishlarini samarali tashkil etish va oliy ta’lim boshqaruvini takomillashtirish imkonini beradi.

Shu bilan birga, sun’iy intellektni ta’limga joriy etish faqat texnologik masala emas. Bu jarayon pedagogik, huquqiy, axloqiy va ijtimoiy jihatlarni ham qamrab oladi. Ayniqsa, akademik halollik, ma’lumotlar xavfsizligi va talabalarning mustaqil fikrlash qobiliyatini saqlab qolish masalalariga alohida e’tibor berish zarur.

Kelajakdagi oliy ta’lim modelida inson va sun’iy intellektning hamkorligi muhim o‘rin egallaydi. O‘qituvchining pedagogik tajribasi, ijodkorligi va insoniy muloqoti sun’iy intellektning katta hajmdagi ma’lumotlarni qayta ishlash va tahlil qilish imkoniyatlari bilan uyg‘unlashganda ta’limning sifati va samaradorligini yanada oshirish mumkin. Demak, sun’iy intellektdan to‘g‘ri va mas’uliyatli foydalanish O‘zbekistonda oliy ta’limni zamonaviy, raqobatbardosh va innovatsion tizimga aylantirishning muhim omillaridan biri bo‘lib xizmat qiladi.

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THE ROLE OF ARTIFICIAL INTELLIGENCE IN LANGUAGE LEARNING

Khayriniso Bakhtiyarovna Ganiyeva
khayrinisoganiyeva@gmail.com
JSPU. Associate Professor,PhD
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Abstract. *In the rapidly evolving digital landscape, the role of English teachers is transforming to meet the demands of 21st-century learners. This article explores the integration of critical thinking skills within digital learning environments to prepare future English teachers effectively. By examining current pedagogical strategies, digital tools, and theoretical frameworks, the study highlights the importance of fostering analytical and evaluative abilities in educators. The findings suggest that a combination of technology-enhanced instruction and critical pedagogy can significantly enhance the preparedness of future English teachers, enabling them to cultivate critical thinking in their students. Recommendations for teacher education programs and future research directions are also discussed.*

Key words: *integration of critical thinking skills, digital learning environments, technology-enhanced instruction, problem-solving, decision-making, logical reasoning, collaborative learning, interactive pedagogical approaches.*

Annotatsiya. *Raqamli dunyoning tez sur'atlar bilan rivojlanayotgan sharoitida ingliz tili o‘qituvchilarining roli XXI asr o‘quvchilarining talablariga javob berish uchun o‘zgarib bormoqda. Ushbu maqola kelajakdagi ingliz tili o‘qituvchilarini samarali tayyorlash maqsadida raqamli o‘quv muhitida tanqidiy fikrlash ko‘nikmalarini integratsiyalashni o‘rganadi. Hozirgi pedagogik strategiyalar, raqamli vositalar va nazariy asoslar shuni ko‘rsatadiki, o‘qituvchilarda tahliliy va baholash qobiliyatlarini rivojlantirish muhim ahamiyatga ega. Tadqiqot natijalari shuni ko‘rsatadiki, texnologiya bilan boyitilgan ta'lim va tanqidiy pedagogika kombinatsiyasi kelajakdagi ingliz tili o‘qituvchilarining tayyorgarligini sezilarli darajada oshirishi va ularni o‘z o‘quvchilarida tanqidiy fikrlashni rivojlantirishga imkon yaratishini ta'kidlaydi. O‘qituvchilarni tayyorlash dasturlari va kelgusidagi tadqiqot yo‘nalishlari bo‘yicha tavsiyalar ham muhokama qilinadi.*

Kalit so‘zlar: *tanqidiy fikrlash ko‘nikmalarini integratsiyalash, raqamli ta’lim muhiti, texnologiya asosida takomillashtirilgan o‘qitish, muammolarni yechish, qaror qabul qilish, mantiqiy fikrlash, hamkorlikda o‘rganish, interfaol pedagogik yondashuvlar.*

INTRODUCTION

The 21st century has ushered in an era characterized by rapid technological advancements and an abundance of information. In this context, critical thinking has emerged as a pivotal skill for both educators and learners. For English teachers, the ability to analyze, evaluate and synthesize information is essential in fostering a deeper understanding of language and literature. In the context of higher education particularly within English Departments, the insufficient application of critical thinking skills and the lack of engaging activities are believed to contribute to why university students often struggle to exchange ideas and write critically in English. They tend to accept opinions, especially regarding current issues like politics,

corruption, and education, without properly evaluating them. This is likely due to the fact that many of these students previously attended primary and secondary schools that predominantly used a teacher-centered approach. As a result, expressing ideas in English, both communicatively and critically, can be challenging for students in English Departments. This article examines the strategies and tools necessary to develop critical thinking skills in future English teachers within digital learning environments.

MAIN PART

Critical thinking involves the ability to engage in reflective and independent thinking, crucial for problem-solving and decision-making (Ennis, 1987). In education, it enables students to comprehend complex texts, construct coherent arguments, and engage in meaningful discussions (Facione, 2011). For English teachers, cultivating these skills is essential for effective teaching and fostering a learning environment that encourages intellectual growth. As Edenia Gadis Maryam (2024) states critical thinking is seen as a crucial skill in educational settings and as an essential tool in the development of a student's thinking skills and capacity. It is frequently brought up in connection with the higher order thinking abilities students need to develop in order to perform better academically. For example, the Partnership for 21st Century Learning (2019) lists analysis, synthesis, and assessment as critical thinking activities. It implies that one do not directly absorb the information or the situation as how it actually is but analyze whether the information they accepted correlates with their previous knowledge on that topic or not, does research to identify to what extend the information is reliable or not and then draw conclusion.

In this age of fast technological innovation, critical thinking—a core ability necessary for processing complex information and making educated decisions—faces particular difficulties. The emergence of artificial intelligence (AI) and digital technology offers both chances to improve teaching methods and difficulties in making sure that students acquire the analytical abilities required to assess and use these tools critically. By using conventional approaches, traditional pedagogies for teaching critical thinking have mostly concentrated on problem-solving, logical reasoning, and analytical skills. However, there are new factors to take into account as AI is incorporated into the educational setting. Intelligent tutoring systems, data analytics, and adaptive learning platforms are a few examples of AI technologies that provide cutting-edge resources to improve critical thinking instruction.

Digital Learning Environments and Pedagogy

Digital learning environments offer diverse tools and resources that can enhance teaching and learning processes (Johnson et al., 2016). The integration of technology in education facilitates access to vast information, collaborative learning, and interactive pedagogical approaches (Mishra & Koehler, 2006). However, the effective use of these tools requires educators to possess strong critical thinking skills to navigate and evaluate digital content.

Teacher education programs play a critical role in preparing future educators with the necessary skills and competencies (Darling-Hammond et al., 2017). Incorporating critical thinking into teacher training ensures that educators can model and teach these skills to their students. Studies have shown that teacher preparedness in critical thinking directly impacts student outcomes (Paul & Elder, 2014).

This study employs a mixed-methods approach, combining qualitative and quantitative data to explore the development of critical thinking skills in future English teachers. Data was collected through surveys, interviews, and classroom observations from participants enrolled in a

teacher education program. The digital tools utilized in the study included learning management systems, collaborative platforms, and critical thinking software.

The survey indicated that participants recognized the importance of critical thinking in teaching but felt inadequately prepared to integrate digital tools effectively. Approximately 60% of respondents expressed a need for more training in using technology to foster critical thinking. Interviews revealed that hands-on experience with digital tools and exposure to critical pedagogy significantly enhanced participants' confidence in their ability to teach critical thinking. Participants highlighted the value of collaborative projects and problem-based learning in developing these skills. Classroom observations showed that instructors who effectively integrated digital tools facilitated higher levels of student engagement and critical discourse. Techniques such as digital storytelling, online debates, and multimedia presentations were particularly effective in promoting critical thinking.

The findings underscore the necessity of integrating critical thinking into teacher education within digital contexts. The use of digital tools can enhance the development of critical thinking by providing diverse and interactive learning experiences. However, the effectiveness of these tools depends on the educators' ability to use them strategically. Teacher education programs must prioritize training in both critical pedagogy and digital literacy to equip future English teachers with the skills needed for modern classrooms. Teacher education programs should incorporate modules that focus on critical thinking and digital literacy. Practical training with digital tools, coupled with theoretical knowledge of critical pedagogy, can prepare educators to create engaging and intellectually stimulating learning environments. One of the primary challenges is the varying levels of digital proficiency among future teachers. To address this, programs should offer differentiated training that caters to diverse skill levels. Additionally, fostering a community of practice where educators can share experiences and strategies can support continuous professional development.

CONCLUSION

As education continues to evolve in the digital age, the preparation of future English teachers must adapt to incorporate critical thinking within digital learning environments. By leveraging technology and emphasizing critical pedagogy, teacher education programs can equip educators with the necessary skills to foster analytical and evaluative abilities in their students. Future research should explore longitudinal studies to assess the long-term impact of these educational strategies on teaching practices and student outcomes.

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DIGITAL HUMANITIES BASED COMPUTATIONAL ANALYSIS OF LINGUISTIC EVOLUTION

Khayriniso Bakhtiyarovna Ganiyeva
khayrinisoganiyeva@gmail.com
JSPU. Associate Professor,PhD
https://doi.org/10.5281/zenodo.22897498

Abstract. *The swift progress in computational techniques has provided ample possibilities for investigating the evolution of language and changing discourse patterns in large corpora of texts. The paper describes a computational framework or investigating longitudinal register shifts and formal discourse organization in American English using the Corpus of Contemporary American English (COCA) from 1990–2019. Lexical, discourse, informational, temporal, and statistical analyses are combined into the framework to detect systematic change from one period to another. Three periods, 1990–1999, 2000–2009, and 2010–2019, were identified in the corpus and analyzed on the level of thedocument in terms of linguistic indicators calculated through word-count weighting.*

Key words: *Digital Humanities, Computational Linguistics, Linguistic Evolution, Corpus Analysis, Discourse Analysis, COCA*

Annotatsiya. *Hisoblash usullarining jadal rivojlanishi katta matnli korpuslar yordamida til evolyutsiyasi va nutq naqshlaridagi o‘zgarishlarni o‘rganish uchun keng imkoniyatlar yaratdi. Ushbu maqolada 1990–2019 yillar uchun Zamonaviy Amerika ingliz tili korpusi (COCA) yordamida Amerika ingliz tilida registr va rasmiy nutq tashkilotidagi uzoq muddatli o‘zgarishlarni o‘rganish uchun hisoblash tizimi tasvirlangan.*

Ushbu tizim bir davrdan ikkinchisiga tizimli o‘zgarishlarni aniqlash uchun leksik, nutq, axborot, vaqt va statistik tahlillarni birlashtiradi. Korpus ichida uchta davr aniqlandi: 1990–1999, 2000–2009 va 2010–2019. Har bir davr so‘zlar sonining og‘irligiga asoslangan holda hisoblangan lingvistik ko‘rsatkichlar yordamida hujjat darajasida tahlil qilindi.

Kalit so‘zlar: *Raqamli gumanitar fanlar, Hisoblash lingvistikasi, Lingvistik evolyutsiya, Korpus tahlili, Diskurs tahlili, COCA*

Аннотация. *Стремительное развитие вычислительных методов создало широкие возможности для исследования эволюции языка и изменений в моделях дискурса на основе больших корпусов текстов. В статье описывается вычислительная система для исследования долгосрочных изменений регистров и формальной организации дискурса в американском английском языке с использованием Корпуса современного американского английского языка (Corpus of Contemporary American English, COCA) за период с 1990 по 2019 год. В рамках данной системы объединены лексический, дискурсивный, информационный, временной и статистический виды анализа, позволяющие выявлять систематические изменения от одного периода к другому. В корпусе были выделены три периода: 1990–1999, 2000–2009 и 2010–2019 годы. Каждый период анализировался на уровне документа с использованием лингвистических показателей, рассчитанных на основе взвешивания количества слов.*

Ключевые слова: *Цифровые гуманитарные науки, компьютерная лингвистика, языковая эволюция, корпусный анализ, дискурс-анализ, COCA*

INTRODUCTION

The rapid digitalization of contemporary longitudinal corpus has led to changes in the research of language, culture, and heritage because it allows conducting computer-based investigations of textual documents, which were available mostly through close reading. Digital Humanities (DH) creates an interdisciplinary platform where it is possible to combine computer methods, archives, linguistics, and cultural studies to conduct research on the historical evidence, which cannot be conducted using conventional approaches. The recent developments prove that digital humanities are becoming more engaged in archive studies, multilingual corpora, and computational methods, thus increasing opportunities for the investigation of cultural and linguistic diversity in historical documents (Wang & Lin, 2026). Interactive and visual methods of analysis have also helped scholars to reveal connections and structures in large corpora of text that are not so obvious in the case of traditional methods (Jänicke et al., 2017). With the advent of text mining, machine learning, deep learning, visualization, and corpus analyses, the computational approach in the field of DH has seen significant growth. The bibliometric analysis reveals that computationally oriented text research is increasingly becoming one of the significant components of the developing intellectual structure of Digital Humanities (Aladağ & Aydin, 2026). Furthermore, deep learning using neural networks has also been shown to provide the capability of extracting semantic and contextual knowledge from complicated texts beyond frequency-based analysis (Suissa et al., 2022). This is part of a wider trend within the scope of DH whereby DH is shifting from being purely digitization-focused to being an analytic research science with the combination of computation and humanistic interpretation (Dalbello, 2011). Nevertheless, the disciplinary status of DH remains in line with the integration of methods from computer sciences and humanities research (Luhmann & Burghardt, 2022). Historical textual analysis is especially beneficial for computational exploration due to the dynamic nature of language. Language undergoes transformations and modifications depending on what changes occur in society in terms of technology, politics, economy, and culture. Computational exploration, thus, becomes a way to explore language development during a long period of time rather than focus only on single documents or examples chosen manually. The formation of the international research infrastructure of DH is an indicator of growing interest in the use of computation to explore language, literature, culture, and history (Wang, 2018). In the realm of artificial intelligence, computational approaches are additionally transforming the study of language and literature due to theirability to classify and interpret collections of documents (Shweta, 2025).

MAIN PART

Computational Digital Humanities has evolved from early digitization and management techniques to become an analytical discipline that now includes natural language processing, machine learning, visualization, network analysis, and modeling. The evolution of this discipline is characterized by gradual integration of computational tools into traditional humanities research (Dalbello, 2011). Growing institutional and disciplinary consolidation has also led to the emergence of computational tools able to tackle large-scale problems of cultural and textual research (Luhmann & Burghardt, 2022). Text mining is among the main computational methods in digital humanities research due to the possibility of analyzing large amounts of data using

frequency distribution, categorization, clustering, semantic representation, and pattern detection. Text mining techniques have been applied so widely that computation can now be employed for the purpose of exploring both hypotheses and problems in humanities research (Jockers & Underwood, 2015). In addition, longitudinal bibliometric data show that there is increased intellectual coherence in the field of DH even when considered as an interdisciplinary field of study (Tang et al., 2017). Digital history, too, has begun using computational methods to study historical documents at levels beyond the capabilities of manual analysis. The state of research on digital history shows that the use of computational analysis as part of historical research is becoming more important but, at the same time, insists on the importance of historical interpretation and source criticism (Romein et al., 2020). Recent debates about the computational turn stress the change of historical research because of data-driven methods but ask for an approach to incorporating computational methods into existing historical methods (Lang, 2026). Studies on text mining of historical literature illustrate even further the penetration of digital methods into historical research (Sokova et al., 2026).

While it was impossible to build a co-occurrence network of the concepts directly, there are several discourse measures that can serve as quantitative indicators of the organization of narratives. Specifically, Reasoning, Information Comparison, Purpose–Plan, and Reader-Directed Metadiscourse altogether account for the degree of relationship building within texts, their argumentation, their purpose expression, and their guidance to the reader. The concurrent rise in these measures, as seen in table 4, shows a tendency to the development of the structured informational discourse in the years 2010-2019. To assess the validity of the suggested computational approach, the uploaded Corpus of Contemporary American English (COCA) was employed, which included the data from the period 1990-2019. COCA includes 42,720 documents, around 149.23 million words, and includes 8 text types: academic, blog, fiction, magazine, news, spoken, television/movie, and web texts. There is an equal representation of 1,068 documents per year in the temporal distribution. For analysis, the corpus was split into three periods: 1990-1999, 2000-2009, and 2010-2019. The empirical analysis evaluates document-level annotations across 42,720 COCA documents from 1990 to 2019. Variables were calculated using word-count-weighted means per chronological period to trace the evolution of lexical specialization, informational density, and discourse organization.

CONCLUSION

This study shows that through computational corpus analysis, it is possible to see gradual shifts in linguistic specialization, information structuring, reasoning, and academic discourse structuring. The methodology creates a basis for replicable research into the language development and shift in registers of contemporary language use. Through the integration of measurements related to lexicon, information, discourse structuring, time, and statistics, the study offers a multidimensional tool to detect changes in textual data over time. The results show a significant gap between the two time periods studied (1990–1999 and 2010–2019). Character types have decreased by 8.48%, but expert vocabulary has increased by 15.20%. Information Comparison and Information Quantities have increased by 12.88% and 15.24%, respectively. Discourse structuring shows particularly great progress, with Methods–Results–Discussion increasing by 28.82%, Purpose–Plan by 20.26%, and Reasoning by 21.20%. Reader-directed metadiscourse also increased by 13.92%.

The study shows that computational corpus analysis may be used to detect gradual shifts in lexical specialization, information structuring, reasoning, and discourse construction. Unfortunately, the current annotations of the COCA do not allow

one to analyze the semantic shift and cultural topics directly. While this study successfully leveraged document-level metadata to track longitudinal register shifts, future research utilizing raw text corpora can extend this framework.

Specifically, incorporating contextual vector embeddings (SSw) will enable micro-level semantic shift tracking, latent Dirichlet allocation (TPk,t) can capture explicit thematic topic shifts, and weighted co-occurrence networks (Wij) can map evolving concept topologies.

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OLIY TA’LIM MUASSASALARIDA MENTORLIK FAOLIYATI VOSITASIDA TALABALARNING QADRIYATLI TARBIYASINI TAKOMILLASHTIRISH

G‘aybullayev Quvonchbek G‘olibjon o‘g‘li
Buxoro davlat universiteti Pedagogika kafedrasi 1-bosqich tayanch doktoranti
https://doi.org/10.5281/zenodo.22870853

Annotatsiya. *Mazkur maqolada oliy ta'lim muassasalarida talabalarni ma'naviy-axloqiy jihatdan kamol toptirishda mentorlik usulining pedagogik imkoniyatlari yoritilgan. Mentorlik asosida qadriyatli tarbiya modelini joriy etishning nazariy asoslari, tarkibiy komponentlari hamda amaliy mexanizmlari tahlil qilingan. Shuningdek, mentor va mentee o‘rtasidagi hamkorlik orqali talabalarda milliy va umuminsoniy qadriyatlarni shakllantirish, refleksiv fikrlashni rivojlantirish hamda ijtimoiy mas'uliyatni kuchaytirish yo‘llari asoslab berildi.Mentorlik uslubini rivojlantirishdan madsadimiz shuki kelajagimiz bo‘lmish yoshlarni ilg‘or fikrlovchi va ma’naviy-axloqiy tafakkurlarini boyitishdan iborat.*

Kalit so‘zlar: *mentorlik, qadriyatli tarbiya, ma'naviy-axloqiy tarbiya, oliy ta'lim, mentor, refleksiya, pedagogik model, kompetensiya, qadriyatli yondashuv.*

Аннотация. *В данной статье рассматриваются педагогические возможности применения наставничества в духовно-нравственном воспитании студентов высших учебных заведений. Проанализированы теоретические основы, структурные компоненты и практические механизмы внедрения модели ценностно-ориентированного воспитания на основе наставничества. Обоснованы пути формирования у студентов национальных и общечеловеческих ценностей, развития рефлексивного мышления и усиления социальной ответственности посредством эффективного взаимодействия между наставником и студентом.*

Ключевые слова: *наставничество, ценностно-ориентированное воспитание, духовно-нравственное воспитание, высшее образование, наставник, студент (mentee), рефлексия, педагогическая модель, компетентность, ценностный подход.*

Abstract. *This paper examines the pedagogical potential of mentoring in the spiritual and moral education of university students. It analyzes the theoretical foundations, structural components, and practical mechanisms for implementing a value-based education model through mentoring. The study substantiates effective ways of fostering national and universal values, developing reflective thinking, and strengthening students' social responsibility through productive mentor–mentee interaction.*

Keywords: *mentoring, value-based education, spiritual and moral education, higher education, mentor, mentee, reflective thinking, pedagogical model, competence, value-based approach*

KIRISH

Globallashuv, raqamli transformatsiya va ijtimoiy munosabatlarning jadallashuvi sharoitida yoshlarning ma'naviy qadriyatlarini mustahkamlash dolzarb pedagogik vazifalardan biri hisoblanadi. Oliy ta'lim tizimida mazkur vazifani samarali amalga oshirishning innovatsion shakllaridan biri mentorlik usulidan foydalanishdir.

Mentorlik – bu tajribali mutaxassis yoki pedagogning talabaning kasbiy, shaxsiy va ma'naviy rivojlanishiga tizimli ko‘mak berish jarayonidir. Ushbu jarayonda mentor nafaqat bilim beruvchi, balki ma'naviy yo‘l-yo‘riq ko‘rsatuvchi, ijtimoiy tajriba ulashuvchi va shaxsiy namuna vazifasini ham bajaradi. Shu jihatdan mentorlik qadriyatli tarbiyaning muhim pedagogik vositasi sifatida namoyon bo‘ladi.

Taklif etilayotgan qadriyatli tarbiya modeli quyidagi komponentlardan iborat:

Maqsadli komponent – talabalarda milliy va umuminsoniy qadriyatlarni shakllantirish;

Mazmuniy komponent – ma'naviy-axloqiy, fuqarolik, kasbiy va ijtimoiy qadriyatlarni o‘z ichiga oluvchi ta'lim mazmuni;

Jarayon komponenti – mentorlik uchrashuvlari, refleksiv suhbatlar, loyiha faoliyati, ijtimoiy tashabbuslar va individual rivojlanish rejalari;

Diagnostik komponent – qadriyatlar shakllanish darajasini monitoring qilish, refleksiya va baholash mezonlari;

Natijaviy komponent – ma'naviy yetuk, mas'uliyatli, kasbiy kompetent va ijtimoiy faol shaxsni shakllantirish.

Mazkur modelni joriy etishda mentor va talaba o‘rtasida ishonchli muloqot, individual yondashuv, muntazam refleksiya hamda amaliy faoliyatning uzviyligi asosiy tamoyillar sifatida qaraladi. Mentorlik jarayonida talabalarning hayotiy vaziyatlarni tahlil qilish, mustaqil qaror qabul qilish, ijtimoiy mas'uliyatni his etish va qadriyatlarga asoslangan xulq-atvorni namoyon etish ko‘nikmalari rivojlanadi.

ADABIYOTLAR SHARHI VA NAZARIY ASOS

Talabalarda qadriyatli tarbiyani takomillashtirish hamda mentorlik texnologiyalarini ta'lim jarayoniga joriy etish masalalari zamonaviy pedagogika fanining ustuvor yo‘nalishlaridan biri hisoblanadi. So‘nggi yillarda oliy ta'lim tizimida shaxsga yo‘naltirilgan ta'lim, kompetensiyaviy yondashuv va qadriyatli tarbiya konsepsiyalarining rivojlanishi mentorlik faoliyatining mazmun va mohiyatini yangi bosqichga olib chiqdi.

Xorijiy ilmiy manbalarda mentorlik talabaning akademik muvaffaqiyati, kasbiy rivojlanishi va shaxsiy kamolotini ta'minlovchi samarali pedagogik mexanizm sifatida talqin etiladi. K.E. Kram mentorlikni tajribali mutaxassis tomonidan yosh shaxsning kasbiy va shaxsiy rivojlanishini qo‘llab-quvvatlashga qaratilgan uzluksiz hamkorlik jarayoni sifatida izohlaydi. G. Crisp va I. Cruz mentorlikning psixologik qo‘llab-quvvatlash, kasbiy yo‘naltirish, akademik maslahat va shaxsiy rivojlanishga ko‘maklashish kabi asosiy funksiyalarini ilmiy jihatdan asoslab berganlar.

L.S. Vygotskiyning ijtimoiy-madaniy rivojlanish nazariyasi ham mentorlikning ilmiy asosini tashkil etadi. Unga ko‘ra, shaxsning rivojlanishi ijtimoiy hamkorlik va tajribali shaxs bilan muloqot jarayonida yuz beradi. Aynan mentor va talaba o‘rtasidagi hamkorlik "yaqin rivojlanish zonasi"ni kengaytirib, talabaning intellektual hamda ma'naviy rivojlanishini jadallashtiradi.

Aksiologik yondashuv bo‘yicha ilmiy tadqiqotlarda qadriyatlar shaxsning dunyoqarashi, xulq-atvori va ijtimoiy faolligini belgilovchi asosiy omil sifatida e'tirof etiladi. M. Rokeach qadriyatlarni inson xulq-atvorini boshqaruvchi barqaror e'tiqodlar tizimi sifatida tavsiflagan bo‘lsa, Sh. Schwartz qadriyatlarning universal modelini ishlab chiqib, ularning shaxs va jamiyat taraqqiyotidagi o‘rnini asoslab bergan.

MUHOKAMA VA TAHLIL

Olib borilgan nazariy tahlillar va pedagogik manbalar o‘rganilishi shuni ko‘rsatadiki, oliy ta’lim tizimida talabalarning ma’naviy-axloqiy tarbiyasini samarali tashkil etishda mentorlik usuli muhim pedagogik vositalardan biri hisoblanadi. An’anaviy tarbiyaviy ishlar ko‘proq ommaviy tadbirlar, ma’ruzalar va suhbatlar orqali amalga oshirilayotgan bo‘lsa, mentorlik modeli individual yondashuv, doimiy muloqot va o‘zaro ishonchga asoslanganligi bilan ajralib turadi. Shu sababli mentorlik orqali qadriyatlarni singdirish jarayoni talabaning shaxsiy ehtiyojlari, qiziqishlari va rivojlanish xususiyatlarini hisobga olgan holda tashkil etiladi.

Tahlillar shuni ko‘rsatadiki, mentor va talaba o‘rtasidagi muntazam hamkorlik talabalarda refleksiv fikrlash, mustaqil qaror qabul qilish, kasbiy mas’uliyat va ijtimoiy faollikning rivojlanishiga xizmat qiladi. Mentor tomonidan beriladigan tavsiyalar, hayotiy tajribalar va shaxsiy namuna talabaning ma’naviy qadriyatlarni anglash hamda ularni kundalik faoliyatida qo‘llashiga ijobiy ta’sir ko‘rsatadi. Bunday jarayon qadriyatlarni faqat nazariy tushunish emas, balki amaliy faoliyat orqali ichki e’tiqodga aylantirish imkonini beradi.

Qadriyatli tarbiya modelini mentorlik asosida tashkil etishda to‘rtta asosiy omil alohida ahamiyat kasb etadi. Birinchidan, mentorning kasbiy va ma’naviy salohiyati yuqori bo‘lishi zarur. Mentor talaba uchun nafaqat bilim manbai, balki shaxsiy namuna ham hisoblanadi. Ikkinchidan, mentorlik faoliyati tizimli reja asosida tashkil etilishi, unda individual uchrashuvlar, guruhiy muloqotlar, refleksiv mashg‘ulotlar va ijtimoiy loyihalar uyg‘unlashtirilishi lozim. Uchinchidan, mentorlik natijalarini muntazam monitoring qilish va baholash mexanizmlarini ishlab chiqish model samaradorligini oshiradi. To‘rtinchidan, oliy ta’lim muassasasida qadriyatlarni qo‘llab-quvvatlovchi pedagogik va ijtimoiy muhitni shakllantirish mentorlik faoliyatining barqarorligini ta’minlaydi.

Xorijiy va mahalliy tadqiqotlar natijalari qiyosiy tahlil qilinganda, rivojlangan davlatlar universitetlarida mentorlik dasturlari asosan akademik moslashuv, kasbiy rivojlanish va psixologik qo‘llab-quvvatlashga yo‘naltirilgani kuzatiladi. Mazkur tadqiqotda esa mentorlikning ma’naviy-axloqiy tarbiya bilan integratsiyalashgan modeli taklif etilmoqda. Ushbu model mentorlikni nafaqat ta’lim texnologiyasi, balki talabalarning milliy va umuminsoniy qadriyatlarini shakllantirishning uzluksiz pedagogik tizimi sifatida talqin etiladi.

XULOSA

Mentorlik usuliga asoslangan qadriyatli tarbiya modeli talabalarning ma'naviy-axloqiy kamolotini ta'minlashda samarali pedagogik mexanizm hisoblanadi. Modelni oliy ta'lim tizimida tizimli ravishda joriy etish yoshlarning milliy va umuminsoniy qadriyatlarga sodiqligini mustahkamlaydi, ularning kasbiy hamda ijtimoiy kompetensiyalarini rivojlantiradi. Shu bois mentorlik faoliyatini qadriyatli yondashuv asosida tashkil etish zamonaviy pedagogik ta'limning ustuvor yo‘nalishlaridan biri sifatida e'tirof etilishi lozim.

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FARZANDLAR O‘RTASIDA HASAD HISSINI O‘RGANISHDA TADQIQOTNING METODOLOGIK ASOSI VA METODIKALAR TASNIFI

Jumabekov Ziyovuddin Xazratqul o‘g‘li
“Oila va gender” ilmiy tadqiqot instituti doktoranti BIU o‘qituvchisi
https://doi.org/10.5281/zenodo.22870898

Annotatsiya. *Mazkur maqolada farzandlar o‘rtasida hasad hissining shakllanishi va namoyon bo‘lishini o‘rganishning metodologik asoslari hamda tadqiqot metodikalarining tasnifi yoritilgan. Farzandlar o‘rtasidagi hasad hissining psixologik tabiati, uning yuzaga kelishiga ta’sir etuvchi oilaviy, ijtimoiy-psixologik va shaxsiy omillar tahlil qilingan. Tadqiqotda hasad hissini o‘rganishda kuzatish, suhbat, so‘rovnoma, psixodiagnostik metodikalar, eksperiment hamda psixologik testlardan foydalanish imkoniyatlari ko‘rib chiqilgan. Shuningdek, mazkur metodlarni tanlash mezonlari, ularning ilmiy-amaliy ahamiyati va farzandlar o‘rtasidagi munosabatlarni psixologik jihatdan baholashdagi o‘rni asoslab berilgan. Tadqiqot natijalari farzandlar o‘rtasida sog‘lom munosabatlarni shakllantirish, hasad hissining salbiy ko‘rinishlarini kamaytirish hamda oiladagi psixologik muhitni yaxshilashga xizmat qilishi mumkin.*

Kalit so‘zlar: *farzandlar, hasad hissi, aka-uka va opa-singillar munosabati, oilaviy munosabatlar, metodologik asos, psixodiagnostika, psixologik metodlar, kuzatish, suhbat, so‘rovnoma, eksperiment, shaxslararo munosabatlar.*

Abstract. *This article examines the methodological foundations and classification of research methods for studying feelings of jealousy among children. The psychological nature of jealousy between siblings and the family, socio-psychological, and personal factors influencing its development and manifestation are analyzed. The study considers the possibilities of using observation, interviews, questionnaires, psychodiagnostic methods, experiments, and psychological tests to investigate jealousy. The criteria for selecting appropriate research methods, their scientific and practical significance, and their role in assessing relationships between children are also substantiated. The findings may contribute to the development of healthy relationships among children, reduction of negative manifestations of jealousy, and improvement of the psychological climate within the family.*

Keywords: *children, jealousy, sibling relationships, family relationships, methodological foundations, psychodiagnostics, psychological methods, observation, interview, questionnaire, experiment, interpersonal relationships.*

Аннотация. *В статье рассматриваются методологические основы и классификация методов исследования чувства зависти и ревности между детьми. Анализируются психологическая природа чувства зависти между братьями и сёстрами, а также семейные, социально-психологические и личностные факторы, влияющие на его возникновение и проявление. Рассматриваются возможности применения наблюдения, беседы, анкетирования, психодиагностических методик, эксперимента и психологических тестов при изучении чувства зависти. Обосновываются критерии выбора исследовательских методов, их научно-практическое значение и роль в психологической оценке взаимоотношений между детьми. Результаты исследования могут*

способствовать формированию здоровых взаимоотношений между детьми, снижению негативных проявлений чувства зависти и улучшению психологического климата в семье.

Ключевые слова: *дети, чувство зависти, отношения между братьями и сёстрами, семейные отношения, методологические основы, психодиагностика, психологические методы, наблюдение, беседа, анкетирование, эксперимент, межличностные отношения.*

KIRISH

Oila bolaning shaxs sifatida shakllanishi, emotsional tajriba orttirishi va boshqa insonlar bilan munosabat o‘rnatishida asosiy ijtimoiy muhit hisoblanadi. Ayniqsa, aka-uka va opa-singillar o‘rtasidagi munosabatlar uzoq muddatli xarakterga ega bo‘lib, ularda yaqinlik, hamkorlik, raqobat, konflikt va hasad kabi turli emotsional holatlar bir vaqtda namoyon bo‘lishi mumkin. Sibling munosabatlarini o‘rganishga bag‘ishlangan klassik tadqiqotlarda yaqinlik, nisbiy maqom va hokimiyat, konflikt hamda raqobat alohida o‘lchamlar sifatida ajratilgan [1].

Farzandlar o‘rtasidagi hasadni tadqiq etishda uni faqat “salbiy xarakter xususiyati” sifatida baholash metodologik jihatdan yetarli emas. Hasad ko‘pincha ijtimoiy taqqoslash, ota-onaning differensial munosabati, e’tibor va resurslarning taqsimlanishi, bolaning o‘z qadrini baholashi hamda oiladagi adolatlilik haqidagi tasavvurlari bilan bog‘liq holda yuzaga keladi. Empirik tadqiqotlar aka-uka va opa-singillarning ota-onalar munosabatidagi farqlarni sezishi hamda bunday farqlarning hasad va moslashuv ko‘rsatkichlari bilan bog‘liqligini ko‘rsatadi.

Shu sababli farzandlararo hasadni o‘rganish uchun bitta test yoki bitta metodga tayanishdan ko‘ra, bir-birini to‘ldiruvchi metodlar majmuasidan foydalanish maqsadga muvofiq. Mazkur maqolaning maqsadi farzandlar o‘rtasida hasad hissini o‘rganishda qo‘llaniladigan metodologik yondashuvlarni asoslash va tadqiqot metodikalarini ilmiy-amaliy mezonlar asosida tasniflashdan iborat.

Hasad hissining vaziyatga bog‘liq o‘zgarishini aniqlash imkonini beradi. Masalan, ikki farzandga bir xil vazifa berilib, natijalar e’lon qilinadi; keyin bir farzandga alohida maqtov berilgan vaziyatda ikkinchi bolaning emotsional va xulqiy reaksiyasi kuzatiladi. Biroq bunday tajriba bolaga kuchli psixologik bosim bermasligi, qisqa muddatli va etik talablarga mos bo‘lishi kerak.

Masalan, ota-onaning differensial munosabati bilan hasad darajasi o‘rtasidagi bog‘liqlikni korrelyatsion tahlil orqali, yosh guruhlari bo‘yicha farqlarni ANOVA orqali, jins va tug‘ilish tartibining ta’sirini esa ko‘p omilli regressiya modeli yordamida tekshirish mumkin. Zamonaviy tadqiqotlarda sibling jealousy va ota-onaning differensial munosabati o‘rtasidagi aloqalarni korrelyatsion hamda regressiya asosidagi modellar bilan tekshirish amaliyoti mavjud [2].

Farzandlararo hasadni o‘rganish metodikasining samaradorligi ko‘p metodli yondashuvga bog‘liq. Sibling Relationship Questionnaire kabi vositalar munosabatning umumiy sifatini ko‘rsatadi, SIDE esa ota-onaning differensial munosabatini aniqlashga yordam beradi; kuzatish va suhbat esa ushbu ko‘rsatkichlarning hayotiy vaziyatdagi namoyon bo‘lishini ochib beradi [1; 3]. Shuning uchun bitta test natijasiga asoslanib bolani “hasadgo‘y” deb xulosalash ilmiy va etik jihatdan noto‘g‘ri.

Tadqiqotlar ota-onaning farzandlarga turlicha munosabatini bolalar sezishi va bunday farqlarning sibling jealousy bilan bog‘lanishi mumkinligini ko‘rsatadi. Shu bilan birga, farzandlar turlicha munosabatni har doim ham adolatsiz deb qabul qilmaydi: yosh, ehtiyoj va vaziyat bilan bog‘liq farqlar tushuntirilganida, adolatlilik idroki hasadning salbiy oqibatlarini

kamaytirishi mumkin [2]. Demak, tadqiqotda “differensial munosabat”ning mavjudligi bilan bir qatorda, bolaning ushbu munosabatni qanchalik adolatli deb baholashi ham alohida o‘zgaruvchi sifatida o‘rganilishi kerak.

Shuningdek, zamonaviy meta-tahliliy ishlar ota-onaning differensial munosabati bolalarning ichki va tashqi xulqiy muammolari bilan bog‘liq bo‘lishi mumkinligini ko‘rsatadi [4]. Bu holat farzandlararo hasadni faqat oilaviy nizolar nuqtai nazaridan emas, balki bolaning psixologik moslashuvi bilan bog‘liq kompleks fenomen sifatida tadqiq etish zarurligini anglatadi.

XULOSA

Farzandlar o‘rtasidagi hasad hissini ilmiy o‘rganish uchun tizimli va kompleks metodologik yondashuv zarur. Tizimli, rivojlanish, faoliyatga yo‘naltirilgan, ijtimoiy-madaniy, individual-differensial va shaxsga yo‘naltirilgan yondashuvlar mazkur hodisaning ko‘p omilli tabiatini ochib berishga xizmat qiladi.

Tadqiqot metodikalarini nazariy, empirik, psixodiagnostik, eksperimental va statistik guruhlarga ajratish maqsadga muvofiq. Ayniqsa, sibling relationship, ota-onaning differensial munosabati, adolatlilik idroki va hasadning emotsional-xulqiy indikatorlarini birgalikda baholash tadqiqotning ilmiy asoslanganligini oshiradi. SRQ va SIDE kabi xalqaro ilmiy amaliyotda qo‘llanadigan vositalarni o‘zbek tiliga moslashtirishda tarjima, ekspert bahosi, pilot tadqiqot va psixometrik tekshiruv bosqichlariga qat’iy rioya qilish zarur.

Shunday qilib, farzandlararo hasadni o‘rganishning eng maqbul modeli — bir metodga emas, balki o‘zaro to‘ldiruvchi metodlar majmuasiga asoslangan multimodal diagnostika hisoblanadi. Bunday yondashuv keyingi bosqichda hasadning oldini olish va psixokorreksion dasturlarni ilmiy asosda ishlab chiqish imkonini beradi.

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METHODOLOGY FOR TEACHING THE ESP COURSE USING AI-BASED SOFTWARE

Zulfiya Khabirova
Associate professor at Ajou university in Tashkent; Independent researcher at Nizami National Pedagogical University of Uzbekistan
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Abstract. *This article examines the methodology of teaching English for Specific Purposes (ESP) courses through the integration of artificial intelligence (AI)-based software tools. As professional communication demands grow across technical fields such as IT, engineering, and medicine, traditional ESP instruction often struggles to provide individualized pacing, sufficient speaking practice, and timely feedback. The study explores how AI technologies including chatbots, speech-recognition applications, adaptive learning platforms, and automated text-editing tools can address these limitations by enabling personalized learning, real-time assessment, and career-oriented practice. Drawing on established pedagogical frameworks such as Task-Based Language Teaching, Blended Learning, Project-Based Learning, and Data-Driven Learning, the article proposes a five-stage model for implementing AI tools in ESP classrooms: diagnosis, goal-setting, practice, feedback, and monitoring. The advantages of this integration including time efficiency, continuous practice opportunities, reduced learner anxiety, and adaptability to professional contexts are discussed alongside key limitations, such as the risk of linguistically inaccurate AI output, over-reliance on automation, unequal access to technology, and insufficient teacher training. The article concludes that AI should function as a complementary pedagogical tool rather than a replacement for the instructor, with the most effective outcomes achieved through a blended model that combines AI-driven personalization with the teacher’s methodological oversight.*

Keywords: *English for Specific Purposes (ESP), artificial intelligence in education, AI-based language learning tools, personalized learning; task-based language teaching, blended learning, teacher training.*

In the modern higher education system, teaching foreign languages with a professional focus, known as English for Specific Purposes (ESP), is becoming increasingly important. Specialists in technical fields (such as IT, engineering, medicine, and economics), in particular, require language instruction that goes beyond general grammar rules, focusing instead on terminology, texts, and scenarios directly relevant to their professional activities. Recent advancements in artificial intelligence (AI) technologies have introduced groundbreaking possibilities for ESP teaching methodologies, enabling personalized learning, automated assessment, rapid feedback, and real-time practice. This article examines the use of AI-based software tools in ESP classes, exploring their methodological foundations, practical implementation stages, as well as their advantages and limitations. [1;2]

The Role of ESP and Traditional Methodology

Traditional ESP classes often face several challenges:

a. Disparities among students within a group regarding their language proficiency and professional focus;

b. Insufficient time for the teacher to provide an individualized approach to each student;
c. Limited classroom time available for oral communication practice (speaking);
d. Rote memorization of professional terminology as isolated vocabulary rather than in context;
e. Delays in the writing process and in providing feedback.

AI-based solutions serve to bridge precisely these gaps.[3]

Main types of AI tools and their functions in ESP classes.

Type of AI Tool	Examples	Main Function in ESP Class
Chatbots (conversational AI)	ChatGPT, Claude, Gemini	Free-form communication on professional topics, Q&A, role-plays (e.g., “IT job interview simulation”)
Speech recognition & pronunciation analysis	ELSA Speak, Speechling	Automatic pronunciation assessment, highlighting individual errors
Text generation & editing tools	Grammarly, QuillBot, ChatGPT	Grammatical and stylistic support in writing professional texts (reports, technical documents, CVs)
Adaptive learning platforms	Duolingo for Schools, Century Tech	Recommending exercises based on each student's level
Translation & terminology tools	DeepL, Reverso Context	Translating and explaining field-specific terms in context
Presentation & visual content generators	Canva AI, Gamma, ChatGPT+DALL·E	Preparing professional presentations for student projects

1- Table. An overview of AI tool categories and their primary application in teaching ESP (English for Specific Purposes).

3. Methodological Approaches

There are several pedagogically sound approaches to using AI tools in an ESP course. Each serves a specific purpose and objective; therefore, it is recommended to employ them as a complementary system rather than in isolation.

3.1. Personalized Learning Approach

AI systems analyze each of the student’s responses to identify strengths and weaknesses, subsequently suggesting tailored exercises.

Mechanism: The platform records the specific grammatical structure or lexical unit where the student made an error in an “error database” and generates practice exercises based on this data.

Application in the ESP context: For an IT student, for instance, the topic of “Present Perfect vs. Past Simple” is practiced using examples from technical reports (e.g., “The system has crashed three times this week”) basing the exercises on professional texts rather than general language content.

Result: Each student progresses at their own pace (self-paced learning), and proficiency gaps within the group are reduced.[4]

3.2. Task-Based Language Teaching (TBLT) + AI

In this approach, the student is assigned a specific professional task, while the AI acts as a “language partner” during the execution of that task. Stages: the task is assigned → the student completes the task while interacting with AI → AI provides feedback on language and content → the teacher conducts a final analysis.

IT ESP example: Given the task "Write a message to the technical support department regarding a server error," the student first drafts it with an AI chatbot and then presents it in the classroom.

Advantage: language is not separated from the task and the student practices using the language rather than just studying it.[1;4]

3.3. Blended Learning Model

Combining classroom instruction with independent work on an AI platform.

Flipped classroom variant: the student independently masters a new topic (e.g., technical vocabulary or grammatical structures) at home using an AI tool, while the classroom session focuses solely on practice and discussion.

Time allocation: 70% of the lesson is dedicated to practice and 30% to theory, as the theoretical component is mastered at home via AI.

3.4. Project-Based Learning (PBL) and AI

Students work in groups on a real-world professional project, with AI serving as an assistive tool during the research, text drafting, and presentation stages.

Example: IT students prepare a "New Mobile App Presentation" in English drafting the text with AI (ChatGPT), designing the presentation (Canva AI/Gamma), and practicing pronunciation (ELSA Speak). Skills: This approach develops not only language proficiency but also professional-communicative and digital literacy.[5]

3.5. Corpus-based teaching (Data-Driven Learning, DDL)

Using AI and large language corpora, students study patterns of word and phrase usage in authentic professional texts.

Tool: Sketch Engine, AntConc, or submitting a prompt to an AI chatbot such as: “In what contexts is the word “deploy” used in the IT sector? Provide 10 examples.”

Benefit: The student learns the word not merely by its dictionary definition but within its natural context.

3.6. Formative assessment and rapid feedback (AI-based Formative Assessment)

AI provides immediate feedback on every exercise or written assignment, reducing a process that traditionally required days of waiting to mere seconds.

Application: Upon submitting a technical report via Grammarly or QuillBot, the student instantly receives recommendations regarding grammar, style, and clarity.

Teacher’s role: The teacher maintains methodological oversight by “filtering” the AI-generated feedback and verifying its professional and contextual accuracy.[6;7]

3.7. Collaborative learning mediated by AI

Students work in groups, and the AI acts as a “third party” a moderator or teacher.

Comparison Table of methodological Approaches:

Approach	Main AI Tool	Skill Developed	Frequency of Use
Personalized Learning	Duolingo for Schools, Century Tech	Grammar, vocabulary	Every lesson

Approach	Main AI Tool	Skill Developed	Frequency of Use
Task-Based + AI	ChatGPT, Claude	Speaking, writing, problem-solving	1–2 times a week
Blended Learning	Any AI platform	Independent learning	Ongoing (homework)
Project-Based Learning	ChatGPT + Canva AI + ELSA	Complex communicative skills	2–3 projects per semester
Data-Driven (Corpus-Based) Learning	AntConc, AI chatbot	Contextual vocabulary	When introducing new topics
Formative Assessment	Grammarly, QuillBot	Written accuracy	Every written assignment
Collaborative Learning	AI moderator (chatbot)	Communication, critical thinking	Group work sessions

2-Table. Methodological approaches for integrating AI-based software tools into ESP (English for Specific Purposes) courses.

Integrating AI tools into an ESP (English for Specific Purposes) course should not be done haphazardly but rather through a series of consistent stages.

The first stage is diagnosis which involves determining the students’ initial language proficiency using AI-based testing. The goal of this stage is to segment the group according to proficiency levels, ensuring that each student begins working on exercises suited to their specific level of difficulty.

The second stage involves setting objectives: selecting the AI tool best suited to the professional context of each topic. Consequently, the appropriate tool is seamlessly integrated, for instance, choosing Grammarly for technical writing tasks or a chatbot for communication exercises.

The third stage is practice, which takes place either in class or at home through interactive AI-driven exercises (such as dialogues or writing tasks). During this stage, students transform theoretical knowledge into practical skills by applying the language units they have learned to real-life situations.

The fourth stage focuses on feedback: the AI performs an automated assessment, followed by a final review conducted by the instructor. This two-tiered system ensures rapid and precise feedback; students learn of their errors immediately, while the instructor maintains quality control.

The fifth and final stage is monitoring, which entails tracking student progress via an AI dashboard. This allows for the observation of each student's individual development trends over time and enables methodological adjustments when necessary. The consistent execution of these five stages ensures the systematic and effective integration of AI tools into the ESP course with no single stage yielding a complete result on its own. [8;9]

Integrating AI tools into an ESP course offers a number of significant advantages.

Time savings - in traditional teaching methods, a large portion of an instructor’s time is consumed by routine tasks, such as manually checking for basic grammatical errors in students’ written work or repeatedly answering the same types of questions. AI tools take over many of these tasks: they automatically analyze text, highlight errors, and even suggest corrections.

Consequently, instructors can dedicate the time saved to methodological planning, improving lesson quality, and engaging in more in-depth, individualized work with students.

Opportunities for 24/7 practice - classroom sessions are time-constrained, making it difficult to allocate sufficient time for each student to practice speaking. AI tools overcome this limitation, allowing students to practice independently in the evening, on weekends, or at any other convenient time. This is particularly important for students who work or have busy schedules, as it enables them to maintain continuous language practice outside the classroom.

A safe environment - many students feel self-conscious about making mistakes or mispronouncing words in front of their peers, which can inhibit active participation. One-on-one interaction with AI eliminates this social pressure, allowing students to experiment freely without the fear of making errors. Reducing this psychological barrier, in turn, boosts the student’s motivation to learn the language and increases their active participation.

Adaptability to professional contexts - one of the greatest strengths of AI tools is their ability to rapidly generate text and scenarios tailored to any field. Whether it is a technical report for IT, a patient interaction script for medicine, or a financial analysis for economics, all of these can be created in mere seconds. This alleviates the need for the teacher to manually prepare materials every time and enables a more complete practical realization of the “profession-oriented” principle inherent in ESP courses.

However, integrating AI tools into ESP classes also introduces a number of serious challenges and risks that cannot be overlooked.

The possibility of linguistically incorrect or contextually inappropriate responses. No matter how advanced AI models are, they can sometimes produce responses that are grammatically incorrect, stylistically unsuitable, or even contain misapplied domain-specific terminology. If the teacher does not monitor for such errors, there is a risk that the student might accept an incorrect language pattern as “correct” and reinforce it in their own speech. Therefore, it is essential for teachers to always verify AI-generated results.

The risk of over-reliance on AI

If a student becomes accustomed to completing every assignment with AI assistance, it may weaken their skills in independent thinking, text composition, and problem-solving. In particular, completing written assignments entirely through AI deprives students of opportunities for critical thinking and creative writing. To prevent this, AI should be used solely as a “support tool” one that enhances independent work rather than replacing it. [10]

Inequality in internet access and device availability. Not all students have access to high-quality internet connections, modern smartphones, or computers. This disparity can be particularly pronounced in regional higher education institutions or among socio-economically disadvantaged students. Consequently, AI-based assignments may fail to provide equal opportunities for all students, raising concerns about educational equity.

Insufficient methodological preparedness among teachers. Effectively utilizing AI tools requires not only technical skills but also methodological knowledge; it is crucial to understand which tool suits a specific purpose, how to integrate it into lessons, and how to evaluate the results. Many teachers have not undergone specific training in this area; therefore, there is a need to organize professional development courses on AI-based teaching methodologies for university-level educators.

Given these challenges, the key to achieving effective results lies in using AI tools cautiously, under clear methodological oversight, and in balance with traditional teaching methods.

Conclusion

Artificial intelligence enriches the teaching methodology for Physical Education ESP courses, making them personalized, interactive, and career-oriented. However, AI does not replace the teacher; rather, it should be utilized as a tool to support the pedagogical process. The most effective results are achieved through a blended model that integrates AI technology with traditional methods, with the teacher acting as a methodological supervisor and facilitator.

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DEVELOPING AN EXPANDED LEARNING ENVIRONMENT IN TESOL THROUGH GENERATIVE ARTIFICIAL INTELLIGENCE: INFORMATION INTEGRATION AND INTERACTIVE LEARNING

Khatamov Farkhod Bakhodirovich
Master’s student at Webster University in Tashkent
mr.faro.acro@gmail.com
https://doi.org/10.5281/zenodo.22871764

Abstract. *The integration of generative artificial intelligence into education has expanded opportunities for accessing information, processing learning materials, and developing interactive communication in language learning. However, the pedagogical value of these opportunities depends on how the technology is positioned within the learning process. Effective use requires generative AI to function not as a provider of ready-made answers, but as an intelligent tool that connects learners with reliable information sources, adapts learning content to their needs, and supports active language practice. Against this background, the article examines the pedagogical role of generative AI in creating an expanded learning environment for TESOL. Particular attention is given to the integration of reliable information resources, GenAI-mediated support, interactive language practice, cognitive processing, and human verification within a unified learning environment. The article also highlights how such an environment can broaden learners’ access to information, intensify meaningful language interaction, support critical engagement with learning materials, and promote the independent production of language output. In this context, generative AI is viewed not as a substitute for teachers or learners, but as an intelligent mediator that extends opportunities for active, personalized, and critically informed language learning.*

Keywords: *TESOL, generative artificial intelligence, expanded learning environment, information integration, interactive learning, English language teaching, digital pedagogy, information verification, active learning.*

Annotatsiya. *Ta’lim jarayoniga generativ sun’iy intellektning integratsiyalashuvi axborotdan foydalanish, o‘quv materiallarini qayta ishlash va til o‘rganishda interaktiv muloqotni rivojlantirish imkoniyatlarini kengaytirmoqda. Biroq uning pedagogik samaradorligi texnologiyaning ta’lim jarayonida qanday qo‘llanilishiga bog‘liq. Mazkur maqolada TESOL doirasida generativ sun’iy intellektning kengaytirilgan ta’lim muhitini shakllantirishdagi o‘rni tahlil qilinadi. Asosiy e’tibor ishonchli axborot manbalari, interaktiv til amaliyoti, o‘quv mazmunini moslashtirish, kognitiv qayta ishlash va inson tomonidan tekshirish jarayonlarini yagona ta’lim muhitiga integratsiyalashga qaratiladi. Generativ sun’iy intellekt o‘qituvchi yoki o‘rganuvchini almashtiruvchi vosita emas, balki faol, shaxsiylashtirilgan va tanqidiy fikrlashga asoslangan til o‘rganishni qo‘llab-quvvatlovchi intellektual vositachi sifatida talqin etiladi.*

Kalit so‘zlar: *TESOL, generativ sun’iy intellekt, kengaytirilgan ta’lim muhiti, axborot integratsiyasi, interaktiv ta’lim, ingliz tilini o‘qitish, raqamli pedagogika, axborotni tekshirish, faol ta’lim.*

The initial integration of digital technologies into education primarily expanded opportunities to convert learning materials into electronic formats, distribute them remotely, and retrieve information rapidly. The development of generative artificial intelligence, however, is moving this process into a qualitatively new stage. Contemporary GenAI systems can communicate with users in natural language, organize large volumes of content, explain the same concept at different levels of complexity, generate examples and exercises, analyze texts, and provide feedback. Their educational significance therefore cannot be assessed solely in terms of the speed of information retrieval. TESOL (Teaching English to Speakers of Other Languages) constitutes a particularly suitable pedagogical context for this technological shift. Language acquisition depends not only on receiving information about grammatical rules or lexical items, but also on sustained exposure to the language, meaningful input, interaction, expression of one's own ideas, feedback on errors, and the transfer of acquired knowledge to new communicative situations. GenAI has the potential to expand precisely these forms of activity. Yet realizing this potential requires an important conceptual distinction. Treating GenAI as a source of knowledge is not the same as using it as an intelligent mediator that expands access to knowledge sources and supports engagement with them. In the first case, a learner may accept an AI-generated response as ready-made knowledge. In the second, AI helps the learner identify, compare, interpret, and study content from multiple sources, while determining the reliability of information and constructing knowledge from it remain human responsibilities.

UNESCO emphasizes that the use of generative AI in education should be guided by human-centered principles and should expand human learning opportunities and agency [1]. Research in TESOL likewise shows that GenAI can support dialogue simulation, responses to grammar-related questions, the creation of multimodal materials, feedback, and individualized learning [2]. The growing body of recent empirical literature further confirms the relevance of this issue. A 2025 systematic review by Li, Tan, Wang, and Lowell covered 144 empirical studies published in 2023-2024. Of these, 86.7% focused on higher education, 86.1% were conducted in EFL contexts, and 42.4% addressed writing. Although the field is developing rapidly, the authors demonstrate that there remains a need to integrate different language skills within a unified pedagogical system and to investigate the deeper mechanisms of GenAI integration [3]. Accordingly, this study addresses the following research problem: How can the information retrieval and processing capabilities of generative AI be integrated with the communicative nature of TESOL in a way that expands learners' access to knowledge, language practice, and independent intellectual activity rather than creating dependence on technology?

The analysis indicates that the value of generative AI in TESOL is best understood not through isolated functions, but through four interrelated dimensions of pedagogical expansion. In a traditional TESOL lesson, the learning environment often consists of a textbook, materials recommended by the teacher, dictionaries, and a limited range of digital resources. Although such resources remain important, they offer limited capacity to reorganize content quickly in response to a learner’s specific question or to adapt it to the learner’s proficiency level. GenAI introduces a new function in this context: it becomes an intelligent interface that facilitates engagement with materials of different types and complexity. Instead of merely obtaining a definition of a topic, a learner can identify differences between concepts, ask for a complex text to be re-explained at B1 or B2 level, compare opposing viewpoints, generate an example for an authentic situation, or create questions based on existing materials. For this reason, the present study defines information integration not as the simple accumulation of information, but as a

process of locating → selecting → connecting → adapting → verifying → transforming information into a learning task. An important limitation must nevertheless be recognized: generative AI itself does not replace an academic source. In a study by Franzoni Velázquez, Huerta, and Jensen examining the generation of academic references with earlier versions of ChatGPT, only 48% of 50 generated references corresponded to existing sources. This finding cannot be transferred directly to all current GenAI systems because models and search capabilities are evolving rapidly; nevertheless, it clearly demonstrates the need to verify AI-generated bibliographic information independently [10]. Thus, a robust TESOL learning environment should be based on the principle AI ≠ source; rather, AI = source navigator + synthesizer + learning mediator. This distinction constitutes one of the study's key theoretical conclusions.

A second fundamental advantage of GenAI in TESOL is its ability to transform information into interaction. A conventional electronic text does not respond to a learner's questions; a video lesson does not adapt to the learner's errors; and a dictionary cannot serve as a conversational partner. GenAI, by contrast, creates a two-way and iterative interaction between information and the user. For example, the topic of a “job interview” may be taught in a traditional lesson through a text and a prepared dialogue. With GenAI, however, the learner can simulate several types of job interview by changing the interviewer's profession, the level of difficulty, and the nature of the questions; receive feedback on responses; explore alternative expressions; and repeat the interaction. In a study involving 65 EFL learners, Fathi, Rahimi, and Derakhshan found that AI-mediated interactive speaking activities produced positive results in the development of speaking skills and willingness to communicate in English compared with conventional face-to-face practice [4]. Similar outcomes have been observed in reading. In a 12-week study with university EFL students, Pan, Lai, and Guo found that GenAI-enabled interactive and personalized support positively influenced students' use of self-regulated reading strategies and their engagement in reading [5]. These findings show that interactivity should not be understood simply as frequent learner-AI conversation. The pedagogical value of interaction is determined by whether each exchange leads the learner to produce new language output. A simple question → AI response cycle is therefore insufficient. For TESOL, a productive cycle should take the form input → question → interaction → language output → feedback → revision → new language output.

Access to information and interactivity do not, by themselves, constitute learning. A learner may receive a large amount of information and interact with AI for an extended period, yet the cognitive outcome will remain limited if the learner does not analyze the content, compare it, or transfer it to a new context. For this reason, cognitive transformation is introduced in this study as the third requirement of a GenAI-based expanded learning environment. Information obtained through AI must be transformed by the learner into new knowledge. For example, asking AI to “explain the difference between formal and informal English” represents a first-level use. If the learner then obtains two sample texts in different registers and independently identifies their differences, the activity moves to a second level. If the learner subsequently converts a given informal message into an academic register independently and justifies the choices made, the activity reaches a higher cognitive level. The strength of GenAI in TESOL therefore lies not in the perfection of a ready-made answer, but in its capacity to move the learner from asking a question to reconstructing knowledge. In a 2025 study by Kohnke, Zou, and Su, students of English for Academic Purposes evaluated positively the personalized

feedback and creative support offered by GenAI tools; 66.7% of participants reported using such tools regularly. At the same time, learners also identified the risks of irrelevant feedback and over-reliance [7]. Accordingly, the central criterion of an expanded learning environment should not be “How much work did AI do?” but rather “How much new intellectual and communicative work was the learner able to perform with the support of AI?” Based on these findings, generative AI should be organized not as an isolated electronic tool, but as part of an expanded learning environment that connects information, interactivity, and human activity.

Table 1

Expanded Learning Environment Based on Generative Artificial Intelligence

Environment component	Core content	GenAI function	Human activity	Expected pedagogical outcome
1. Verifiable information resources	Textbooks, articles, corpora, authentic texts, audio-video materials, teacher-provided materials	Locating, grouping, comparing, and explaining information	Selecting sources and verifying their reliability	Expanded access to information
2. Intelligent mediation	Adapting content to proficiency level, purpose, and context	Simplifying, reformatting, and generating examples and exercises	Creating needs-based prompts and pedagogical tasks	Personalized learning
3. Interactive language environment	Speaking, writing, reading, vocabulary, pragmatics	Dialogue, simulation, role-play, immediate feedback	Active interaction and production of language output	Greater intensity of language practice
4. Cognitive processing	Comparing, critiquing, editing, and synthesizing	Generating alternative responses and contrasting positions	Selecting, justifying, and drawing independent conclusions	Deeper acquisition of knowledge

Environment component	Core content	GenAI function	Human activity	Expected pedagogical outcome
5. Human verification	Accuracy, cultural appropriateness, academic reliability	Providing supporting signals and explanations for verification	Final expert judgment by the teacher and learner	Reliable and pedagogically grounded outcomes

A distinctive feature of the proposed concept is that GenAI is not placed at the center of the system. Instead, the learner’s learning activity occupies the central position. Artificial intelligence strengthens the connections between information resources and learner activity. Conceptually, the process can be represented as follows:

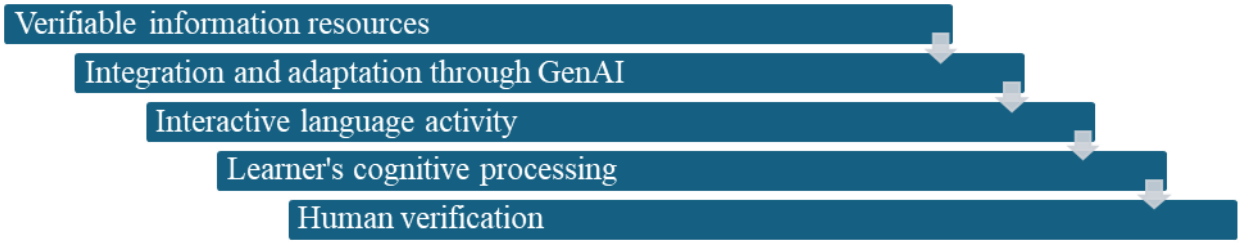


Figure 1. Conceptual model of the GenAI-based expanded learning environment in TESOL

This model is not a linear process. If a learner encounters a new question during verification, the learner returns to the sources; if feedback reveals a new error, a new exercise is generated; and if the teacher increases the complexity of the task, GenAI creates a new communicative situation. The expanded environment therefore operates as an iterative, adaptive learning ecosystem based on continuous interaction. A 2025 study by Guan, Lee, Zhang, and Gu similarly shows that the balanced integration of teachers, learners, and AI in EFL education can strengthen human pedagogical interaction through mediation rather than replacing it [6].

The model’s core theoretical principle is that the pedagogical effectiveness of GenAI should be assessed by considering four criteria together:

- Information breadth - Was the learner able to work with a larger and more diverse range of reliable information than before?

- Interactivity - Did the learner gain greater opportunities to engage actively with the language and receive feedback?

- Cognitive depth - Did the learner merely receive information, or did the learner compare, evaluate, process, and transform it into a new outcome?

- Reliability - Was the generated content supported by verifiable sources, aligned with the pedagogical purpose, and confirmed through human expertise?

If any one of these four criteria is absent, the pedagogical value of GenAI decreases. For example, when information breadth is high, but verification is absent, the risk of inaccurate information increases. When interactivity is high but cognitive activity is low, interaction becomes superficial. Conversely, when a reliable source is available but no interactive processing takes place, GenAI differs little from conventional electronic search.

The proposed approach also changes the structure of the TESOL lesson itself. For example, in a traditional lesson on “Environmental Problems” a learner may read a prepared text and answer comprehension questions. In an expanded learning environment, the teacher first defines a set of reliable materials or establishes criteria for acceptable sources. With the help of GenAI, the learner identifies topic-specific terminology, compares perspectives from two or three sources, requests explanations of unfamiliar content at an appropriate CEFR level, and identifies contrasting positions. AI then creates a communicative situation such as an international climate conference, a university debate, or a local community meeting. The learner develops an argument, responds to questions, and receives feedback. The learner then compares the AI-generated response again with evidence from authentic sources and independently produces a final spoken presentation or argumentative paragraph. In this process, GenAI does not write the text on behalf of the learner. Instead, it creates conditions for the learner to consult more sources → ask more questions → engage in more interaction → compare more alternatives → produce a higher-quality independent outcome. This sequence captures the essential meaning of the expanded learning environment.

The study demonstrates that the principal pedagogical value of generative artificial intelligence in TESOL is better explained not by its capacity to replace teachers or learners, but by its ability to expand their opportunities for teaching and learning. First, GenAI should be used in TESOL not as an independent and final source of information, but as an intelligent mediator that helps locate, connect, explain, and reorganize diverse verifiable information resources in accordance with pedagogical goals. Second, an important advantage of GenAI is its ability to transform existing learning materials into an interactive environment. Through speaking simulations, role-play, individualized question-and-answer activities, writing feedback, and reading support, this environment increases the amount of time learners actively engage with the language. Third, more information and more interaction do not automatically produce better educational outcomes. The pedagogical effectiveness of GenAI integration depends on whether learners compare, verify, and process the information they receive, make reasoned choices, and create new independent language output. Fourth, the study develops a concept of an expanded TESOL learning environment that integrates verifiable information resources - GenAI mediation - interactive language activity - cognitive processing - human verification within a single system. Fifth, the outcomes of GenAI integration in TESOL should be evaluated through the combined change in information breadth, interactivity, cognitive depth, and reliability. This approach makes it possible to identify the actual pedagogical added value of the technology rather than merely recording the fact that it was used. Accordingly, the AI-supported future model of TESOL should move from the principle “AI works for the learner” to the principle “AI expands the learner’s capacity to learn.” Such an approach places not the technology, but the learner at the center of GenAI use: a learner who has broader access to knowledge, engages in more interaction, processes information critically, and makes the final decision independently.

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SUN’IY INTELLEKT ASRIDA BO‘LAJAK PEDAGOGNING BOSHQARUVCHILIK QOBILIYATI: TO‘RT XALQARO TADQIQOT NATIJALARI ASOSIDA NAZARIY-METODIK SINTEZ

Kudiyarova Gauxar Iyambergenovna
Mustaqil izlanuvchi, Qori Niyoziy nomidagi Tarbiya pedagogikasi milliy instituti
Qoraqalpog‘iston filiali
https://doi.org/10.5281/zenodo.22871786

Annotatsiya. *Ushbu maqolada bo‘lajak pedagoglarning boshqaruvchilik qobiliyatlarini rivojlantirish masalasi sun’iy intellekt texnologiyalari keng qo‘llanilayotgan zamonaviy ta’lim konteksti nuqtai nazaridan ko‘rib chiqiladi. To‘rt xalqaro tadqiqot - rus (Yevstigneev va boshq., 2026; Molchanova va boshq., 2025; Glazunova va boshq., 2025) va Indoneziya (Hilhamsyah va boshq., 2025) ilmiy maktablarida e’lon qilingan ishlar - tahlil qilinib, ularning natijalari muallif tomonidan ilgari asoslangan boshqaruvchilik qobiliyatining to‘rt komponentli strukturasi (motivatsion-qadriyatli, kognitiv, faoliyatli-amaliy, refleksiv) bilan uyg‘unlashtiriladi. Maqolada kompetensiya strukturasi, promt-injiniring metodikasi, institutsional empirik dalillar va AI-TPACK pedagogik tayyorlash strategiyasi yagona nazariy-amaliy modelga birlashtiriladi. Natijada bo‘lajak pedagoglarni tayyorlashning to‘rt bosqichli (kognitiv, faoliyatli, motivatsion, refleksiv) amaliy yo‘nalishi taklif etiladi. Maqola xulosalari oliy pedagogik ta’lim muassasalarida «Pedagogik menejment asoslari» maxsus kursi mazmunini takomillashtirish uchun ilmiy-metodik asos bo‘lib xizmat qiladi.*

Kalit so‘zlar: *boshqaruvchilik qobiliyati, sun’iy intellekt, AI-TPACK, promt-injiniring, bo‘lajak pedagog, gibrid boshqaruv modeli, refleksiv komponent, pedagogik menejment.*

Аннотация. *В статье рассматривается проблема развития управленческих способностей будущих педагогов в контексте современного образования, характеризующегося широким внедрением технологий искусственного интеллекта. Проанализированы четыре международных исследования - российские (Евстигнеев и др., 2026; Молчанова и др., 2025; Глазунова и др., 2025) и индонезийское (Hilhamsyah и др., 2025), результаты которых соотнесены с ранее обоснованной автором четырёхкомпонентной структурой управленческой способности (мотивационно-ценностный, когнитивный, деятельностно-практический, рефлексивный компоненты). В статье объединяются в единую теоретико-практическую модель структура компетенций в области ИИ, методика промт-инжиниринга, институциональные эмпирические данные и стратегия педагогической подготовки на основе AI-TPACK. По итогам исследования предложено четырёхэтапное (когнитивное, деятельностное, мотивационное, рефлексивное) практическое направление подготовки будущих педагогов. Выводы статьи служат научно-методической основой для совершенствования содержания спецкурса «Основы педагогического менеджмента» в высших педагогических учебных заведениях.*

Ключевые слова: *управленческая способность, искусственный интеллект, AI-TPACK, промт-инжиниринг, будущий педагог, гибридная модель управления, рефлексивный компонент, педагогический менеджмент.*

Abstract. *This article examines the development of managerial abilities in future pedagogues within the context of contemporary education shaped by the widespread adoption of artificial intelligence technologies. Four international studies are analyzed - Russian (Yevstigneev et al., 2026; Molchanova et al., 2025; Glazunova et al., 2025) and Indonesian (Hilhamsyah et al., 2025) — and their findings are correlated with the author's previously substantiated four-component structure of managerial ability (motivational-value, cognitive, activity-practical, and reflexive components). The article integrates AI-competence structure, prompt-engineering methodology, institutional empirical evidence, and the AI-TPACK teacher-preparation strategy into a unified theoretical-practical model. As a result, a four-stage (cognitive, activity-based, motivational, reflexive) practical direction for preparing future pedagogues is proposed. The article's conclusions serve as a scientific-methodological basis for improving the content of the special course "Fundamentals of Pedagogical Management" in higher pedagogical education institutions.*

Keywords: *managerial ability, artificial intelligence, AI-TPACK, prompt engineering, future pedagogue, hybrid management model, reflexive component, pedagogical management.*

KIRISH

Bugungi kunda pedagog kasbining mazmuni sun’iy intellekt texnologiyalari ta’sirida shiddat bilan o‘zgarib bormoqda, biroq bu o‘zgarish o‘qituvchining bekor bo‘lishini emas, uning boshqaruv vazifasi tubdan yangicha shakl olishini anglatadi. Bo‘lajak pedagoglarning boshqaruvchilik qobiliyatlarini rivojlantirish metodikasini ilgari asoslagan tadqiqotimizda [1] ushbu qobiliyatning to‘rt komponentli - motivatsion-qadriyatli, kognitiv, faoliyatli-amaliy va refleksiv - strukturasi ilmiy jihatdan dalillangan edi. Biroq sun’iy intellektning ta’lim boshqaruviga jadal kirib kelishi ushbu strukturaning yangi texnologik kontekstda qanday amal qilishini alohida tahlil qilishni taqozo etadi.

Tadqiqotning maqsadi - so‘nggi xalqaro ilmiy adabiyotda e’lon qilingan to‘rt tadqiqot natijalarini tahlil qilish va ularni bo‘lajak pedagoglarning boshqaruvchilik qobiliyatlarini rivojlantirish metodikasi bilan nazariy-amaliy jihatdan bog‘lashdan iborat.

1. KOMPETENSIYA STRUKTURASI MASALASI

Yevstigneev va hammualliflari [2] o‘qituvchining sun’iy intellekt sohasidagi kompetensiyasini olti komponentga - motivatsion-maqsadli, axborot xavfsizligi, axloqiy, promt-injiniring, o‘qitish-nazorat va o‘quv jarayonini boshqarish - ajratadilar hamda buni «pedagog - sun’iy intellekt - o‘quvchi» uchburchagidagi yangi rolga o‘tish sifatida talqin qiladilar. Mualliflar ta’kidlashicha, o‘qituvchi endi «bilim manbai va uni uzatuvchi» rolidan «kuzatuvchi va murabbiy» roliga o‘tadi [2, 88-b.]. Bizning tadqiqotimizda asoslangan to‘rt komponentli struktura bilan bu model o‘zaro to‘ldiruvchi tarzda mos keladi: har ikkala yondashuv ham o‘qituvchidan nafaqat bilim, balki axloqiy mas’uliyat va o‘z-o‘zini nazorat qilish qobiliyatini talab etadi.

2. AMALIY VOSITA SIFATIDA PROMT-INJINIRING

Molchanova, Burak va Shchelokova [3] tadqiqotida ta’kidlanganidek, hibrid «o‘qituvchi + sun’iy intellekt» modelida samarali muloqot uchun aniq struktura - rol, vazifa, auditoriya, format va detallar - zarur, biroq yakuniy pedagogik qaror hech qachon algoritmga topshirilmasligi kerak: «neyrotarmoq pedagogga hamkasb emas, balki instrument bo‘lib xizmat qiladi, biroq final qarorlar inson tomonidan qabul qilinishi shart» [3, 363-b.]. Ushbu tamoyil

bizning boshqaruvchilik qobiliyati modelidagi kognitiv komponentni texnologik jihatdan boyitadi, biroq uning pedagogik mas’uliyat mazmunini o‘zgartirmaydi.

3. INSTITUTSIONAL DALILLAR

Glazunova va hammualliflarining [4] 1248 respondent ishtirokidagi keng ko‘lamli tadqiqoti sun’iy intellektning boshqaruv funksiyalariga notekis kirib kelishini ko‘rsatdi: ma’muriy jarayonlarda yuqori samara (vaqt xarajatlarini 42,3 foizga qisqartirish) qayd etilsa-da, ilmiy-metodik ish boshqaruvida joriy etish darajasi atigi 3,1 foizni tashkil etadi [4, 341–344-b.]. Bundan muhimi - gibrid model (inson va sun’iy intellekt hamkorligi) barcha modellar orasida eng yuqori samaraga ega ekanligi isbotlangan: bu «har qanday model insonni almashtirmaydi, balki inson salohiyatini kuchaytirish va jarayonlarni optimallashtirish vositasi sifatida qaraladi» degan xulosani tasdiqlaydi [4, 349-b.].

4. PEDAGOGIK TAYYORLASH STRATEGIYASI

Hilhamsyah va hammualliflarining [5] 12 xalqaro tadqiqotni qamragan sistematik sharhi TPACK modelini AI-TPACK darajasiga ko‘targan holda, o‘qituvchilarni tayyorlashda dizayn-tafakkuri va o‘sish tafakkuri tamoyillarini taklif etadi. Mualliflar ta’kidlashicha, «o‘sish tafakkuriga ega o‘qituvchilar AI savodxonligidagi cheklovlarni yakuniy nuqta emas, balki loyihalash iteratsiyasining bir qismi sifatida talqin qiladilar, muvaffaqiyatsizlik belgisi sifatida emas» [5, 293-b.]. Ushbu xulosa bizning refleksiv komponentimiz mazmunini boyitadi.

5. YAGONA METODIK MODEL

1. To‘rt manbaning sintezi bo‘lajak pedagoglarning boshqaruvchilik qobiliyatlarini rivojlantirish uchun to‘rt bosqichli amaliy yo‘nalishni taklif etadi:
2. **Kognitiv daraja** - promt-injiniring va AI savodxonligi asoslarini o‘zlashtirish;
3. **Faoliyatli daraja** - dizayn-tafakkur sikli asosida amaliy loyihalar bajarish;
4. **Motivatsion daraja** - o‘sish tafakkurini shakllantiruvchi qo‘llab -quvvatlovchi muhit yaratish;
5. **Refleksiv daraja** - inson-mashina hamkorligidagi qarorlarni axloqiy va institutsional kontekstda tahlil qilish.

XULOSA

To‘rtala manba ham bir umumiy haqiqatga ishora qiladi: sun’iy intellekt qanchalik rivojlanmasin, boshqaruv san’atining mohiyati - inson shaxsini ongli, erkin va har tomonlama shakllantirish g‘oyasi - o‘zgarmas bo‘lib qoladi, texnologiya esa faqat shu g‘oyaga xizmat qiluvchi vosita bo‘lib qolishi kerak. Kelgusi tadqiqotlarda taklif etilgan to‘rt bosqichli modelni «Pedagogik menejment asoslari» maxsus kursi doirasida empirik tekshirish va uning samaradorligini miqdoriy ko‘rsatkichlar orqali dalillash maqsad qilib qo‘yilgan.

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HUMAN AND ARTIFICIAL INTELLIGENCE COLLABORATION IN PLURILINGUAL HIGHER EDUCATION: A CONCEPTUAL FRAMEWORK FOR RESPONSIBLE LANGUAGE LEARNING IN UZBEKISTAN

Mohamadreza Jafary[1], Gulnora Nasirova[2]
[1]PhD, McGill University, Canada
[2]PhD, Uzbekistan State World Languages University, Tashkent, Uzbekistan
https://doi.org/10.5281/zenodo.22896114

Abstract. *Artificial intelligence (AI) is creating new opportunities for language learning by expanding access to practice, feedback, and learning support. However, the educational value of these technologies depends on how they are integrated into teaching and learning. This conceptual paper brings together scholarship from second language acquisition, plurilingual higher education, and critical computer-assisted language learning to examine how universities in Uzbekistan can adopt AI while preserving teacher judgement, student agency, linguistic diversity, and academic responsibility. Through an integrative conceptual synthesis, we identify three requirements for the responsible integration of AI: a clear pedagogical purpose, attention to plurilingual learners, and sustained human oversight. These requirements are translated into a seven-step Curated Augmentation Pipeline that guides the design, implementation, and evaluation of AI-supported language learning. The framework emphasizes pedagogically driven technology adoption, inclusive multilingual practices, transparent use of learning data, critical engagement with AI-generated feedback, and ongoing evaluation of learning and equity outcomes. Rather than positioning AI as an educational authority, the framework locates it within a process of human judgement and institutional accountability. For Uzbek higher education, this approach highlights the importance of multilingual resources, teacher preparation, clear disclosure policies, and context-sensitive evaluation of AI-supported learning.*

Keywords: *Artificial intelligence; human-AI collaboration; plurilingual education; higher education; responsible AI; language learning; Uzbekistan*

Introduction

Chatbots, speech recognition, translation, automated writing feedback, and adaptive platforms are already part of numerous students' language-learning procedures. They can create additional possibilities for practice and provide a response when a teacher is not readily accessible. That convenience, however, should not be confused with sound pedagogy. Once an institution introduces an AI system, it also introduces decisions about data, acceptable language, assessment, access, and commercial influence. Critical CALL is constructive here because it regards technology as part of an institutional and social arrangement rather than as a neutral device (Shakib Kotamjani et al., 2026). The literature reports genuine opportunities, but it also documents algorithmic bias, unequal access, inaccurate feedback, and uneven teacher preparation (Crompton et al., 2024). The key issue, therefore, is not whether universities will use AI, but how they will maintain educational responsibility in doing so.

The question takes on particular significance in plurilingual university settings. In Uzbekistan, students may move among Russian, Uzbek, Karakalpak, English, and other

languages as they learn a discipline and develop an academic voice. A system trained around a narrow model of English may read this movement as error. The problem is not simply hypothetical. Liang et al. (2023) found that several AI-text detectors disproportionately categorized writing by non-native writers or misidentify the writing of learners who use English as an additional language as machine-generated text. An effective system should therefore be evaluated not only by what students learn, but also by the language practices it recognizes and values.

We respond by bringing three interconnected bodies of work into discussion. One analyzes the limits and contribution of AI across second language acquisition (Kohnke et al., 2023; Jafary & Shakib Kotamjani, 2026a). A second focuses on support for plurilingual graduate students (Marshall & Moore, 2013; Jafary & Shakib Kotamjani, 2026b). The third applies an essential perspective pertaining to CALL to develop the concept of curated augmentation, in which teachers select and interpret technological assistance rather than yield authority to it (Luckin & Cukurova, 2019; Shakib Kotamjani et al., 2026). From this comparison, we develop a seven-step process for planning and reviewing AI-supported language education in Uzbekistan.

Method

We conducted an integrative conceptual synthesis rather than an empirical study. The analysis drew initially on six complementary anchor publications organized into three thematic strands: artificial intelligence in second-language teaching and learning, plurilingualism in higher education, and human-centred educational technology design. Additional research studies and policy documents were used to clarify, challenge, and corroborate the ideas identified across these strands. These published sources constituted the conceptual material for the analysis.

We compared the sources according to four dimensions: the educational purpose assigned to AI, the roles attributed to learners and teachers, the risks associated with its use, and the recommendations offered for practice. An idea was retained when it appeared across more than one strand or when independent scholarship identified a comparable concern. Three questions guided the comparison: Which learning problem is the technology expected to address? Which judgements must remain with people? What evidence would justify continuing or expanding its use? The principal outcomes of the synthesis were three requirements for responsible AI integration and the seven-step Curated Augmentation Pipeline. The framework is proposed as a basis for local implementation and evaluation; it should not be interpreted as evidence that the approach has already improved learning in Uzbek classrooms.

Results of the Conceptual Synthesis: Three Requirements for Responsible Integration

First, a tool requires a solid educational objective. A voice chatbot may give a hesitant speaker a private place to rehearse, while a writing application may help a student notice problems with organization or cohesion. Neither approach assures learning. A chatbot can maintain an exchange and still miss a request which is considered as culturally indirect; a fluent rewrite can also remove the writer's intended emphasis. Escalante et al. (2023) found that students realized the speed and detail of AI-generated feedback loops in the writing process. Those characteristics are significant only when provided feedback assists learners better understand the objective, detect a problem, and decide what to do next, the three questions emphasized by Hattie and Timperley (2007). Students should engage critically with feedback rather than simply reproducing AI-generated suggestions.

Second, the design must accommodate needed space for plurilingual practice. Students do not inevitably keep their heritage languages in isolated sections while reading, planning, or solving a problem. A quick look at the carried out studies within Canadian higher education demonstrates how coordinated and structured plurilingual activity can best enhance participation and academic language development (Galante et al., 2019). The same principle may be applicable in Uzbekistan, although its effectiveness should be examined through local adaptation and empirical testing.

A student might plan an argument in Uzbek, compare Russian and English explanations, and then select the wording that best suits an English academic audience. AI can assist this movement, but uneven training data and translation quality make human checking indispensable. Language technologies also reproduce hierarchies when one dominant variety is treated as the unmarked standard (Blodgett et al., 2020). Students who cannot or do not wish to use a commercial system need an accessible alternative (Song et al., 2024).

Third, people must remain answerable for consequential decisions. The Curated Augmentation Pipeline places AI within teaching rather than above it: teachers set the objectives, interpret the output, and decide whether a suggestion belongs in the course (Luckin & Cukurova, 2019; Shakib Kotamjani et al., 2026).

Assessment should likewise reveal the path to the final text. Drafts, notes, selected prompts, and short explanations of accepted or rejected suggestions can show how a student exercised judgement. This record is more educationally useful than asking a detector to pronounce a text human or artificial. It also accords with guidance that stresses privacy, transparency, fairness, and human control (Miao & Holmes, 2023; Nguyen et al., 2023).

Drawing on research in AI-supported language learning, feedback, plurilingualism, algorithmic fairness, and educational governance, we propose a seven-step Curated Augmentation Pipeline for the responsible design, implementation, and evaluation of AI-supported language education (Blodgett et al., 2020; Crompton et al., 2024; Kohnke et al., 2023; Miao & Holmes, 2023).

Seven Step Curated Augmentation Pipeline

Step 1 Define the pedagogical purpose

Start with a problem observed in teaching. A class may need more speaking practice, clearer distinctions between description and argument, or earlier feedback on cohesion. The expected learning outcome, the students concerned, and the permitted role of the tool should be specified in advance because effective feedback depends on a clear understanding of what learners are expected to achieve (Hattie & Timperley, 2007). Decisions about learning objectives, success criteria, assessment, accommodations, and the educational use of AI remain the responsibility of the instructor. Beginning with pedagogy rather than technology helps ensure that AI addresses an identified learning need rather than becoming a solution in search of a problem.

Step 2 Curate inclusive data and learning resources

Select examples that reflect relevant disciplines, genres, proficiency levels, and language backgrounds (Galante et al., 2019; Blodgett et al., 2020). Systems developed primarily from polished native-speaker texts may not adequately represent the linguistic practices of multilingual learners. Resources should also be reviewed for their suitability to local educational contexts, including Uzbek higher education. When local corpora are limited, educators can supplement available materials, document gaps, and consult students regarding overlooked

language practices. Issues of consent and copyright should be addressed before materials are used for training or evaluation.

Step 3 Prepare data and protect privacy

Collect only the information required for the educational purpose. Remove direct identifiers, establish clear retention periods, and limit data use to purposes communicated to students (Miao & Holmes, 2023). Data preparation should preserve meaningful features of multilingual writing, including code-switching and transliteration where relevant. Students should receive a clear explanation of how their work is processed, who can access it, and what alternatives are available if they choose not to participate. Sensitive student work should not be transferred to external platforms without appropriate institutional authorization.

Step 4 Select interpretable features and tools

Choose methods that align with the instructional objective. Vocabulary measures may help examine lexical development, contextual embeddings may support analysis of meaning, and speech-processing tools may offer tentative indicators of fluency or pronunciation (Crompton et al., 2024). Large language models can generate prompts, explanations, and feedback, but their educational value depends on how teachers and students evaluate and use the output (Kohnke et al., 2023). Before implementation, systems should be tested using local names, multilingual texts, disciplinary genres, and developing language varieties. Interpretability can support teacher review, but understandable outputs are not automatically fair or pedagogically beneficial.

Step 5 Configure the model and design the learning task

When predictive models are required, the design of AI-supported learning tasks should be guided by educational rather than technical considerations. Tools should be selected for their transparency, reliability, and pedagogical usefulness rather than their computational sophistication alone. Learning activities should focus on skills that can be taught, practiced, and improved, such as organization, evidence use, argumentation, and disciplinary communication. Greater complexity is justified only when it produces meaningful educational benefits. Classification categories should correspond to features that can be taught and improved, such as organization, evidence use, argumentation, or methodological reasoning. Learning tasks should require students to exercise judgement. For example, students might accept one AI recommendation, reject another, and justify both decisions, thereby treating feedback as an object of evaluation rather than an answer to copy (Escalante et al., 2023). A portfolio containing prompts, drafts, revisions, and an AI-use statement can help make this reasoning visible.

Step 6 Evaluate Learning Outcomes, System Performance, and Equity

Technical metrics such as accuracy, precision, recall, F1 score, and area under the receiver operating characteristic curve provide information about system performance, but they do not demonstrate educational effectiveness. Evaluation should also consider revision quality, performance on subsequent unaided tasks, student understanding, teacher workload, accessibility, and outcomes across different learner groups (Nguyen et al., 2023; Song et al., 2024). Because aggregate statistics may conceal unequal patterns of error, representative cases should also be examined qualitatively. Results should be compared with realistic alternatives, such as peer review or teacher conferencing.

Step 7 Deploy under human supervision and audit continuously

Implementation should begin on a limited scale with clearly assigned responsibilities for instructional decisions, technical support, privacy protection, and dispute resolution. Teachers should retain the authority to override system recommendations, and students should have

opportunities to question feedback or contest academic-integrity concerns (Miao & Holmes, 2023). Institutions should document model updates, recurring errors, and differences in outcomes across learner groups. Expansion should be guided by evidence of learning, fairness, and educational value. Substantial changes in curriculum, student populations, or technology should trigger a renewed review of the original pedagogical purpose.

Application in Uzbek Higher Education

Universities in Uzbekistan are facing the simultaneous challenges of expanding access to academic English, supporting students who use multiple languages, and integrating emerging digital technologies into teaching and learning. These developments create opportunities for AI-supported language education, but they also raise practical concerns regarding accuracy, transparency, privacy, teacher preparedness, and equitable access. Previous research suggests that university lecturers in Uzbekistan are generally interested in the potential of AI while remaining cautious about its educational and ethical implications (Shakib Kotamjani et al., 2023). The Curated Augmentation Pipeline offers one possible framework for addressing these concerns by locating AI within established pedagogical practices rather than treating it as a substitute for teacher expertise.

Consider a pilot in an English for Academic Purposes course. Students develop and submit a de-identified paragraph, and the system generates probable comments under content, language, evidence and organization. The teacher rewrites or eliminates improper comments before returning the assignments along with feedback and comments. Students evaluate the remaining hints with the course rubric, keep their revised and initial drafts, and clarify why they rejected at least one suggestion (Escalante et al., 2023; Hattie & Timperley, 2007). A subsequent task achieved without receiving assistance investigates whether learning is considered a transferable concept. Results can best be assessed by reported linguistic background or level of proficiency, while interviews can also characterize comments that students found linguistically narrow or culturally improper. The system performs an initial sorting function; the teacher still decides what counts as useful feedback.

Policy should draw a clear border between judgement and assistance. Confirmed uses for rehearsal, brainstorming, comparative translation, or formative feedback may be sufficient when they assist the realization of the course objectives. An unclear score should not determine a final grade, misconduct finding, admission, or any claims about authorship. According to the studies carried out on the concept of “bias” documented by Liang et al. (2023), an AI-text detector is particularly weak when it is the basis of our judgment as only evidence against a plurilingual writer. Institutions require published classifications of acceptable use, a process for appeal, disclosure proportionate to the task, and more than one form of evidence when consequences are serious.

Discussion

Taken together, curated augmentation describes an intentionally unequal partnership between human and artificial intelligence. An intended model can possibly scan many texts, identify recurrent patterns, and grant frequent practice. It cannot be held accountable for a student's grade or decode the entire cultural and disciplinary purpose of a text. Educators convey expert judgement, while students bring insight into what they intend to communicate. Effective classroom activities should make this difference visible by informing students to question, compare, and, when appropriate, reject automated suggestions rather than adopt them uncritically (Kohnke et al., 2023; Luckin & Cukurova, 2019).

This viewpoint also reforms how efficiency is understood. Improvements in grammatical accuracy alone do not constitute a sufficient educational outcome if students have learned to accept revisions without understanding the reasons behind them. In a similar vein, metrics demonstrating a strong average performance are regarded as less convincing. This is particularly the case when mistakes disproportionately influence language groups. In low-stakes learning landscapes, even an imperfect tool can still possess educational value because critiquing and analyzing its output becomes a constituent segment of the learning process. Evaluations should therefore consider not only technical performance but also learning outcomes, local language practices, and students’ ability to question and challenge automated decisions.

These conclusions stay tentative. We do not report outcome data from Uzbek classrooms, and findings from Canadian plurilingual education cannot simply be replicated and transferred to a different context. The seven steps presented here are best understood as design propositions that require further research through locally grounded studies. Future investigations could provide a more precise comparative analysis of automated feedback, teacher feedback, and blended approaches; examine how learning transfers to later unaided work; and encompass resources in Uzbek, Russian, Karakalpak, and English. Research should also explore how students and teachers interpret issues of trust, disclosure, and responsibility in everyday educational practice (Liang et al., 2023; Song et al., 2024).

Conclusion

AI has the potential to expand opportunities for practice, feedback, and language support in Uzbek higher education, but its educational value depends on how it is integrated into teaching and learning. This paper has argued that pedagogical purpose should guide technological adoption rather than the reverse. Drawing on research in second-language acquisition, plurilingual education, and critical perspectives on educational technology, we proposed three requirements for responsible AI integration and a seven-step Curated Augmentation Pipeline.

The framework is intended as a practical tool for designing, implementing, and evaluating AI-supported language learning while preserving teacher judgement, student agency, linguistic diversity, and institutional accountability. Rather than presuming educational effectiveness, it offers a structured process through which universities can generate context-sensitive evidence about the role of AI in multilingual learning environments.

Future research should examine how the framework functions in practice across different educational settings and language combinations, including Uzbek, Russian, Karakalpak, and English. Comparative studies of teacher, automated, and hybrid feedback approaches, as well as investigations of trust, transparency, and learning transfer, would further strengthen the evidence base. Ultimately, the question is less whether universities will use AI than how they will maintain educational responsibility when they do.

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НЕКОТОРЫЕ АСПЕКТЫ ОРГАНИЗАЦИИ САМОСТОЯТЕЛЬНОЙ РАБОТЫ СТУДЕНТОВ ПРИ ИЗУЧЕНИИ ДИСЦИПЛИНЫ «АНАТОМИЯ И ФИЗИОЛОГИЯ»

Миркамалов Фуркатжон Рихсиевич[1], Миркамалов Кудрат Фуркатович[2]
[1]Заместитель декана филиала МГУ имени М.В. Ломоносова в городе Ташкенте,
mirqudrat2004@gmail.com
[2]Студент Ташкентского государственного юридического университета,
mirqudrat2004@gmail.com
https://doi.org/10.5281/zenodo.22896268

Аннотация. *В статье рассматриваются педагогические возможности и границы сотрудничества человека и искусственного интеллекта при организации самостоятельной работы студентов-дефектологов, изучающих дисциплину «Анатомия и физиология». Анализ литературы показал, что интеллектуальные цифровые инструменты (адаптивные обучающие системы, автоматизированное тестирование с обратной связью, учебная аналитика, виртуальные анатомические практикумы) продуктивны лишь при их встраивании в педагогически спроектированную систему форм самостоятельной работы. Предложено распределение функций между искусственным интеллектом, преподавателем и студентом в структуре четырёхкомпонентного коррекционно-познавательного кейса; охарактеризованы этические и здоровьесберегающие условия такого сотрудничества.*

Ключевые слова: *искусственный интеллект; высшее образование; самостоятельная работа студентов; анатомия и физиология; дефектологическое образование; адаптивное обучение; коррекционно-познавательный кейс; учебная аналитика; академическая честность; здоровьесбережение.*

Annotatsiya. *Maqolada «Anatomiya va fiziologiya» fanini o‘rganayotgan bo‘lajak defektolog talabalarning mustaqil ishini tashkil etishda inson va sun’iy intellekt hamkorligining pedagogik imkoniyatlari hamda chegaralari ko‘rib chiqiladi. Adabiyotlar tahlili shuni ko‘rsatdiki, intellektual raqamli vositalar (adaptiv o‘qitish tizimlari, qayta aloqaga ega avtomatlashtirilgan testlar, o‘quv analitikasi, virtual anatomik praktikumlar) faqat pedagogik jihatdan loyihalashtirilgan mustaqil ish shakllari tizimiga kiritilgandagina samarali bo‘ladi. To‘rt komponentli korreksion-bilish keysi tuzilmasida sun’iy intellekt, o‘qituvchi va talaba o‘rtasida funksiyalarni taqsimlash taklif etilgan; bunday hamkorlikning axloqiy va salomatlikni saqlovchi shartlari tavsiflangan.*

Kalit so‘zlar: *sun’iy intellekt; oliy ta’lim; talabalarning mustaqil ishi; anatomiya va fiziologiya; defektologik ta’lim; adaptiv o‘qitish; korreksion-bilish keysi; o‘quv analitikasi; akademik halollik; salomatlikni saqlash.*

Abstract. *The article examines the pedagogical potential and limits of human–artificial intelligence collaboration in organizing the independent work of students of special education (defectology) studying the discipline “Anatomy and Physiology”. The analysis of the literature has shown that intelligent digital tools (adaptive learning systems, automated testing with feedback, learning analytics, virtual anatomy practicums) are productive only when embedded in*

a pedagogically designed system of independent work. A distribution of functions between artificial intelligence, the teacher and the student within the four-component correctional-cognitive case is proposed; the ethical and health-preserving conditions of such collaboration are characterized.

Keywords: *artificial intelligence; higher education; students’ independent work; anatomy and physiology; special education; adaptive learning; correctional-cognitive case; learning analytics; academic integrity; health preservation.*

Введение

Современный этап развития высшего образования Республики Узбекистан определяется совокупностью стратегических документов, задающих курс на цифровую трансформацию педагогического образования: Концепцией развития системы высшего образования Республики Узбекистан до 2030 года, Стратегией «Цифровой Узбекистан - 2030», новой редакцией Закона Республики Узбекистан «Об образовании» (2020), впервые закрепившей категории электронного обучения и цифровой образовательной среды, а также Постановлением Кабинета Министров № 391 от 6 июля 2021 года о совершенствовании подготовки педагогов-дефектологов [1–4].

В этих условиях самостоятельная работа студента из факультативного элемента учебного процесса превращается в его обязательную составляющую, удельный вес которой закреплён кредитно-модульной системой, а её организация всё в большей мере опосредуется цифровыми, в том числе интеллектуальными, технологиями; создание информационно-образовательной среды при этом рассматривается как стратегическое условие повышения качества педагогического образования [13].

Стремительное распространение технологий искусственного интеллекта (далее - ИИ) в образовании ставит перед педагогикой высшей школы вопрос уже не о том, применять ли эти технологии, а о том, как распределить функции между человеком и ИИ так, чтобы познавательная деятельность студента активизировалась, а не редуцировалась к делегированию учебной работы машине. Особую остроту этот вопрос приобретает в подготовке будущих дефектологов при изучении дисциплины «Анатомия и физиология»: без прочно усвоенного анатомо-физиологического знания корректное коррекционно-педагогическое решение невозможно, а «самостоятельно найденное» с помощью ИИ, но не понятое студентом ошибочное представление в клинико-биологическом содержании впоследствии оборачивается ошибкой в работе с ребёнком с особыми образовательными потребностями.

Целью настоящей статьи является обоснование модели сотрудничества человека и искусственного интеллекта в организации самостоятельной работы студентов-дефектологов по дисциплине «Анатомия и физиология», опираясь на разработанную автором методическую систему организации самостоятельной работы будущих дефектологов.

Отметим, что Республиканские эмпирические данные показывают, что массовая практика организации самостоятельной работы в вузах остаётся преимущественно репродуктивной: доминирует формат «презентационные слайды -реферат», удерживающий познавательную деятельность на уровне воспроизведения и не обеспечивающий её движения к творчеству [5], тогда как большинство студентов

предпочло бы практико-ориентированные проектные и исследовательские формы (таблица 1).

Значимая доля студентов признаёт нарушения академической честности, что в условиях доступности генеративных ИИ-сервисов создаёт дополнительные риски имитации самостоятельной работы.

Таблица 1 -Формы самостоятельной работы в массовой практике вузов Республики Узбекистан (по материалам социологического опроса Центра исследований развития высшего образования, 2022)

Показатель	**Ответы студентов**	**Ответы преподавателей**
Задания в форме презентационных слайдов	49,8 %	62,7 %
Задания в форме реферата	26,9 %	35,2 %
Предпочтение практико-ориентированных проектов и мини-исследований	около 60 %	-
Самостоятельная работа только по теоретическим вопросам, без связи с практикой	-	54,5 %
Признание нарушений академической честности в той или иной степени	каждый четвёртый	-

В методической системе, разработанной авторами, самостоятельная работа по дисциплине «Анатомия и физиология» строится через сочетание индивидуальной, диадической, малогрупповой и фронтальной форм, реализуемых в единой цифровой образовательной среде с четырьмя функциональными слоями - контентным, коммуникативным, проектным и диагностико-оценочным.

Проектирование заданий ведётся по уровням таксономии Б. Блума в редакции Л. Андерсона и Д. Кратволя: от воспроизведения («назовите кости верхней конечности») через применение и анализ к синтезу и оценке («спроектируйте систему упражнений для развития мелкой моторики у детей с ДЦП с учётом анатомии кисти»). Именно на верхних уровнях таксономии, требующих проектирования и профессиональной аргументации, репродуктивная имитация с помощью ИИ становится наименее возможной, а сотрудничество с ИИ -наиболее продуктивным.

Таким образом, в цифровой образовательной среде подготовки дефектолога технологии ИИ уже сегодня представлены целым спектром решений. Адаптивные обучающие системы автоматически корректируют траекторию освоения материала в зависимости от исходного уровня подготовки студента, темпа работы и типичных ошибок: студент, испытывающий затруднения с темой, получает дополнительные материалы и упражнения, а студент с высоким уровнем освоения переходит к задачам повышенной сложности. Автоматизированное тестирование с пояснениями обеспечивает немедленную обратную связь -то самое «чёткое требование обратной связи» к

индивидуальной форме самостоятельной работы, которое в традиционной организации выполняется с запаздыванием. Учебная аналитика (частота входа в среду, инициативная активность, длительность работы с материалом) даёт преподавателю и самому студенту объективированную картину динамики мотивационных показателей, а инструменты автоматизированного анализа текста поддерживают первичную обработку рефлексивных отчётов. Наконец, виртуальные анатомические практикумы и физиологические симуляторы с элементами ИИ позволяют моделировать не только норму, но и анатомо-физиологические особенности при конкретных нарушениях развития -от сенсоневральной тугоухости до ДЦП.

Вместе с тем методологическая позиция, принятая автором вслед за концептуальными рамками TPACK [6], SAMR и универсального дизайна обучения (UDL) [11], состоит в том, что цифровые и интеллектуальные технологии не должны рассматриваться как цель -они оправданы лишь как средство преобразования характера познавательной деятельности. По модели SAMR продуктивным является не «замещение» (цифровой тест вместо бумажного), а «преобразование» -учебные деятельности, в принципе невозможные в традиционной аудитории: регулярная работа студента с двухслойным коррекционно-познавательным кейсом, виртуальные диагностические симуляции, телерефлексия [7].

Выбор ИИ-инструмента, согласно рамке TPACK, должен исходить из содержания темы и дидактической задачи, а не наоборот: обоснованием служит необходимость преодоления конкретных трудностей дисциплины «Анатомия и физиология» - абстрактности материала, дефицита визуализации, запаздывающей обратной связи.

Существенное ограничение задаёт теория когнитивной нагрузки [8]: студент первого-второго курса, осваивающий анатомию и физиологию, - новичок, и минимально управляемый «поиск ответов» (в том числе с помощью генеративного ИИ) расходует его когнитивные ресурсы на сам поиск, а не на формирование знания. Отсюда принцип угасающего руководства: ориентировочная схема, этапы решения и критерии самопроверки, поддерживаемые в том числе интеллектуальными подсказками системы, постепенно снимаются по мере роста подготовленности студента.

Кроме того, клинико-биологическое знание дефектолога должно присутствовать как внутренняя, автоматизированная схема: сведения о строении слухового анализатора невозможно «искать в сети» в ходе коррекционного занятия, когда специалист принимает решения, наблюдая реакцию ребёнка. Поэтому ИИ-среда должна поддерживать, а не замещать прочное усвоение ядра дисциплины.

Центральной методической единицей самостоятельного образования будущего дефектолога на наш взгляд, выступает коррекционно-познавательный кейс -дидактическая конструкция, интегрирующая анатомо-физиологический норматив, индивидуально-типологический портрет нарушения, проектное действие и профессиональную рефлексию. Кейс рассчитан на 4–6 академических часов самостоятельной работы, распределённых на 5–7 дней; за семестр студент проходит 8–10 кейсов. Именно четырёхкомпонентная структура кейса позволяет корректно распределить функции между ИИ-инструментами, преподавателем и студентом (таблица 2).

Таблица 2 -Распределение функций между ИИ-инструментами и участниками образовательного процесса в структуре коррекционно-познавательного кейса

Компонент кейса	Функции ИИ-инструментов	Функции преподавателя и студента
1. Анатомо-физиологический норматив	Интерактивные 3D-модели; адаптивное тестирование с автоматизированной проверкой и пояснениями; индивидуальный подбор упражнений по типичным ошибкам	Отбор и структурирование содержания; контроль прочности усвоения ядра дисциплины; осмысленная работа студента с моделью и атласом
2. Индивидуально-типологический портрет	Базы данных нозологий; интеллектуальный поиск клинико-педагогических материалов; модифицированные модели структур при нарушениях	Клинико-педагогическая интерпретация случая; профессиональный комментарий; соотнесение нормы и нарушения студентом
3. Проектное действие	Шаблоны и конструкторы коррекционных маршрутов; проверка формальной полноты проекта; библиотеки коррекционных методов	Содержательная экспертиза проекта; оценка коррекционной целесообразности решений; авторство и обоснование решения -за студентом
4. Профессиональная рефлексия	Видеофиксация деятельности (телерефлексия); первичный автоматизированный анализ рефлексивного отчёта; аналитика динамики показателей	Само- и взаимоанализ; обсуждение в малой группе (4–6 человек); экспертная обратная связь курирующего преподавателя

Как видно из таблицы, ИИ берёт на себя рутинные, воспроизводимые и вычислимые функции -визуализацию, тренаж, автоматизированную проверку, поиск и первичную аналитику, -высвобождая время преподавателя и студента для собственно профессиональных действий: интерпретации случая, проектирования коррекционного маршрута и рефлексии. Наиболее принципиальные компоненты кейса -проектное действие и профессиональная рефлексия -остаются зоной человеческой ответственности: именно они отличают дефектологическую подготовку от любой иной и составляют содержательное ядро будущей профессии.

Такое распределение согласуется с положением о том, что активизация познавательной деятельности в цифровой среде достигается не оцифровкой материалов, а выполнением эвристических и исследовательских заданий с опорой на деятельностный компонент, и с идеями смешанного обучения [12] и «перевёрнутого класса» [9]: аудиторное и синхронное время преподавателя расходуется не на трансляцию материала, освоение которого поддержано ИИ-средой, а на профессиональную коммуникацию вокруг уже освоенного.

Следовательно, сотрудничество человека и ИИ в самостоятельной работе требует специальных условий, без которых оно вырождается либо в имитацию учебной деятельности, либо в новые риски для здоровья студента.

Первое условие:

- академическая честность: задания должны проектироваться так, чтобы использование ИИ было легитимной частью работы (поиск, визуализация, самопроверка), а оцениваемым результатом выступали действия, которые невозможно делегировать,

- обоснование проектного решения, защита кейса в малой группе, рефлексивный отчёт с видеофиксацией. Оценивание при этом переориентируется с объёма выполненного на прирост компетентности, а учебная аналитика используется прежде всего для возврата студенту информации о динамике его собственной активности, а не только для административного контроля.

Второе условие:

-защита персональных данных и прозрачность цифрового следа: студент должен знать, какие его учебные действия фиксируются средой, кто имеет доступ к этим данным и как они защищаются в соответствии с национальным законодательством о персональных данных.

Третье условие - здоровьесбережение как сквозной принцип: работа с ИИ-инструментами увеличивает экранное время, поэтому в архитектуру цифрового учебно-методического комплекса встраиваются механизмы цифровой гигиены -напоминания о перерывах по правилу «20-20-20», ограничение непрерывной работы с экраном 1,5–2 часами, двигательные паузы каждые 45–60 минут, мониторинг учебной нагрузки.

Для будущего дефектолога культура цифровой гигиены и критической оценки информации, полученной от ИИ, имеет двойное значение: она сохраняет его собственное здоровье и одновременно формирует профессиональную компетенцию, которую он будет передавать детям с особыми образовательными потребностями и их родителям. Наконец, четвёртое условие -цифровая грамотность: повседневные пользовательские навыки студентов не гарантируют академической ИИ-грамотности, что делает необходимым вводный модуль по критической оценке источников и корректному использованию интеллектуальных инструментов [10].

Заключение

Проведённый анализ позволяет заключить, что продуктивной моделью применения искусственного интеллекта в организации самостоятельной работы студентов-дефектологов по дисциплине «Анатомия и физиология» является не замещение педагогических функций, а их распределённое сотрудничество: ИИ обеспечивает адаптивность, визуализацию, немедленную обратную связь и аналитику, преподаватель -дидактическое проектирование, содержательную экспертизу и сопровождение рефлексии, студент -субъектность познавательного и проектного действия.

Организационной рамкой такого распределения выступает четырёхкомпонентный коррекционно-познавательный кейс, а его условиями -академическая честность, защита данных, цифровая грамотность и здоровьесбережение как сквозной образовательный принцип. Именно в этом сочетании сотрудничество человека и искусственного интеллекта становится фактором активизации, а не редукции познавательной деятельности будущего специалиста.

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ТЕХНОЛОГИЯ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА В ОБУЧЕНИИ РУССКОМУ ЯЗЫКУ: СОТРУДНИЧЕСТВО ПЕДАГОГА И ИСКУССТВЕННОГО ИНТЕЛЛЕКТА

Муллаахунова Нилуфар Мухаматумановна
Доцент кафедры Прикладных иностранных языков, доктор философии по педагогическим наукам (PhD), Андижанский государственный педагогический институт
e-mail: Mullaahunova70@gmail.com
https://doi.org/10.5281/zenodo.22871807

Аннотация. *В тезисах обосновывается модель сотрудничества преподавателя и искусственного интеллекта в обучении русскому языку. Систематизированы основные дидактические возможности генеративного ИИ: персонализация учебного материала, создание контента, моделирование речевого взаимодействия, оперативная обратная связь и поддержка учебной автономии. Предложена четырехэтапная модель «преподаватель – ИИ – студент», включающая педагогическое проектирование, взаимодействие студента с ИИ, критическую верификацию и педагогическую рефлексию. Определены условия эффективного применения технологии: целесообразность, педагогическая управляемость, качество запроса, обязательная проверка информации, ориентация на деятельность студента и соблюдение академической добросовестности. Рассмотрены практические модели использования ИИ при обучении письменной и устной речи, грамматике, чтению и проектной деятельности, а также основные риски. Показано, что педагогическая ценность ИИ определяется не автономностью технологии, а качеством ее методической интеграции и сохранением ответственности преподавателя.*

Ключевые слова: *искусственный интеллект, генеративный ИИ, обучение русскому языку, высшее образование, педагогическое сотрудничество, личностно-ориентированный подход, цифровые образовательные технологии, учебная автономия, академическая добросовестность.*

Abstract. *This paper substantiates a model of teacher–AI collaboration in Russian language teaching. The main didactic affordances of generative AI are systematized, including personalization of learning materials, content creation, simulation of speech interaction, immediate feedback, and support for learner autonomy. A four-stage “teacher–AI–student” model is proposed, comprising pedagogical design, student interaction with AI, critical verification, and pedagogical reflection. The conditions for effective application of the technology are identified: appropriateness, pedagogical manageability, prompt quality, mandatory information verification, a focus on student activity, and adherence to academic integrity. Practical models of AI use in teaching written and oral speech, grammar, reading, and project-based activities are considered, along with the main risks. It is demonstrated that the pedagogical value of AI is determined not by the autonomy of the technology, but by the quality of its methodological integration and the preservation of teacher responsibility.*

Keywords: *artificial intelligence, generative AI, Russian language teaching, higher education, teacher–AI collaboration, learner-centered approach, digital educational technologies, learner autonomy, academic integrity.*

Современное образование развивается в условиях стремительной цифровизации, расширения информационного пространства и появления технологий, способных выполнять интеллектуальные операции, ранее считавшиеся исключительно человеческими. Искусственный интеллект (ИИ) уже перестал быть исключительно технологическим феноменом и становится значимым фактором трансформации образовательного процесса. Особенно заметны эти изменения в языковом образовании, поскольку работа с текстом, речью, информацией, коммуникацией и созданием учебного контента непосредственно связана с теми задачами, которые способны выполнять современные генеративные системы.

Распространение генеративного искусственного интеллекта существенно изменяет привычную модель взаимодействия участников образовательного процесса. В традиционной дидактической системе основное взаимодействие происходит между преподавателем и студентом; в цифровой среде к этой системе добавляется интеллектуальный технологический посредник. В результате формируется новая трехкомпонентная модель «преподаватель – ИИ – студент», в которой искусственный интеллект не должен рассматриваться ни как автономный субъект обучения, ни как замена педагога. Его продуктивная роль заключается в расширении возможностей преподавателя и обучающегося, повышении вариативности учебных заданий, создании дополнительных условий для языковой практики и персонализации обучения. Аналогичный подход представлен в современных исследованиях по методике преподавания русского языка как иностранного. Сысоев и Филатов рассматривают ИИ именно как участника триады «обучающийся – искусственный интеллект – преподаватель», подчеркивая его лингводидактический потенциал. [4]

Актуальность проблемы определяется не только быстрым развитием ИИ-инструментов, но и необходимостью педагогического осмысления способов их использования. UNESCO подчеркивает, что применение генеративного ИИ в образовании должно основываться на личностно-ориентированном подходе, обеспечивать безопасное, этичное, справедливое и содержательно значимое использование технологий. В 2024 г. UNESCO представила рамку компетенций педагога в области ИИ, включающую личностно-ориентированное мышление, этику ИИ, основы и применение ИИ, ИИ-педагогику и использование ИИ для профессионального развития. [6,7]

В этих условиях особое значение приобретает поиск ответа на принципиальный методический вопрос: каким образом интегрировать искусственный интеллект в обучение русскому языку так, чтобы технологические возможности усиливали, а не ослабляли педагогический компонент образовательного процесса? Решение данной проблемы предполагает переход от стихийного использования нейросетей к педагогически проектируемому сотрудничеству преподавателя и ИИ.

Цель исследования состоит в обосновании педагогической модели сотрудничества преподавателя и искусственного интеллекта (ИИ) в обучении русскому языку, раскрытии дидактических возможностей ИИ-инструментов и определении условий их эффективного и ответственного применения.

Методы исследования. Использованы теоретический анализ и систематизация научных публикаций по проблеме применения генеративного ИИ в высшем образовании и обучении русскому языку, сопоставление дидактических возможностей и рисков ИИ, а также педагогическое моделирование. Результатом исследования является авторская

модель сотрудничества «преподаватель – ИИ – студент», включающая этапы педагогического проектирования, взаимодействия студента с ИИ, критической верификации и педагогической рефлексии, а также комплекс методических условий и практических моделей ее реализации.

Искусственный интеллект как новая составляющая образовательной технологии. Появление генеративного ИИ не следует рассматривать как очередной этап технического оснащения учебного процесса. Принципиальное отличие современных интеллектуальных систем заключается в том, что они способны не только предоставлять заранее подготовленную информацию, но и генерировать новые тексты, формулировать объяснения, создавать задания, моделировать диалоги, редактировать письменные высказывания, анализировать языковой материал и адаптировать содержание под заданные параметры.

В результате изменяется сама логика использования цифровых средств обучения. Если традиционные электронные ресурсы преимущественно предоставляли доступ к уже существующему материалу, то генеративные системы позволяют конструировать содержание непосредственно в процессе учебного взаимодействия. Преподаватель может сформулировать требования к уровню владения языком, теме, объему, жанру, грамматическому материалу и коммуникативной ситуации и получить несколько вариантов учебного контента. Студент, в свою очередь, получает возможность использовать ИИ как персональный инструмент языковой практики, редактор, собеседник, консультант и средство самопроверки.

Для преподавания русского языка особенно важным является то, что ИИ работает непосредственно с языковым материалом. Это открывает возможность организации большого количества речевых тренировок, которые трудно обеспечить исключительно за счет аудиторного времени. Исследования в области РКИ показывают, что чат-боты и голосовые помощники могут поддерживать письменную и устную речевую практику, а также создавать условия для самостоятельной работы обучающегося за пределами аудитории. [4]

Дидактические возможности ИИ в обучении русскому языку. Наиболее значимым преимуществом ИИ является возможность расширить индивидуальное образовательное пространство студента. В традиционной аудитории преподаватель вынужден одновременно учитывать различия в уровне подготовки, темпе работы, объеме словарного запаса, характере типичных ошибок и индивидуальных образовательных потребностях студентов. Генеративный ИИ позволяет частично компенсировать эти ограничения посредством быстрой адаптации материала.

Прежде всего, ИИ может использоваться для персонализации языкового материала. Один и тот же учебный текст может быть представлен в нескольких вариантах: с упрощенной или усложненной лексикой, с дополнительными комментариями, заданиями на поиск информации, грамматический анализ или интерпретацию содержания. Возможно создание разноуровневых упражнений на одну и ту же языковую тему, что особенно важно в неоднородной студенческой группе.

Следующая важная возможность связана с генерацией учебного контента. Преподаватель может использовать ИИ для подготовки упражнений на лексику, морфологию, синтаксис, орфографию и пунктуацию; заданий на развитие чтения, письма, говорения и аудирования; текстов для анализа; коммуникативных ситуаций; вопросов для

дискуссии; заданий проектного характера. Современные исследования РКИ фиксируют потенциал генеративных моделей в создании адаптированных текстов, разноуровневых упражнений и материалов для освоения функциональных стилей русского языка [3].

Не менее важное направление – моделирование речевого взаимодействия. Студент может вступать в диалог с ИИ в различных коммуникативных ролях: покупателя и продавца, преподавателя и студента, соискателя и работодателя, туриста и сотрудника гостиницы, участника дискуссии и т. д. Это позволяет расширить объем речевой практики и особенно важно для студентов, которые изучают русский язык вне естественной русскоязычной среды. Исследования Сысоева и Филатова показывают, что взаимодействие с чат-ботом может быть встроено в последовательное формирование навыков речевого общения, а результаты внеаудиторного взаимодействия – становиться материалом для последующего обсуждения на занятии. [4]

Особая возможность – оперативная обратная связь. ИИ способен быстро обнаруживать отдельные лексические, грамматические и стилистические ошибки, предлагать варианты редактирования и объяснять причины исправлений. Это особенно полезно на этапе черновой работы с текстом. Студент получает возможность неоднократно перерабатывать собственное высказывание, сравнивать исходный и исправленный варианты и осознанно принимать или отвергать рекомендации.

Еще одно направление связано с развитием учебной автономии. Использование ИИ позволяет студенту продолжать языковую практику за пределами учебного занятия, самостоятельно формулировать запросы, уточнять непонятные явления, получать дополнительные примеры и организовывать индивидуальную траекторию работы. В исследованиях по РКИ автономия обучающихся рассматривается как один из значимых результатов взаимодействия с ИИ. [4]

Сотрудничество преподавателя и ИИ как педагогическая модель. Принципиально важно разграничивать понятия «использование ИИ» и «сотрудничество преподавателя и ИИ». В первом случае технология может применяться ситуативно: студент задает вопрос нейросети, получает ответ и использует его без дополнительной проверки. Во втором случае ИИ включается в специально спроектированную последовательность учебных действий, в которой человек сохраняет целеполагание, контроль и ответственность за результат.

Данное сотрудничество можно представить как последовательность четырех взаимосвязанных этапов.

Первый этап – педагогическое проектирование. Преподаватель определяет учебную цель, формулирует ожидаемый результат, выбирает языковой материал, определяет уровень сложности и критерии оценки. ИИ на этом этапе выступает инструментом разработки и вариативного конструирования учебных материалов.

Второй этап – взаимодействие студента с ИИ. Обучающийся выполняет языковое задание, вступает в диалог с чат-ботом, получает варианты текста, анализирует предложения, корректирует собственную письменную работу или решает коммуникативную задачу. Здесь ИИ становится инструментом учебной деятельности.

Третий этап – критическая верификация. Студент сопоставляет ответ ИИ с изученными правилами, учебником, словарями, корпусами и другими надежными источниками. Это особенно важно для языкового обучения, поскольку убедительно

сформулированный ответ нейросети не гарантирует его лингвистическую или фактическую правильность.

Четвертый этап – педагогическая рефлексия. Преподаватель анализирует полученный результат совместно со студентами: обсуждаются ошибки, сильные и слабые стороны ответа ИИ, причины расхождений, качество запроса, корректность исправлений. В результате сам ИИ становится объектом критического анализа и одновременно средством развития языковой и цифровой компетентности.

Именно четвертый этап принципиально отличает педагогически организованное сотрудничество от механического делегирования учебной работы нейросети.

В данном контексте преподаватель постепенно меняет характер своей профессиональной деятельности. Он не утрачивает свою роль, а, напротив, переходит от преимущественно информационной функции к функции проектировщика, модератора, эксперта и наставника. Эта тенденция соответствует рамке компетенций UNESCO, в которой педагогическая деятельность в эпоху ИИ связывается не только с техническим владением инструментами, но и с личностно-ориентированным мышлением, этикой и ИИ-педагогикой. [6, 7].

Методические условия эффективного применения ИИ. Интеграция ИИ в обучение русскому языку требует соблюдения определенных педагогических условий.

Первым условием является целесообразность применения технологии. ИИ должен использоваться не потому, что он является современной технологией, а потому, что способен решить конкретную дидактическую задачу эффективнее или разнообразнее традиционного средства. Не каждое упражнение нуждается в генеративной модели.

Вторым условием выступает педагогическая управляемость. Преподаватель должен заранее определить, в какой момент занятия, с какой целью, в каком формате и в течение какого времени студент взаимодействует с ИИ. Спонтанная работа с нейросетью не гарантирует достижения образовательного результата.

Третье условие – качество запроса. Умение формулировать точный и содержательный запрос (промт, команду) становится новой составляющей учебной и профессиональной грамотности. Чем четче заданы роль ИИ, цель, уровень обучающегося, языковой материал, формат ответа и критерии качества, тем выше вероятность получения полезного результата. Вместе с тем обучение эффективному взаимодействию с ИИ не должно сводиться исключительно к технике написания промптов; студент должен понимать, почему полученный ответ следует считать релевантным, корректным или сомнительным.

Четвертым условием является обязательная проверка информации. Генеративный ИИ способен создавать содержательно убедительные, но ошибочные ответы. Для языкового образования это может выражаться в грамматических и лексических неточностях, смешении стилистических регистров, неуместном употреблении слов, ошибочной интерпретации языкового правила или культурного факта. Исследования по РКИ прямо указывают на риск появления недостоверной информации и необходимость предупреждать обучающихся об ограничениях ИИ. [4]

Пятое условие – ориентация на деятельность студента, а не на готовый продукт. Наиболее опасным вариантом использования ИИ является простая передача ему всей учебной работы. Если студент получает готовое эссе, пересказ, анализ или ответ и лишь представляет его преподавателю, технология начинает выполнять функцию замещения, а

не обучения. Поэтому целесообразнее оценивать не только конечный текст, но и процесс его создания: исходный вариант, запросы к ИИ, отбор предложений, исправления, комментарии и аргументацию окончательного решения.

Шестое условие – сохранение академической добросовестности. Использование ИИ должно быть встроено в понятные правила учебной деятельности. Студенту необходимо объяснять, какие виды помощи допустимы, какие требуют обязательного указания факта использования ИИ, а какие противоречат требованиям самостоятельной работы. UNESCO также рассматривает вопросы этики, безопасности, конфиденциальности и ответственного использования генеративного ИИ как центральные элементы его интеграции в образование. [6,7]

Практические модели использования ИИ на занятиях по русскому языку. Например, при работе над письменной речью студент сначала самостоятельно создает текст, затем просит ИИ выявить языковые и стилистические проблемы, после чего не просто принимает автоматически предложенные исправления, а объясняет каждое изменение и создает окончательную версию текста. На завершающем этапе группа обсуждает наиболее сложные случаи. Таким образом, ИИ выполняет функцию дополнительного редактора, а студент остается автором текста.

При изучении грамматики возможна модель «ИИ как провокатор ошибки». Студент получает несколько ответов нейросети, содержащих намеренно или спонтанно возникшие языковые ошибки, и должен установить, какие из них являются нормативными, какие нет, и обосновать решение с опорой на правило. В таком случае ИИ становится не источником готового знания, а объектом лингвистического анализа.

При развитии устной речи может применяться модель «виртуальный собеседник». ИИ моделирует коммуникативную ситуацию и поддерживает диалог на русском языке. Преподаватель заранее задает тему, уровень сложности, коммуникативную цель и ограничения. После завершения диалога студент анализирует собственные речевые действия, определяет трудности и формулирует рекомендации по дальнейшему совершенствованию речи. Возможность использования чат-ботов именно как инструмента системной речевой практики подтверждается исследованиями в области РКИ [4].

Риски и ограничения. Использование ИИ связано с рядом рисков, прежде всего с недостоверностью генерируемых ответов. ИИ способен представить ошибочное языковое правило, указать несуществующий источник, предложить неверную интерпретацию или сформировать стилистически неудачный текст. Поэтому результаты его работы требуют обязательной экспертной проверки. Перечислим наиболее распространенные риски:

– ИИ способен представить ошибочное языковое правило, придумать несуществующий источник, предложить неправильную интерпретацию или сформировать стилистически неудачный текст. Следовательно, доверие к технологическому инструменту не может заменять экспертную проверку;

– снижение когнитивной самостоятельности. При чрезмерной ориентации на готовые ответы студент может постепенно сокращать собственную интеллектуальную работу: перестает самостоятельно формулировать мысли, искать аргументы, подбирать языковые средства и редактировать текст. В результате внешняя эффективность выполнения задания может сочетаться с ослаблением реального образовательного эффекта;

– унификация речевого продукта. Массовое использование одних и тех же генеративных инструментов потенциально способствует появлению типовых речевых моделей и снижению индивидуальности письменного высказывания. В методике русского языка это особенно важно, поскольку целью обучения является не только правильность, но и способность самостоятельно выражать смысл, учитывать адресата, ситуацию общения, стиль и коммуникативное намерение;

– следующий риск связан с академической добросовестностью. Простое представление сгенерированного текста как собственной работы нарушает принципы самостоятельности. Поэтому появление ИИ требует пересмотра некоторых форм контроля и усиления внимания к процессу выполнения задания. Исследования по генеративному ИИ в высшем образовании также отмечают угрозы, связанные с недостоверностью информации, предвзятостью, конфиденциальностью и академической добросовестностью [5].

Результаты исследования показывают, что методически продуктивное применение ИИ определяется не автономностью технологии, а ее включением в управляемую последовательность учебных действий, где педагог сохраняет целеполагание, экспертный контроль и ответственность, а студент – субъектность и авторство образовательного результата.

Заключение. Технология искусственного интеллекта постепенно становится значимым компонентом современного языкового образования. Ее потенциал особенно велик в обучении русскому языку, поскольку ИИ позволяет работать непосредственно с текстом и речью, моделировать коммуникацию, создавать и адаптировать учебные материалы, обеспечивать дополнительную обратную связь и расширять возможности индивидуальной языковой практики.

Однако педагогическая ценность искусственного интеллекта определяется не количеством используемых инструментов, а качеством их методической интеграции. Наиболее перспективной представляется модель сотрудничества «преподаватель – ИИ – студент», в которой каждый участник сохраняет собственную функцию. Студент остается субъектом учебной деятельности и автором образовательного результата; преподаватель определяет цели, проектирует обучение, осуществляет экспертную оценку и организует рефлексию; ИИ выполняет вспомогательные интеллектуальные операции, расширяя пространство языковой практики и вариативность учебных действий.

Перспективу развития технологии искусственного интеллекта в обучении русскому языку следует связывать не с вытеснением педагога, а с трансформацией его профессиональной роли и расширением педагогического инструментария. Главным результатом такой трансформации должно стать не просто более быстрое создание учебного контента, а формирование у обучающегося способности самостоятельно учиться, критически работать с информацией, осознанно использовать цифровые инструменты и сохранять человеческое измерение языка как средства мышления, общения и культуры.

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ZAMONAVIY TA’LIMDA RAQAMLI TEXNOLOGIYALARINING AHAMIYATI

S.S. Mirzoyeva
Buxoro davlat texnika universiteti tadqiqotchisi, sayyoramirzayeva96@mail.ru
https://doi.org/10.5281/zenodo.22875619

Annotatsiya. *Bugungi kunda axborot texnologiyalari shu jumladan, kompyuter, planshet va mobil telefon jamiyatimizning ajralmas qismiga aylanib ulgurdi. Shu bilan birga raqamli pedagogika an’anaviy bo‘lgan o‘qitish va o‘qish jarayonlari o‘zgartirdi. Ushbu maqolada zamonaviy ta’limda qo‘llaniladigan usullar, shu jumladan onlayn kurslar haqida fikr yuritiladi. So‘nggi bir ikik yil ichida ta’lim sohasida ulkan o‘zgarishlar sodir bo‘ldi deb aytish mumkin. Talim tizimi COVID-2019 pandemiyasi tufayli o‘quvchi va talabalarni ko‘proq resruslar bilan ta’minlash uchun ta’limning masofaviy shaklidan foydalana boshlashdi. Axborot texnologiyalariga asoslangan axborot tizimlar esa masofaviy ta’limga kirib keldi.Axborot texnologiya tizimlari masofaviy ta’lim hamda imtihon jarayonlarini o‘tkazishda shafoflikni ta’minlash uchun foydalanildi. Ushbu maqolada axborot texnologiyalariga asoslangan masofaviy ta’lim tizimlarni ishlab chiqishning axborot modeli taklif etilgan.*

Kalit so‘zlar. *kompyuter, mobil telefon, axborot texnologiyalar, onlayn kurslar, masofaviy talim, raqamli pedagogika.*

Аннотация. *Сегодня информационные технологии, включая компьютеры, планшеты и мобильные телефоны, стали неотъемлемой частью нашего общества. В то же время цифровая педагогика трансформировала традиционные процессы преподавания и обучения. В статье рассматриваются методы, используемые в современном образовании, в том числе онлайн-курсы. Можно сказать, что за последние пару лет в сфере образования произошли огромные изменения. В связи с пандемией COVID-2019 система образования начала использовать дистанционное обучение, чтобы предоставить учащимся больше ресурсов. Информационные системы, основанные на информационных технологиях, вошли в дистанционное образование. Для обеспечения прозрачности процессов дистанционного обучения и экзаменов используются системы информационных технологий. В статье предлагается информационная модель для разработки систем дистанционного обучения на основе информационных технологий.*

Ключевые слова. *компьютер, мобильный телефон, информационные технологии, онлайн-курсы, дистанционное обучение, цифровая педагогика.*

Abstract. *Today, information technologies, including computers, tablets and mobile phones, have become an integral part of our society. At the same time, digital pedagogy has changed the traditional teaching and learning processes. This article discusses the methods used in modern education, including online courses. It can be said that in the last couple of years, huge changes have occurred in the field of education. Due to the COVID-2019 pandemic, the education system began to use a distance form of education to provide students with more resources. Information systems based on information technologies have entered distance education. Information technology systems are used to ensure transparency in distance education and examination processes. This article proposes an information model for developing distance education systems based on information technologies.*

Keywords: *computer, mobile phone, information technologies, online courses, distance education, digital pedagogy.*

Butun jahon bo‘yicha ta’lim tizimi evolyusion rivojlanmoqda. So‘ngi yil mobaynida masofaviy ta’lim tizimi ham sezilarli suratda rivojlandi. Bundan tashqari, COVID-19 pandemiyasi masofaviy ta’limni joriy etishga katta ta’sir ko‘rsatdi. Pandemiya butun dunyoni yopiq hududlarga majburlaganiligi sababli, ta’lim sektorlari masofaviy talim jarayoniga o‘tish bilan bir qancha muammolar paydo bo‘lishiga olib keldi. Birinchi qiyinchilik talim oluvchilarning ta’lim olish jarayonida har hil qoidabuzarliklarni sodir etishlari (dars mashg‘ulotlariga kirmasligi, o‘rniga org‘oti ishtiroki, yoki umuman tizimdan foydalanmaslik). Ushbu muammolarni hal qilish bo‘yicha ta’lim muassalari ilmiy izlanishdar olib bormoqda. Bunda olimlar asosiy e’tiborni imtixon jarayonlari tashkil etish va boshqarishga samarali yechimlarni taklif etishgan. Masofadan turib imtixonlarni tashkil etish va uni boshqarish tizimlarda videomonitoring qilish jarayonlar jahon bo‘yicha ilmiy tadqiqotchilar samarali natijalarga erishgan. Ammo masofaviy ta’lim jarayoni tashkil etish, boshqarish va ta’lim oluvchilar nazorat qiluvchi tizimlar ishlab chiqish bo‘yicha yetarli muammolar mavjud. Masofadan turib imtihonlari tashkil qiluvchi tizimlarning barcha nazorat foydalanuvchilar nazorat qilishda barcha xususiyatlar mavjud lekin ular asosan yakuniy test sinovlarini nazorat qilishga mo‘ljallangan. Masofaviy nazorat bu onlayn imtihon jarayonini kengaytiriladigan tarzda autentifikatsiya qilish, ruxsat berish va nazorat qilish jarayonidir. Bu to‘liq xavfsizlik standartlarini ta’minlab, tashkilotlarga istalgan joyda va istalgan vaqtda baholash imkonini beradigan jarayon. Boshqacha qilib aytganda, foydalanuvchilar ma’lum bir joyga kelishlari shart emas, chunki ular o‘z uylaridan dars mashg‘ulotlari o‘zlashtirishlar va imtihon topshirishlari mumkin.[7]

Hozirgi kunda ta’lim tizimini takomillashtirish orqali har tomonlama yetuk, barkamol, irodali, fidoiy va tashabbuskor kadrlarni tayyorlashga katta e’tibor berilayapti. Professional ta’lim tizimidagi axborot ta’lim texnologiyalari sohasida kasb ta’limi yo‘nalishlari uchun yuqori malakali kadrlarni tayyorlash, mutaxassislar malakasini oshirish, sohani jadal rivojlantirish va ishlab chiqarish korxonalari o‘rtasidagi uzviy aloqa tizimini takomillashtirish bo‘yicha ularning o‘rtasida o‘zaro manfaatli innovatsion hamkorlikga erishilmoqda. Ilmiy va innovatsion sohalaridagi hamkorlik mamlakatning global iqtisodiy makondagi nufuzini oshiradi. Shiddat bilan yangilanayotgan zamonda ixtirolar, ilmiy tadqiqotlar, innovatsion g‘oyalar, texnik ishlanmalar va ularni tijoratlashtirish o‘ta muhim sanaladi. Aynan ularning ko‘lami va sifati raqobatbardosh, daromadi yuqori mahsulotlar yaratishga xizmat qiladi. [3]

Hozirgi kunda zamonaviy sunniy intellekt texnologiyalari yordamida masofadan ta’lim foydalanuvchilarni samarali nazorat qilish mumkin. Bundan ta’lim istalgan vaqtda, istalgan joydan turib o‘quv materiallari va test imtihonlarini markazlashgan platformadan topshirish imkoniyati yaratib beradi. Axborot texnologiyalarini qo‘llab-quvvatlaydigan avtoproktoring tizimlaridan foydalanish doimiy ravishda moslashishni o‘rganishi va aqlliroq bo‘lishi mumkin. Axborot texnologiyalarni qo‘llab, quvvatlaydigan masofadan turib tekshirish quyidagi uchta sohaga qaratilgan, identifikatsiya firibgarligini aniqlash, aldash xatti-harakatlarini tahlil qiling, kontentni o‘g‘irlashni tahlil qilish. Taklif etililayotgan ishda yuzni tanib olish, boshning, ko‘zning holatinining muvofiqligi tekshirish hamda kerakli qarorlarni qabul qilishdan tashqari ushbu tizimdan foydalanish jarayonida ya’ni imtihon vaqtidan bir necha yuzlar, qo‘shimcha tovushlar bilan aksessuarlar aniqlab xulosalar taqdim etiladi. Oxirgi yillarda dunyonning etakchi

davlatlarida raqamli texnologiyalardan keng foydalanib kelinmoqda. Ayniqsa, Covid-19 global pandemiyasi yana bir bor raqamli texnologiyalardan ko‘proq foydalanish hamda ta’lim sohasini transformatsiya qilish zaruratini keltirib, ijobiy natijalarni berishini ko‘rsatdi. Shu jumladan, mamlakatimizda ham axborot texnologiyalarni keng kirib kelishi hamda barcha jabhalarda shu jumladan ta’lim sohasida qo‘llanilishiga keng e’tibor qaratilmoqda.[6] O‘zbekiston Respublikasi Prezidentining 2020 yil 5 oktyabrdagi PF-6079- sonli “Raqamli O‘zbekiston – 2030” Strategiyasini tasdiqlash va uni samarali amalga oshirish chora-tadbirlari to‘g‘risida”gi farmoni qabul qilindi. O‘zbekiston Respublikasi Prezidentining 2018 yil 5 sentyabrdagi PQ-3930- sonli “Korporativ, loyiha boshqaruvi sohasida kadrlarni tayyorlash, qayta tayyorlash va ularning malakasini oshirish tizimini takomillashtirish bo‘yicha qo‘shimcha chora-tadbirlar to‘g‘risida”gi qarori bilan oliy ta’lim muassasalariga, oliy ta’limdan keyingi ta’lim, kadrlarni qayta tayyorlash va ularning malakasini oshirish muassasalariga, ularning mulkchilik shakli va bo‘ysunuvidan qati’y nazar, masofaviy o‘qitishni tashkil etish huquqi berildi. [1,2]

Raqamli pedagogika haqida gapirganda biz ta’limdagi vaziyatlar, o‘qitish usullari, resurslari shu jumladan, kompyuter yordamida o‘qitish, kompyuter texnologiyalari pedagogikasi, virtual (onlayn) o‘qitish, kiberpedagogika, multimedia pedagogika, inklyuziv pedagogika, gibrid pedagogika kabi tushunchalardan foydalanamiz. Umumiy olganda quyidagi shartlardan biri raqamli pedagogika tushunchasini yoritishi mumkin:

- Ta’lim maqsadlarida bevosita axborot texnologiyalardan foydalanish (o‘qitish, o‘rganish, baholash yoki ta’limni boshqarish).

-Ta’limda raqamli texnologiyalardan foydalanish uchun shart-sharoitlarni ta’minlash (uskunalarni sotib olish dasturlari yoki o‘quv dasturlarini moslashtirish, o‘quv dasturlari orqali raqamli ko‘nikmalarni rivojlantirish).

- Ta’lim yo‘nalishida salohiyatni inobatga olish (ta’lim siyosatini ishlab chiqish, raqamli resurslardan foydalanishni muvofiqlikni baholash).

Raqamli pedagogika ma’lum darajada boshqa maqsadli pedagogikaning o‘rganish yo‘nalishlari bilan mos keladi: ochiq pedagogika, tanqidiy pedagogika, interfaol pedagogika. Shu bilan birga, raqamli pedagogikaning ommalashgan shaklidan biri bo‘lgan onlayn kurslar, xususan Ommaviy ochiq onlayn kurslar (OOOK) haqida alohida to‘xtalib o‘tish lozim. OOOK “Massive Open Online Course” quyidagicha ta’rfilanadi: Ommaviylik – OOOK shunday tartibda ishlab chiqilganki, bir vaqtning o‘zida 1000 dan ortiq talabalar tahsil olishi mumkin. Ochiqlik – mazkur kursalar interneti borlar uchun hammaga ochiq. Onlayn – kurslar faqatgina internet orqali ishlaydi. Kurs – nafaqat materiallar taqdimotidan iborat, balki uyga vazifa va imtihonlarni o‘z ichiga olgan mahsulot hisoblanadi. OOOK larning bir qator turlari mavjud bo‘lib, o‘ziga xos tasniflanishi bilan bir-biridan farq qiladi. [4,5]

Xulosa qilib shuni aytib o‘tish joizki, bugungi kunda jahonda elektron ta’lim resurslari, xususan onlayn darslar ta’lim jarayonining ajralmas qismi hisoblanadi. “O‘zbekistonda mazkur yo‘nalishni takomillashtirish uchun quyidagilar taklif etiladi: onlayn darslar ommabopligini oshirish bo‘yicha tegishli chora-tadbirlar ishlab chiqish; mamlakatimizning chekka hududlarini axborot-kommunikatsion infratuzilma bilan keng qamrab olish darajasini oshirish; onlayn ta’lim jarayonini ishlab chiqishda o‘quvchilar qiziqishi va istaklarini inobatga olish.

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THE ROLE OF ARTIFICIAL INTELLIGENCE IN TEACHING LITERATURE IN HIGHER EDUCATION

Murodova Dilnavoz Nizomovna
Associate professor (PhD) of Uzbekistan State
World Languages University
E-mail: dil7navoz@gmail.com
https://doi.org/10.5281/zenodo.22875641

Abstract. *The rapid development of Artificial Intelligence (AI), particularly Generative Artificial Intelligence (GenAI), is transforming teaching and learning practices in higher education. Since the emergence of publicly accessible generative AI systems such as ChatGPT, universities have increasingly examined the opportunities and challenges associated with incorporating AI into teaching, learning, assessment, and research. Literature education represents a particularly significant field for examining this transformation because literary studies require close reading, interpretation, critical thinking, creativity, contextual understanding, and independent argumentation. This article examines the role of AI in teaching literature in higher education, with particular attention to its pedagogical applications, potential benefits, challenges, and implications for the changing role of the literature teacher.*

Keywords: *Artificial Intelligence, Generative AI, literature teaching, higher education, literary studies, literary analysis, ChatGPT, critical thinking, AI literacy, academic integrity, digital humanities.*

Introduction

Artificial Intelligence has become one of the most influential technological developments in contemporary education. Although AI had been incorporated into educational technologies long before the emergence of ChatGPT, the rapid development of Generative AI has significantly expanded the possibilities for interaction between students, teachers, and digital systems. Generative AI can produce text, provide explanations, generate questions, summarize information, offer feedback, translate material, and engage users in natural-language dialogue. Consequently, higher education institutions are increasingly reconsidering traditional approaches to teaching, assessment, academic writing, and learning support (Crompton & Burke, 2023; Qian, 2025).

The educational significance of Generative AI lies not only in its ability to automate particular tasks but also in its capacity to change the relationship between learners and knowledge. Students can now interact with AI systems in ways that resemble conversations with tutors or study partners. Teachers can use AI to support lesson planning, create instructional materials, design activities, and provide preliminary feedback. At the same time, these possibilities raise questions about what students should learn independently, how academic achievement should be assessed, and what role human teachers should continue to play. Recent research indicates that the impact of AI in higher education is broad but uneven. Crompton and Burke (2023), in a systematic review of AI research in higher education, demonstrated that AI applications encompass teaching, learning, assessment, administration, and student support. More recent systematic reviews specifically examining Generative AI have

shown rapid expansion in research since the introduction of ChatGPT (Qian, 2025). A systematic review of 139 studies of GenAI in higher-education classroom teaching found that applications have been particularly common in language, engineering, and health-related disciplines, while humanities and social sciences remain comparatively less represented (Luo et al., 2025).

This relative lack of research in the humanities makes the question of AI and literature teaching especially significant. Literature is fundamentally concerned with language, interpretation, human experience, culture, imagination, and meaning. Unlike disciplines in which many questions have relatively determinate answers, literary studies frequently involve ambiguity and competing interpretations. A poem, novel, drama, or short story can support several interpretations depending on textual evidence, theoretical perspective, historical context, and the reader's response.

Consequently, AI cannot simply be regarded as a machine that provides the "correct" interpretation of a literary work. Its educational value must instead be considered in relation to the processes through which students learn to interpret texts. UNESCO (Miao & Holmes, 2023) similarly promotes a human-centred approach to Generative AI in education, emphasizing ethical, safe, equitable, meaningful, and pedagogically appropriate use. In literature education, this principle is particularly important. AI can help students understand difficult vocabulary, identify possible literary devices, generate alternative interpretations, explore historical contexts, compare literary works, and receive feedback. However, if students use AI to summarize every text or produce complete literary analyses, they may bypass the very intellectual processes that literature courses are designed to develop. The central issue, therefore, is not whether AI should be used in literature education but **how it can be used to strengthen rather than weaken literary learning**. This article explores the role of AI in teaching literature in higher education by examining existing research, pedagogical applications, opportunities, risks, and implications for teachers and students.

Literature Review

The increasing use of AI has created the need for a new dimension of digital literacy: **AI literacy**. AI literacy involves understanding how AI systems work, recognizing their strengths and limitations, evaluating generated information, identifying possible bias, protecting personal information, and using AI responsibly. For literature students, AI literacy can be integrated naturally with critical reading. Students can learn to examine AI-generated literary interpretations in the same way that they examine scholarly arguments. For example, students might ask:

What evidence does the AI provide?

Does the primary text support the claim?

Has the AI overlooked an important passage?

Does the interpretation depend on an unsupported assumption?

Are the historical facts accurate?

Could another interpretation be equally plausible? Such activities transform AI literacy from a technical skill into an extension of critical literary thinking. UNESCO‘s guidance emphasizes the need for human capacity-building and a human-centred approach to AI in education, including attention to ethical and pedagogical considerations (Miao & Holmes, 2023).

Research on GenAI in higher education has developed rapidly, but disciplinary coverage is uneven. Luo et al. (2025) found that humanities applications were less represented than applications in several other disciplines.

This is important because humanities subjects have distinctive epistemological characteristics. Literary knowledge cannot always be reduced to factual recall or procedural problem-solving. Interpretation frequently involves uncertainty, ambiguity, contextual reasoning, and argumentation. AI can therefore be valuable in literature education not because it eliminates ambiguity but because it can provide additional perspectives that students learn to evaluate. The humanities may consequently offer an important context for developing responsible approaches to AI. Students can investigate not only what AI produces but also how machine-generated language affects concepts such as authorship, creativity, interpretation, originality, and meaning.

Discussion

Close reading is central to literary studies because it requires students to pay careful attention to language and textual structure.

AI can support this process by generating questions rather than simply providing answers. For example, instead of asking: "What does this poem mean?" students could ask an AI system to identify recurring images and then independently determine how those images contribute to the poem's meaning. Students could investigate: imagery; metaphor; symbolism; repetition; tone; diction; syntax; narrative perspective; characterization; irony.

The important point is that AI should stimulate students' attention to the text rather than replace their engagement with it.

A productive sequence might therefore be: **Read → Annotate → Interpret → Consult AI → Evaluate → Reinterpret.** This approach preserves the central role of close reading while allowing AI to introduce additional perspectives.

Critical thinking is one of the most important objectives of university literature courses. Students need to learn how to formulate claims, evaluate evidence, recognize assumptions, compare interpretations, and construct logical arguments.

AI can be used to support these skills if students are required to evaluate its responses. For example, an instructor could provide an AI-generated interpretation of a literary passage and ask students to identify: accurate observations;

unsupported claims; missing evidence; possible factual errors; alternative interpretations. This creates an important reversal of the traditional AI model.

Instead of asking: **"What does AI think about this text?"** students ask: **"Can I demonstrate whether AI's interpretation is justified?"** Such activities position students as evaluators rather than passive recipients. Recent research emphasizes that pedagogically guided use of GenAI can support argumentation, critical thinking, and other higher-order skills, while unguided outsourcing may produce weaker learning outcomes (Daniel, 2025; OECD, 2026).

University literature classes contain students with different levels of language proficiency, reading experience, cultural knowledge, and academic preparation. AI can provide individualized scaffolding. For example, a student struggling with an unfamiliar nineteenth-century text can request: vocabulary explanations;

definitions of literary terms; contextual information; simplified explanations; examples of analytical techniques.

Literature courses taught in English or another second language can present significant linguistic challenges. Students may encounter: archaic vocabulary;

idiomatic expressions; figurative language; dialect; complex syntax; culturally specific references. AI can provide preliminary explanations and examples.

For example, students reading Victorian literature may ask an AI system to explain unfamiliar vocabulary in context. They can then verify the explanation using a reliable dictionary or scholarly edition. This approach can improve accessibility while simultaneously developing students' source-verification skills.

Understanding historical and cultural context is essential to literary interpretation. AI can provide preliminary information about: literary movements; historical periods; authors; philosophical ideas; social conditions; cultural practices; intellectual movements. For example, before studying Romantic poetry, students can use AI to obtain an initial overview of Romanticism and then compare that overview with academic sources. However, AI-generated contextual information must be verified. This is particularly important because Generative AI systems can produce plausible but inaccurate information. UNESCO (Miao & Holmes, 2023) consequently emphasizes the importance of responsible and critical approaches to GenAI rather than treating AI-generated information as inherently reliable.

Comparative Literary Analysis

AI can help students generate possible dimensions for comparing literary texts. For example, students studying two novels might compare: representations of nature; concepts of identity; individual and society; social class; gender; colonialism; migration; alienation; narrative perspective; symbolism. AI can suggest potential categories, but students should develop the actual argument from the primary texts and scholarly literature. Thus, AI can function as a **question generator**, while the student remains the **interpreter**.

AI and Creative Writing

Creative writing is another area in which AI can be incorporated into literature courses. Students may use AI to experiment with: narrative perspective; genre; dialogue; characterization; setting; style; alternative endings; adaptation. For example, students can ask AI to rewrite a short scene from the perspective of another character and then analyze how the change affects the reader's understanding. The educational value lies not in producing a finished AI-generated story but in comparing stylistic and narrative possibilities. Students can ask: How does the narrative voice change? What information becomes available? What is lost? How does the tone change? Does the alternative perspective alter the interpretation? In this way, AI becomes an experimental literary tool.

Assessment represents one of the most significant challenges created by Generative AI. Traditional take-home essays can be generated or substantially assisted by AI. Consequently, a final written product may no longer provide sufficient evidence of independent learning. Research and policy discussions increasingly emphasize the need to reconsider assessment design in the context of GenAI (OECD, 2026; Qian, 2025). Literature courses can respond through several approaches.

The Changing Role of the Literature Teacher

The development of AI does not make the literature teacher unnecessary. Instead, it changes the nature of the teacher's role. The literature teacher increasingly becomes: a facilitator of interpretation; a designer of learning activities; a guide to scholarly sources; a moderator of discussion; an evaluator of AI-generated information; a mentor in academic writing; a developer

of critical thinking; a guardian of academic integrity. AI can identify possible metaphors, but the teacher can ask why they matter. AI can summarize a novel, but the teacher can ask what the summary has omitted. AI can produce an interpretation, but the teacher can ask students to defend or challenge it. AI can generate a paragraph, but the teacher can help students develop an independent scholarly voice.

The OECD (2026) similarly emphasizes that educational GenAI can augment human teaching while preserving teacher agency. Effective educational use therefore involves cooperation between human expertise and technological capability rather than replacing one with the other.

Practical AI-Supported Activities

"Find the Error" The teacher presents an AI-generated analysis containing several inaccuracies. Students identify and correct the errors using textual evidence. **Skills developed:** close reading; critical thinking; evidence evaluation; AI literacy. "Two Interpretations" Students ask AI to provide two different interpretations of a literary passage. They compare the interpretations and identify the textual evidence supporting each.

"Context Verification" Students ask AI to provide historical information about a literary work. They verify the information using academic sources.

"Human and AI Interpretation"Students independently interpret a passage. They then compare their interpretation with an AI-generated interpretation. Rather than determining which interpretation is "correct," students analyze differences in: evidence; assumptions; terminology; reasoning; contextual knowledge. This approach emphasizes interpretation as a process of argumentation rather than a search for a single automated answer.

Conclusion

Artificial Intelligence is creating new possibilities for teaching literature in higher education while simultaneously challenging established assumptions about reading, writing, interpretation, assessment, and authorship. The literature reviewed in this article indicates that AI can support numerous aspects of university literature education. It can assist teachers with lesson preparation, provide individualized learning support, facilitate vocabulary development, generate discussion questions, support comparative analysis, provide alternative interpretations, stimulate creative writing, and contribute to innovative assessment practices (Crompton & Burke, 2023; Qian, 2025). However, the benefits of AI should not be confused with automatic educational improvement. Research increasingly indicates that the pedagogical context surrounding AI is more important than the technology itself. The OECD (2026) emphasizes that GenAI can support learning when used with clear pedagogical intentions, while unstructured outsourcing of cognitive tasks may improve students' immediate performance without producing corresponding learning gains.

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OLIY TA’LIMDA SUN’IY INTELLEKT VA RAQAMLI PEDAGOGIK TEXNOLOGIYALARDAN FOYDALANISHNING KIBERPEDAGOGIK MODELI

Mamatov Dilmurad Narmuradovich[1], Bekchonova Shoira Bazarbayevna[2]
[1]DSc, professor, [2]PhD, professor
Yangi asr universiteti
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Annotatsiya. *Ushbu maqolada oliy ta’lim jarayonida sun’iy intellekt va raqamli pedagogik texnologiyalardan samarali foydalanishning kiberpedagogik modeli masalasi yoritilgan. Maqolada sun’iy intellekt asosidagi adaptiv ta’lim, intellektual ta’lim platformalari, raqamli ta’lim resurslari, virtual yordamchilar va avtomatlashtirilgan baholash tizimlarining pedagogik imkoniyatlari tahlil qilingan. Kiberpedagogik modelni shakllantirishda tizimli, kompetensiyaviy va shaxsga yo‘naltirilgan yondashuvlardan foydalanilgan.*

Kalit so‘zlar: *ta’lim, sun’iy intellekt, raqamli pedagogika, kiberpedagogika, kiberpedagogik model, raqamli pedagogik texnologiyalar, raqamli ta’lim muhiti, adaptiv ta’lim, raqamli kompetensiya, ta’limni individuallashtirish.*

Kirish

Bugungi kunda oliy ta’lim tizimini raqamlashtirish, ta’lim jarayoniga sun’iy intellekt (SI) texnologiyalari va zamonaviy raqamli pedagogik vositalarni joriy etish ta’lim sifatini oshirishning muhim yo‘nalishlaridan biriga aylanmoqda. Sun’iy intellekt asosidagi adaptiv ta’lim, intellektual ta’lim platformalari, virtual yordamchilar, avtomatlashtirilgan baholash tizimlari hamda raqamli ta’lim resurslari talabalarning individual ehtiyojlarini hisobga olish, o‘quv jarayonini shaxsiylashtirish va pedagogik faoliyat samaradorligini oshirish imkonini beradi. Shu bilan birga, ushbu texnologiyalardan samarali foydalanish nafaqat texnik infratuzilmani, balki pedagogik, metodik, axborot xavfsizligi va akademik halollik talablarini ham uyg‘unlashtirishni taqozo etadi.

Oliy ta’limda sun’iy intellekt va raqamli pedagogik texnologiyalardan foydalanishni yagona pedagogik tizim sifatida tashkil etish zarurati yuzaga kelmoqda. Mazkur yondashuv kiberpedagogika tamoyillariga asoslangan holda o‘qituvchi, talaba, raqamli ta’lim muhiti va intellektual texnologiyalar o‘rtasidagi o‘zaro aloqani tizimli tashkil etishga xizmat qiladi.

Adabiyotlar tahlili

Oliy ta’limda sun’iy intellekt va raqamli pedagogik texnologiyalardan foydalanishning kiberpedagogik modeli tahlida shu mavzuga oid ilmiy adabiyotlar shuni ko‘rsatadiki, oliy ta’limda sun’iy intellekt, raqamli pedagogika va kiberpedagogik yondashuvlarning imkoniyatlari so‘nggi yillarda keng tadqiq etilmoqda. Xususan, O.Zawacki-Richter, V.I.Marín, M.Bond va F.Gouverneur tomonidan olib borilgan tizimli tadqiqotda oliy ta’limda sun’iy intellektdan foydalanishga oid ilmiy ishlar tahlil qilinib, SI texnologiyalarining akademik qo‘llab-quvvatlash, baholash va ta’lim jarayonini takomillashtirishdagi imkoniyatlari ko‘rsatib berilgan. Olimlar, shuningdek, sun’iy intellekt tadqiqotlarida pedagoglarning roli yetarlicha yoritilmayotganini ta’kidlaydilar.

W.Holmes, M.Bialik va C.Fadel sun’iy intellektning ta’limdagi imkoniyatlari bilan bir qatorda uning pedagogik, texnik va etik jihatlarini ham kompleks tarzda o‘rganib, SI ta’lim mazmuni, o‘qitish usullari va pedagog faoliyatini qayta ko‘rib chiqishni talab etishini ta’kidlaydilar. Ularning fikricha, sun’iy intellekt ta’lim samaradorligini oshirishga xizmat qilishi mumkin, biroq undan foydalanish pedagogik maqsadlar bilan uyg‘unlashtirilishi lozim[2].

F.Miao va W.Holmes tomonidan generativ sun’iy intellektdan ta’lim va ilmiy tadqiqotlarda foydalanishning pedagogik hamda etik jihatlari yoritilgan. Mualliflar sun’iy intellektni ta’limga joriy etishda inson manfaatlariga yo‘naltirilgan yondashuv, ma’lumotlar maxfiyligini ta’minlash, xavfsizlik, tenglik va mas’uliyatli foydalanish tamoyillariga amal qilish zarurligini qayd etadilar[3].

Shuningdek, tadqiqotchilar tomonidan sun’iy intellektdan foydalanishda akademik halollik, shaxsiy ma’lumotlarni himoya qilish, axborot xavfsizligi, pedagogning raqamli kompetensiyasi va inson omili kabi masalalarga alohida e’tibor qaratilmoqda. Shu jihatdan, sun’iy intellektni ta’lim jarayoniga shunchaki texnologik vosita sifatida emas, balki pedagogik maqsad, mazmun, metod, baholash va ta’lim natijalari bilan uzviy bog‘langan tizim sifatida qarash muhimdir[4].



Mavjud ilmiy yondashuvlarda sun’iy intellekt va raqamli pedagogik texnologiyalarning alohida imkoniyatlari yetarlicha o‘rganilgan bo‘lsa-da, ularni oliy ta’limning yagona kiberpedagogik muhiti doirasida tizimli ravishda birlashtirish masalasi dolzarb bo‘lib qolmoqda. Shu sababli o‘qituvchi, talaba, sun’iy intellekt vositalari, raqamli pedagogik texnologiyalar va

ta’lim muhiti o‘rtasidagi o‘zaro aloqani ta’minlovchi kiberpedagogik modelni ishlab chiqish mazkur tadqiqotning muhim ilmiy yo‘nalishi sifatida belgilanadi.

Metodika

Tadqiqotda tizimli, kompetensiyaviy va shaxsga yo‘naltirilgan yondashuvlardan foydalanildi. Kiberpedagogik modelni ishlab chiqishda oliy ta’lim jarayonining maqsad, mazmun, subyektlar, raqamli vositalar, pedagogik texnologiyalar va natijalar kabi asosiy komponentlari o‘zaro bog‘liqlikda ko‘rib chiqildi. Tadqiqot metodlari sifatida ilmiy-pedagogik adabiyotlarni tahlil qilish, taqqoslash, umumlashtirish, modellashtirish va pedagogik tajribani tizimlashtirish usullaridan foydalanildi. Modelning asosini o‘qituvchi va talabaning raqamli kompetensiyalarini rivojlantirish, sun’iy intellekt imkoniyatlaridan maqsadli foydalanish, individual ta’limni qo‘llab-quvvatlash hamda raqamli ta’lim muhitining samaradorligini ta’minlash tamoyillari tashkil etadi.

Munozara va muhokama

Tadqiqot natijalari oliy ta’limda sun’iy intellekt va raqamli pedagogik texnologiyalardan foydalanishni tizimli tashkil etish zarurligini ko‘rsatadi. Mazkur jarayonda sun’iy intellektni faqat texnik vosita sifatida emas, balki o‘qituvchi va talabaning pedagogik faoliyatini qo‘llab-quvvatlovchi intellektual komponent sifatida qarash maqsadga muvofiq. Kiberpedagogik model doirasida raqamli platformalar, sun’iy intellekt vositalari, elektron ta’lim resurslari va interaktiv texnologiyalarning o‘zaro integratsiyasi ta’lim jarayonining individuallashuvi va moslashuvchanligini ta’minlaydi.



Modelning muhim jihatlaridan biri talabaning individual ta’lim ehtiyojlarini aniqlash va unga mos ta’lim resurslarini tavsiya etish imkoniyatidir. Sun’iy intellekt asosidagi texnologiyalar talabaning o‘zlashtirish darajasini tahlil qilish, murakkab mavzularni aniqlash va qo‘shimcha

o‘quv materiallarini tavsiya etish orqali ta’lim samaradorligini oshirishga xizmat qilishi mumkin. Shu bilan birga, o‘qituvchi ta’lim jarayonidagi asosiy pedagogik subyekt sifatida saqlanib qoladi. Uning vazifasi texnologiyani bevosita qo‘llashdan tashqari, sun’iy intellekt tomonidan taqdim etilgan natijalarni pedagogik jihatdan baholash va ta’lim maqsadlariga moslashtirishdan iborat[5].

Kiberpedagogik modelni amaliyotga joriy etishda akademik halollik, axborot xavfsizligi va shaxsiy ma’lumotlarni himoya qilish masalalari ham muhim ahamiyatga ega. Sun’iy intellektdan nazoratsiz foydalanish talabaning mustaqil fikrlash faolligining pasayishiga yoki tayyor axborotga ortiqcha tayanishiga olib kelishi mumkin. Shu sababli SI vositalaridan foydalanish qoidalarini ishlab chiqish, talabalarni raqamli va axborot savodxonligiga o‘rgatish hamda akademik halollik tamoyillarini mustahkamlash zarur.

Kiberpedagogik modelning samaradorligi texnologiyaning o‘ziga emas, balki uning pedagogik maqsadlar bilan qay darajada uyg‘unlashtirilganiga bog‘liq. Shuning uchun oliy ta’lim muassasalarida sun’iy intellekt va raqamli pedagogik texnologiyalarni joriy etishda texnologik, pedagogik, metodik va etik komponentlarning o‘zaro birligi ta’minlanishi lozim.

Xulosa

Tadqiqot natijalariga ko‘ra, oliy ta’limda sun’iy intellekt va raqamli pedagogik texnologiyalardan foydalanish ta’lim jarayonining sifat va samaradorligini oshirish uchun muhim imkoniyatlarni yaratadi. Ularning integratsiyasi individual ta’limni tashkil etish, o‘quv jarayonini moslashtirish, bilimlarni monitoring qilish, baholash jarayonini takomillashtirish va pedagogik faoliyatni qo‘llab-quvvatlash imkonini beradi.

Ishlab chiqilgan kiberpedagogik model o‘qituvchi, talaba, sun’iy intellekt texnologiyalari va raqamli ta’lim muhitining o‘zaro hamkorligiga asoslanadi. Modelning asosiy maqsadi texnologiyani ta’lim jarayoniga shunchaki joriy etish emas, balki undan pedagogik jihatdan maqsadli va samarali foydalanishni ta’minlashdan iborat.

Kiberpedagogik modelni amaliyotga tatbiq etishda pedagoglarning raqamli kompetensiyalarini rivojlantirish, talabalarining sun’iy intellektdan mas’uliyatli foydalanish ko‘nikmalarini shakllantirish, akademik halollik va axborot xavfsizligini ta’minlash muhim shartlar sifatida belgilanadi.

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XITOY TILINI O‘QITISHDA SUN’IY INTELLEKTDAN ETIK FOYDALANISH: MADANIYATLARARO KOMMUNIKATIV KOMPETENSIYANI RIVOJLANTIRISH TAJRIBASI

Nazarova Sayyora Anvarovna
PhD, dotsent, Toshkent davlat sharqshunoslik universiteti Xitoyshunoslik oliy maktabi
https://doi.org/10.5281/zenodo.22871844

Annotatsiya*. Maqolada oliy ta’limda xitoy tilini o‘qitishda generativ sun’iy intellektdan (SI) etik foydalanish masalasi madaniyatlararo kommunikativ kompetensiyani rivojlantirish tajribasi asosida tahlil qilinadi. Tadqiqot xitoy tilini o‘rganuvchi 178 nafar ishtirokchini qamrab olgan kengroq pedagogik tajriba-sinovning SI bilan bog‘liq qismiga tayangan. Eksperimental natijalar madaniyatlararo diskursni talqin qilish, argumentativ diskurs qurish va refleksiv tahlil bo‘yicha ijobiy dinamikani ko‘rsatgan; SI bilan ishlash jarayonidagi kuzatuvlar esa tanqidiy verifikatsiya, inson mualliffligini saqlash, maxfiylik, akademik halollik va o‘qituvchi mediatsiyasi zarurligini aniqlashtirgan. Shu bois maqolada SI alohida o‘qitish metodi yoki o‘qituvchini almashtiruvchi vosita sifatida emas, balki kontekstual talqin, madaniyatlararo qiyoslash va refleksiv qayta ishlashni qo‘llab-quvvatlovchi raqamli ta’lim muhiti sifatida ko‘rib chiqiladi.*

Kalit so‘zlar*: oliy ta’lim, sun’iy intellekt etikasi, xitoy tilini o‘qitish, madaniyatlararo kommunikativ kompetensiya, generativ sun’iy intellekt, akademik halollik, maxfiylik, pedagogik mediatsiya.*

Abstract*. The article examines the ethical use of generative artificial intelligence (AI) in Chinese language education through the experience of developing intercultural communicative competence. The discussion draws on the AI-related component of a broader pedagogical study involving 178 Chinese-language learners. Experimental results demonstrated positive dynamics in intercultural discourse interpretation, argumentative discourse construction and reflective analysis, while observations of AI-assisted activities highlighted the need for critical verification, preservation of human authorship, privacy, academic integrity and teacher mediation. AI is therefore considered not as an independent teaching method or a substitute for the teacher, but as a digitally mediated learning environment supporting contextual interpretation, intercultural comparison and reflective reconstruction.*

Keywords: *higher education, AI ethics, Chinese language teaching, intercultural communicative competence, generative AI, academic integrity, privacy, teacher mediation.*

Kirish

Generativ sun’iy intellektning oliy ta’limga kirib kelishi xorijiy tillarni o‘qitish metodikasida faqat texnologik emas, balki etik va pedagogik masalalarni ham kun tartibiga olib chiqdi. Chatbotlar matn yaratish, tarjima qilish, dialoglarni modellashtirish, tezkor fikr-mulohaza berish va individual topshiriqlarni shakllantirish imkonini beradi. Biroq ushbu imkoniyatlar ta’limiy natijaga avtomatik ravishda olib kelmaydi. Aksincha, SI javoblarining ishonchliligi, talabaning mustaqil fikrlashi, akademik halollik, shaxsiy ma’lumotlarni himoya qilish va o‘qituvchining nazorat funksiyasi kabi masalalar sun’iy intellektdan foydalanishning metodik chegaralarini belgilaydi.

L. Kohnke, B. L. Moorhouse va D. Zou generativ SI til o‘qitishda kommunikativ mashq, teskari aloqa va individual yordam imkoniyatlarini kengaytirishini qayd etadilar, biroq undan samarali foydalanish o‘qituvchi va talabaning raqamli savodxonligi hamda pedagogik nazoratini talab qiladi [1]. E. Kasneci va hammualliflar yirik til modellari bilan ishlashda xatolar, stereotiplar va noto‘g‘ri ma’lumotlar xavfi tufayli inson nazorati va tanqidiy tekshiruv zarurligini ko‘rsatadilar [2]. F. Miao va W. Holmes tomonidan tayyorlangan UNESCOning generativ SI bo‘yicha tavsiyalarida inson markaziyligi, ma’lumotlar maxfiyligi, etik validatsiya va pedagogik loyihalash SI ni ta’limga joriy etishning asosiy shartlari sifatida belgilangan [3].

Mazkur masala xitoy tilini o‘qitishda ayniqsa dolzarbdir. Xitoy kommunikatsiyasida pragmatik yashirinlik, kontekstga bog‘liqlik, bilvosita ifoda, ijtimoiy munosabatlar va madaniy konvensiyalar muhim ahamiyat kasb etadi. Shu bois grammatik jihatdan to‘g‘ri SI javobi har doim ham madaniyatlararo nuqtayi nazardan adekvat bo‘lavermaydi. Maqolaning maqsadi xitoy tilini o‘qitishda generativ SI dan etik foydalanishning pedagogik shartlarini aniqlash va bu shartlarning madaniyatlararo kommunikativ kompetensiyani rivojlantirishdagi o‘rnini ko‘rsatishdan iborat.

Nazariy asoslar: SI etikasi va madaniyatlararo til ta’limi

Madaniyatlararo kommunikativ kompetensiya faqat til birliklarini bilish emas, balki boshqa madaniyat vakilining kommunikativ maqsadini talqin qilish, madaniy ma’nolarni qiyoslash va vaziyatga mos kommunikativ qaror qabul qilishni ham o‘z ichiga oladi. M. Byram ushbu kompetensiyani bilim, munosabat, talqin va o‘zaro ta’sir ko‘nikmalarining birligi sifatida talqin qiladi [4]. A. J. Liddicoat va A. Scarino til o‘rganuvchini madaniy ma’nolarni faol talqin qiluvchi subyekt sifatida ko‘radilar [5]. O‘zbekistonda xitoy tilini o‘qitish amaliyotini tahlil qilgan S. A. Nazarova lingvistik tayyorgarlikni kognitiv-diskursiv va madaniyatlararo talqin bilan integratsiyalash zarurligini asoslaydi [6]. CEFR Companion Volume zamonaviy kommunikativ qobiliyat tarkibida mediatsiya, onlayn o‘zaro ta’sir va ko‘p madaniyatlilik komponentlarini kengaytiradi [7].

Ushbu nazariy pozitsiyalar SI bilan ishlashning etik mezonlarini ham aniqlashtiradi. Agar generativ model tayyor javob ishlab bersa va talaba uni tanqidiy qayta ishlamasdan o‘zlashtirsa, texnologiya o‘quvchining mustaqil talqin va qaror qabul qilish faoliyatini qisqartirishi mumkin. Aksincha, SI javobi tekshiriladigan, qiyoslanadigan va qayta tuziladigan material sifatida qo‘llansa, insonning yetakchi intellektual roli saqlanadi. Shu sababli mazkur maqolada etik foydalanish tushunchasi SI dan voz kechish emas, balki inson muallifligi, maxfiylik, akademik halollik va pedagogik mediatsiyani saqlagan holda foydalanish sifatida talqin qilinadi.

Tadqiqot metodikasi va SI dan foydalanish protokoli

Maqolada xitoy tilini o‘qitishda madaniyatlararo kommunikativ kompetensiyani rivojlantirishga bag‘ishlangan kengroq pedagogik tadqiqotning sun’iy intellekt bilan bog‘liq qismi tahlil qilinadi. Empirik tadqiqotda 178 nafar xitoy tilini o‘rganuvchi qatnashgan; ular eksperimental va nazorat guruhlariga ajratilgan. Tadqiqot dizayni nazariy tahlil, o‘quv dasturlari va materiallarini o‘rganish, diagnostik topshiriqlar, tajriba-sinov, madaniyatlararo diskurs tahlili va pre-test hamda post-test natijalarini qiyosiy baholashni o‘z ichiga olgan.

Eksperimental ta’limda ChatGPT-4, Gemini va ERNIE Bot sun’iy intellekt vositalari qo‘llanildi. Metodik shaffoflikni ta’minlash uchun ochiq va nazoratsiz chatbot muloqotidan emas, balki oldindan ishlab chiqilgan strukturaviy promptlardan foydalanildi. Ular madaniyatlararo dialoglarni modellashtirish, xitoy va o‘zbek kommunikativ vaziyatlarini qiyoslash, pragmatik ma’noni talqin qilish, madaniy jihatdan belgilangan birliklarni tahlil qilish,

mashina tarjimasi bilan kontekstual inson talqinini qiyoslash va diskursni qayta tuzishga yo‘naltirilgan.

SI bilan ishlashda bir necha etik cheklovlar joriy qilindi. Birinchidan, SI tizimlaridan faqat o‘quv maqsadida foydalanildi. Ikkinchidan, talabalarga shaxsiy, maxfiy yoki sezgir ma’lumotlarni SI tizimlariga kiritmaslik bo‘yicha ko‘rsatma berildi. Uchinchidan, SI yaratgan matn yoki javob yakuniy topshiriq sifatida qabul qilinmadi: talaba uni tanqidiy baholashi, xatolar va madaniy-pragmatik cheklovlarni aniqlashi, qayta ishlashi va o‘z yakuniy variantini asoslab berishi talab etildi. Bu qoidalar UNESCO tavsiya qilgan inson markaziyligi va maxfiylik tamoyillari bilan hamohangdir [3].

Etik foydalanishni ta’minlagan strukturaviy SI promptlari

Metodik shaffoflikni ta’minlash maqsadida tajribada erkin chatbot muloqoti emas, balki oldindan ishlab chiqilgan aniq strukturaviy promptlar qo‘llanildi. Promptlar SI dan tayyor javob olishga emas, balki qiyoslash, pragmatik talqin, diskursni qayta tuzish va refleksiv asoslashga yo‘naltirildi. Quyida tajribada qo‘llangan reprezentativ promptlar keltiriladi.

1-prompt. Madaniy konseptlarni qiyosiy tahlil qilish. «Xitoy tilidagi 忍 (rěn) tushunchasi va o‘zbek tilidagi sabr tushunchasini qiyoslang. Ularning madaniy ma’nolari, o‘xshash va farqli jihatlarini tushuntiring. Xitoy va o‘zbek tilida so‘zlashuvchilar o‘rtasidagi muloqotda ushbu tushunchalarni turlicha talqin qilish natijasida yuzaga kelishi mumkin bo‘lgan vaziyatlarni aniqlang.»

2-prompt. Madaniyatlararo pragmatik talqin. «Quyidagi ifodani tahlil qiling: 你的观点很有意思，不过…… (“Sizning fikringiz juda qiziqarli, biroq…”). Uning xitoy kommunikatsiyasidagi pragmatik ma’nosini tushuntiring. Nima sababdan o‘zbek talaba ushbu ifodani boshqacha talqin qilishi mumkin? Madaniyatlararo izoh bering.»

3-prompt. Qiyosiy madaniy refleksiya. «Xitoyning Bahor bayrami (春节) va o‘zbek Navro‘z bayramini qiyoslang. Umumiy qadriyatlarni, urf-odatlardagi farqlarni va madaniy ahamiyatga ega ramzlarni aniqlang. Natijalarni qiyosiy jadval ko‘rinishida taqdim eting va ushbu farqlar madaniyatlararo kommunikatsiyaga qanday ta’sir qilishi mumkinligini izohlang.»

4-prompt. Argumentativ madaniyatlararo dialog. «Siz milliy an’analar haqidagi xalqaro munozarada qatnashayotgan xitoylik universitet talabasisiz. O‘zbek talabaning milliy bayramlarning ahamiyati haqidagi fikriga xushmuomalalik bilan javob bering, bitta dalil keltiring va madaniyatlararo dialogni davom ettiruvchi bitta savol bering.»

5-prompt. Diskursni qayta tuzish. «Quyidagi dialogda madaniy jihatdan noo‘rin to‘g‘ridan-to‘g‘ri tanqid mavjud. Dialogni xitoy kommunikativ madaniyatiga ko‘proq mos keladigan strategiyalar asosida qayta yozing. Qaysi lingvistik va pragmatik o‘zgarishlar kiritilganini va ularning sababini tushuntiring.»

Mazkur promptlarning etik komponenti SI ning o‘zi bergan javob bilan yakunlanmaganidadir. Har bir topshiriqdan so‘ng talabalar SI javobini kontekst va ishonchli manbalar bilan tekshirdilar, umumlashtirish yoki stereotiplashtirish holatlarini aniqladilar, kerakli o‘zgartirishlarni kiritdilar va yakuniy talqinni o‘z nomidan asosladilar. Shu tariqa SI javobi mualliflik mahsuloti emas, tanqidiy tahlil uchun oraliq material sifatida ishlatildi.

Natijalar va muhokama

Tadqiqotning umumiy eksperimental natijalari eksperimental guruhlarda madaniyatlararo diskursni talqin qilish, yashirin ma’nolarni aniqlash, kontekstual kommunikativ tahlil, refleksiv madaniyatlararo tahlil va argumentativ diskurs qurish bo‘yicha ijobiy dinamikani ko‘rsatdi. Eng

katta o‘sish argumentativ madaniyatlararo diskurs qurishda +29,8 foiz punktni, refleksiv madaniyatlararo tahlilda +25,9 foiz punktni, yashirin ma’nolarni aniqlashda +23,6 foiz punktni tashkil etdi. Biroq mazkur ko‘rsatkichlar kompleks eksperimental metodikaning umumiy natijasi bo‘lib, ularni faqat SI ta’siri sifatida talqin qilish mumkin emas.

Uch asosiy mezon - madaniyatlararo diskursni talqin qilish, argumentativ diskurs qurish va refleksiv madaniyatlararo tahlil - bo‘yicha eksperimental va nazorat guruhlari o‘rtasidagi farqlar statistik jihatdan ahamiyatli bo‘lgan ($p < 0,05$). Cohen’s h ko‘rsatkichlari 0,365-0,411 oralig‘ida qayd etilib, o‘rta darajadagi effektni ko‘rsatgan. Ushbu statistik natijalar madaniyatlararo kommunikativ kompetensiya dinamikasini tasdiqlaydi, ammo SI ning alohida sababiy hissasini o‘lchamaydi.

SI bilan bog‘liq kuzatuvlar esa alohida metodik xulosa chiqarishga imkon berdi. Tajribaning dastlabki bosqichlarida ayrim talabalar mashina yaratgan formulirovkalarga ortiqcha tayanishga moyillik ko‘rsatganlar. Shu sababli SI javoblarini tanqidiy tekshirish, muqobil talqinlar bilan qiyoslash, manbaga tayangan holda qayta ishlash va shaxsiy pozitsiyani asoslash majburiy talabga aylantirildi. Demak, etik foydalanish natijaviy ko‘rsatkich sifatida emas, balki SI bilan ishlashni metodik jihatdan boshqaruvchi shartlar tizimi sifatida qaralishi lozim.

Xitoy tilini o‘qitishda SI dan etik foydalanishning metodik tamoyillari

Tajriba natijalari hamda mavjud xalqaro tavsiyalarni umumlashtirish asosida xitoy tilini o‘qitishda SI dan etik foydalanishning besh metodik tamoyili aniqlashtirildi. Birinchisi - maqsadlilik: SI vositasi aniq ta’limiy maqsad va strukturaviy prompt asosida qo‘llanishi kerak. Ikkinchisi - tanqidiy verifikatsiya: SI javobi yakuniy bilim emas, tekshiriladigan va qiyoslanadigan material sifatida ko‘rilishi lozim. Uchinchi tamoyil - inson muallifligini saqlash: topshiriq talabaning mustaqil xulosasi, qayta ishlangan matni yoki asoslangan kommunikativ qarori bilan yakunlanishi zarur.

To‘rtinchi tamoyil - maxfiylik va ma’lumot xavfsizligi. Talaba SI tizimiga shaxsiy, sezgir yoki maxfiy ma’lumotlarni kiritmasligi, o‘quv va tadqiqot ma’lumotlari zarur hollarda anonimlashtirilishi kerak. Beshinchi tamoyil - o‘qituvchi mediatsiyasi va akademik halollik. O‘qituvchi SI dan foydalanish chegaralarini oldindan belgilashi, topshiriqning qaysi qismida SI yordami mumkinligini aniqlashtirishi va talabaning mustaqil intellektual hissasini baholashi lozim. Mazkur tamoyillar SI ni cheklash uchun emas, balki uning ta’limiy salohiyatini inson markaziy, xavfsiz va metodik asoslangan shaklda yuzaga chiqarish uchun zarur.

Tadqiqot cheklovlari va amaliy ahamiyati

Mazkur tadqiqot natijalarini talqin qilishda bir qator cheklovlar hisobga olinishi zarur. Birinchidan, generativ SI eksperimental metodikaning faqat bitta tarkibiy qismi bo‘lgan; u madaniyatlararo qiyoslash, diskursiv tahlil, refleksiv topshiriqlar va o‘qituvchi mediatsiyasi bilan birgalikda qo‘llangan. Shu sababli kuzatilgan kompetensiya o‘sishida SI ning mustaqil sababiy hissasini ajratib ko‘rsatish mumkin emas. Ikkinchidan, tadqiqotda “SI dan etik foydalanish” alohida psixometrik shkala bilan o‘lchanmagan. Etik xulosalar tajriba jarayonida kuzatilgan muammolar, joriy qilingan pedagogik cheklovlar va xalqaro tavsiyalarni qiyosiy umumlashtirish asosida shakllantirilgan. Bu chegarani ochiq ko‘rsatish SI etikasi bo‘yicha natijalarni ortiqcha umumlashtirishning oldini oladi.

Amaliy nuqtayi nazardan esa mazkur yondashuv xitoy tili bo‘yicha topshiriqlarni loyihalashda SI dan foydalanish mezonlarini aniqlashtirishga xizmat qiladi. O‘qituvchi SI vositasini tanlashdan avval ta’limiy maqsadni, ruxsat etilgan foydalanish chegaralarini, verifikatsiya usulini va talabaning yakuniy mustaqil mahsulotini belgilashi lozim. Keyingi

tadqiqotlarda SI yordamidagi faoliyatni SI siz bajariladigan o‘xshash topshiriqlar bilan faktorli yoki kvazi-eksperimental dizayn asosida qiyoslash, shuningdek akademik halollik, SI savodxonligi va madaniyatlararo pragmatik qaror qabul qilishni alohida mezonlar orqali baholash maqsadga muvofiq. Bunday yondashuv inson va SI hamkorligining qaysi komponentlari aynan qaysi ta’limiy natijalarga ta’sir ko‘rsatishini aniqroq belgilash imkonini beradi.

Xulosa

Xitoy tilini o‘qitishda generativ SI ning pedagogik qiymati tayyor matn yoki tarjima yaratish qobiliyati bilangina belgilanmaydi. Uning metodik imkoniyati talabani turli talqinlarni qiyoslash, yashirin va pragmatik ma’nolarni aniqlash, mashina javobining cheklovlarini ko‘rish, madaniyatlararo vaziyatni tahlil qilish va o‘z kommunikativ qarorini asoslashga undashidadir. Shu bilan birga, ushbu tadqiqotda qayd etilgan kompetensiya o‘sishini faqat SI bilan bog‘lash mumkin emas: u diskursiv, madaniyatlararo, refleksiv va raqamli faoliyatlarni birlashtirgan kompleks pedagogik ta’sir natijasidir.

SI dan etik foydalanish insonning yetakchi rolini saqlab qolishni talab qiladi. Sun’iy intellekt kommunikativ vaziyatlarni modellashtirishi va muqobil variantlarni yaratishi mumkin, biroq ma’noni talqin qilish, madaniy adekvatlikni baholash, faktni tekshirish va yakuniy qarorni asoslash talabaning mustaqil intellektual faoliyati bo‘lib qolishi kerak. Demak, oliy ta’limda SI dan foydalanishning asosiy mezoni uning qancha javob yaratishi emas, balki talabaning mustaqil tahlili, refleksiyasi va madaniyatlararo kommunikativ kompetensiyasini qay darajada faollashtira olishidir.

Foydalanilgan adabiyotlar

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O‘ZBEK ADABIYOTI TA’LIMIDA TALABALARNING O‘QUV-BILISH MOTIVATSIYASINI FAOLLASHTIRISH METODIKASI

Ortiqova Dildora Begmirzayevna
Toshkent shahridagi Adju universiteti qoshidagi
Xalqaro maktab direktor o‘rinbosari
Chirchiq davlat pedagogika universiteti Mustaqil izlanivchisi
https://doi.org/10.5281/zenodo.22871868

Annotatsiya. *Ushbu maqolada oliy ta’lim muassasalarida o‘zbek adabiyotini o‘qitish jarayonida talabalarning o‘quv-bilish motivatsiyasini faollashtirishning samarali metodik usullari yoritilgan. Adabiy ta’limning talaba shaxsiyati, estetik didi, mustaqil fikrlashi, ma’naviy-axloqiy qarashlari va ijodiy tafakkurini rivojlantirishdagi o‘rni tahlil qilingan. Shuningdek, interfaol metodlar, muammoli ta’lim, munozara, “aqliy hujum”, klaster, loyiha va axborot-kommunikatsiya texnologiyalaridan foydalanish orqali talabalarning darsdagi faolligini oshirish imkoniyatlari ko‘rib chiqilgan. Maqolada o‘quv-bilish motivatsiyasini shakllantirishda o‘qituvchining pedagogik mahorati, talabaning individual qiziqishlari va mustaqil ta’lim faoliyatining ahamiyati asoslab berilgan.*

Kalit so‘zlar: *o‘zbek adabiyoti, adabiy ta’lim, o‘quv-bilish motivatsiyasi, talaba, motivatsiya, interfaol metodlar, mustaqil ta’lim, muammoli ta’lim, ijodiy tafakkur, pedagogik texnologiya.*

Kirish

Bugungi kunda oliy ta’lim tizimida ta’lim sifatini oshirish, talabalarning mustaqil fikrlashi va ijodiy salohiyatini rivojlantirish muhim vazifalardan biri hisoblanadi. Ayniqsa, o‘zbek adabiyotini o‘qitish jarayonida talabaning faqat badiiy asar mazmunini o‘zlashtirishi emas, balki undagi g‘oyaviy-estetik qarashlarni anglash, obrazlarni tahlil qilish, muallif pozitsiyasini baholash va mustaqil xulosa chiqarishiga erishish zarur.

Adabiyot fani insonning ma’naviy dunyosini boyituvchi, estetik tafakkurini shakllantiruvchi va milliy qadriyatlarga hurmat ruhida tarbiyalovchi muhim fanlardan biridir. Badiiy asarlarni o‘rganish jarayonida talaba o‘zini qiziqtirgan savollarga javob izlaydi, qahramonlarning xatti-harakatlarini baholaydi, turli nuqtayi nazarlarni taqqoslaydi va o‘z fikrini asoslashga harakat qiladi. Shu jihatdan adabiyot darslarida o‘quv-bilish motivatsiyasini shakllantirish alohida metodik ahamiyat kasb etadi.

O‘quv-bilish motivatsiyasi talabaning bilim olishga bo‘lgan ichki ehtiyoji, qiziqishi va ta’lim jarayonida faol ishtirok etishga intilishida namoyon bo‘ladi. Motivatsiyasi yuqori bo‘lgan talaba topshiriqlarni faqat baho olish uchun emas, balki bilim va ko‘nikmalarini rivojlantirish uchun bajarishga intiladi. Shuning uchun zamonaviy adabiyot ta’limida talabaning ichki qiziqishini uyg‘otadigan metod va vositalardan foydalanish muhimdir.

Asosiy qism

O‘quv-bilish motivatsiyasining mazmuni va ahamiyati

O‘quv-bilish motivatsiyasi ta’lim oluvchining bilim, ko‘nikma va kompetensiyalarni egallashga undovchi ichki va tashqi omillar majmuasidir. Talabaning fan bilan bog‘liq qiziqishi,

yangi bilimlarni egallashga bo‘lgan ehtiyoji, o‘z imkoniyatlarini namoyon qilish istagi va mustaqil izlanishga intilishi motivatsiyaning muhim ko‘rsatkichlari hisoblanadi.

O‘zbek adabiyoti ta’limida motivatsiyani kuchaytirish uchun badiiy asarning talaba hayoti bilan bog‘liq jihatlarini ochib berish muhim. Masalan, asardagi axloqiy muammolar, insoniy munosabatlar, vatanparvarlik, adolat, muhabbat, ma’rifat va ma’naviyat kabi masalalar zamonaviy hayot bilan bog‘lab tahlil qilinsa, talabaning mavzuga qiziqishi ortadi.

Adabiyot ta’limida muammoli yondashuv

Talabalarning o‘quv-bilish motivatsiyasini faollashtirishda muammoli ta’lim samarali metodlardan biridir. Bunda o‘qituvchi tayyor xulosani bermaydi, balki talabalarni muayyan muammo ustida fikrlashga undaydi.

Masalan, badiiy asar tahlilida “Qahramonning ushbu qarorini to‘g‘ri deb hisoblash mumkinmi?”, “Muallif nima sababdan aynan shu obrazni markazga qo‘ygan?”, “Asardagi muammo bugungi jamiyat uchun qanday ahamiyatga ega?” kabi savollar berilishi mumkin.

Bunday savollar talabaning mustaqil fikrlashiga, dalillar izlashiga va o‘z nuqtayi nazarini asoslashiga imkon yaratadi. Natijada dars jarayoni oddiy ma’lumot berishdan fikr almashish va izlanish jarayoniga aylanadi.

Interfaol metodlardan foydalanish

O‘zbek adabiyotini o‘qitishda interfaol metodlardan foydalanish talabalarning darsdagi faolligini oshirishga xizmat qiladi. “Aqliy hujum”, “Klaster”, “BBB”, “Insert”, “Bahs-munozara”, “Venn diagrammasi”, “Sinkveyn” kabi metodlar badiiy asarni turli jihatlardan tahlil qilish imkonini beradi. Masalan, “Venn diagrammasi” yordamida ikki adabiy qahramonning xarakteri, dunyoqarashi va xatti-harakatlarini taqqoslash mumkin. “Klaster” metodi orqali yozuvchi ijodining asosiy yo‘nalishlari yoki asarning g‘oyaviy xususiyatlari tizimlashtiriladi. “Bahs-munozara” usulida esa talabalar muayyan adabiy muammo bo‘yicha o‘z fikrlarini dalillar asosida himoya qiladilar.

Interfaol metodlarning muhim jihati shundaki, ular talabani darsning faol ishtirokchisiga aylantiradi. Talaba tayyor ma’lumotni qabul qiluvchi emas, balki bilimni izlash, tahlil qilish va xulosa chiqarish jarayonining bevosita ishtirokchisiga aylanadi.

Badiiy asar tahlili orqali motivatsiyani oshirish

Adabiyot darslarida motivatsiyani oshirishning eng muhim vositalaridan biri badiiy matn bilan bevosita ishlashdir. Talaba asardan parchalarni o‘qish, obrazlar nutqini tahlil qilish, badiiy tasvir vositalarini aniqlash va muallifning uslubiy mahoratini baholash orqali mavzuni chuqurroq o‘zlashtiradi.

Badiiy asar tahlilida “matn — talaba — muallif” munosabati asosida ishlash samarali natija beradi. Talaba matnni mustaqil o‘qib, o‘z taassurotlarini shakllantiradi, keyin esa muallifning g‘oyasi va boshqa talabalarning qarashlari bilan taqqoslaydi.

Shuningdek, qahramonlarning ichki kechinmalarini tahlil qilish, ularning xatti-harakatlariga baho berish va muqobil yakunlar taklif qilish ham ijodiy fikrlashni rivojlantiradi. Bu jarayon talabaning adabiyotga bo‘lgan qiziqishini kuchaytiradi.

Raqamli texnologiyalardan foydalanish

Zamonaviy ta’lim jarayonida raqamli texnologiyalardan foydalanish talabalarning o‘quv-bilish motivatsiyasini kuchaytirishning samarali vositalaridan biridir. Elektron taqdimotlar, videolavhalar, elektron kutubxonalar, raqamli testlar va onlayn muhokama platformalari adabiyot darslarini yanada qiziqarli tashkil etishga yordam beradi.

Masalan, yozuvchi yoki shoir hayoti va ijodiga oid videomateriallardan foydalanish, asar asosida multimedia taqdimoti tayyorlash, elektron viktorinalar tashkil etish talabalarning darsga bo‘lgan qiziqishini oshirishi mumkin.

Biroq texnologiyadan foydalanishning o‘zi maqsad emas. U badiiy asarni chuqurroq anglash, mustaqil izlanish va tahlil qilishga xizmat qilishi lozim. Shuning uchun raqamli vositalar mazmun va metodika bilan uyg‘unlashtirilishi zarur.

Mustaqil ta’lim va ijodiy topshiriqlarning roli

Talabalarning o‘quv-bilish motivatsiyasini shakllantirishda mustaqil ta’lim alohida ahamiyatga ega. Mustaqil topshiriqlar talabaning o‘z bilimini nazorat qilish, qo‘shimcha manbalarni izlash va yangi ma’lumotlarni o‘zlashtirish imkoniyatini kengaytiradi.

Adabiyot fanida mustaqil ta’lim uchun quyidagi topshiriqlardan foydalanish mumkin:

- badiiy asar bo‘yicha tahliliy esse yozish;
- adabiy qahramonga tavsif berish;
- yozuvchi ijodiga oid qo‘shimcha manbalarni o‘rganish;
- asar asosida taqdimot tayyorlash;
- ikki asarni qiyosiy tahlil qilish;
- adabiy munozara uchun savollar tayyorlash;
- asardagi muammolarning zamonaviy hayot bilan bog‘liqligini tahlil qilish.

Ijodiy topshiriqlar talabaning shaxsiy qiziqishlarini hisobga olgan holda tashkil etilsa, uning ichki motivatsiyasi yanada kuchayadi.

O‘qituvchining pedagogik mahorati

Talabalarning o‘quv-bilish motivatsiyasini faollashtirish ko‘p jihatdan o‘qituvchining pedagogik mahoratiga bog‘liq. O‘qituvchi dars jarayonida talabalarni tinglashi, ularning fikrlarini hurmat qilishi va mustaqil fikrlashiga imkon yaratishi kerak.

Adabiyot fanida yagona “to‘g‘ri javob”ga asoslangan yondashuv har doim ham samarali bo‘lavermaydi. Badiiy asar talqinida turli qarashlarning mavjudligi tabiiy. Muhimi, talaba o‘z fikrini matndan olingan dalillar asosida asoslay olishi kerak.

O‘qituvchining rag‘batlantiruvchi fikrlari, konstruktiv baholashi va talabaga individual yondashuvi ham motivatsiyani oshirishda muhim omildir. Baholash faqat natijani emas, balki talabaning izlanishi, faolligi va ijodiy yondashuvini ham hisobga olishi maqsadga muvofiq.

Asosiy qismga qo‘shimcha

Talabalarda adabiyot faniga qiziqishni shakllantirish

O‘zbek adabiyoti ta’limida talabalarning o‘quv-bilish motivatsiyasini shakllantirish, avvalo, ularning adabiyot faniga bo‘lgan qiziqishini oshirishdan boshlanadi. Talaba o‘zi o‘rganayotgan mavzuning mazmuni va hayotiy ahamiyatini anglab yetgan taqdirdagina ta’lim jarayonida faol ishtirok etadi. Shu sababli o‘qituvchi darsning dastlabki bosqichidayoq talabalarda qiziqish uyg‘otishga e’tibor qaratishi lozim.

Buning uchun mavzuga oid muammoli savollar, hayotiy vaziyatlar, qiziqarli faktlar, ijodkor hayotiga oid lavhalar yoki badiiy asardan ta’sirchan parchalar berish mumkin. Masalan, muayyan asarni o‘rganishdan oldin “Siz ushbu vaziyatda qahramon o‘rnida bo‘lganingizda qanday yo‘l tutgan bo‘lardingiz?” kabi savollar berilishi talabaning mavzuga nisbatan shaxsiy munosabatini shakllantiradi.

Adabiyot darslarida talabaning shaxsiy tajribasi bilan badiiy asar o‘rtasidagi bog‘liqlikni yaratish ham muhim. Chunki inson o‘z hayoti bilan bog‘lay olgan ma’lumotni tezroq qabul qiladi va uzoqroq vaqt eslab qoladi. Demak, badiiy asardagi muammolarni zamonaviy hayot,

yoshlar dunyoqarashi va jamiyatdagi jarayonlar bilan bog‘lash o‘quv-bilish motivatsiyasini kuchaytiradi.

Talabalarning individual xususiyatlarini hisobga olish

Har bir talabaning bilim darajasi, qiziqishi, dunyoqarashi va o‘zlashtirish sur’ati bir-biridan farq qiladi. Shu sababli adabiyot darslarini tashkil etishda individual yondashuvdan foydalanish muhim ahamiyatga ega. Bir xil topshiriq barcha talabalar uchun bir xil darajada qiziqarli yoki murakkab bo‘lmasligi mumkin.

O‘qituvchi topshiriqlarni murakkablik darajasiga ko‘ra tabaqalashtirishi mumkin. Ayrim talabalarga badiiy matn mazmunini qayta tahlil qilish, boshqalariga qiyosiy tahlil, yuqori tayyorgarlikka ega talabalarga esa ilmiy muammo asosida mustaqil xulosa chiqarish topshirig‘i beriladi.

Bunday yondashuv talabaning o‘z imkoniyatini namoyon etishiga yordam beradi. O‘z kuchiga ishongan talaba yangi topshiriqlarni bajarishga ko‘proq intiladi. Natijada muvaffaqiyatga erishish hissi keyingi o‘quv faoliyati uchun ichki motivatsiya vazifasini bajaradi.

Adabiy munozaralarni tashkil etish

Adabiyot fanini o‘qitishda munozara metodidan foydalanish talabalarning o‘quv-bilish faoliyatini faollashtirishning samarali vositalaridan biridir. Munozara jarayonida talabalar muayyan adabiy muammo yuzasidan o‘z fikrlarini bayon qiladilar, boshqa qarashlarni tinglaydilar va o‘z pozitsiyalarini dalillar bilan asoslashga harakat qiladilar.

Masalan, asardagi qahramonning xatti-harakatiga baho berishda guruh talabalari ikki xil nuqtayi nazarni himoya qilishi mumkin. Bir guruh qahramonning qarorini qo‘llab-quvvatlasa, ikkinchi guruh unga qarshi fikr bildiradi. Har ikki tomon o‘z fikrini badiiy matndan misollar keltirish orqali asoslaydi.

Munozara talabaning nutqiy kompetensiyasini ham rivojlantiradi. U o‘z fikrini aniq ifodalash, suhbatdoshini tinglash, savol berish, e’tiroz bildirish va xulosa chiqarish ko‘nikmalarini egallaydi. Shu sababli adabiy munozaralar nafaqat bilim olish, balki shaxsiy va kommunikativ rivojlanish vositasi sifatida ham muhimdir.

Rolli o‘yinlardan foydalanish

O‘zbek adabiyoti darslarida rolli o‘yinlardan foydalanish talabalarning badiiy asarga qiziqishini oshirishi mumkin. Bunda talabalar asar qahramonlari, muallif yoki boshqa obrazlar rolini bajaradilar. Ular qahramonning xarakteri, dunyoqarashi va asardagi vaziyatini hisobga olgan holda o‘z rolini ijro etishga harakat qiladi.

Rolli o‘yin orqali talaba badiiy qahramonning ichki dunyosini yaxshiroq anglash imkoniyatiga ega bo‘ladi. Masalan, qahramonlar o‘rtasidagi suhbatni sahnalashtirish orqali asardagi konfliktning mohiyatini chuqurroq tushunish mumkin.

Bunday metod darsni jonlantiradi, passiv talabalarni ham faol ishtirok etishga undaydi. Ayniqsa, ijodkorlikka qiziqadigan talabalar uchun rolli o‘yinlar samarali ta’lim vositasi bo‘la oladi.

“Tadqiqotchi talaba” metodidan foydalanish

Talabaning o‘quv-bilish motivatsiyasini kuchaytirishda uni kichik ilmiy tadqiqotlarga jalb qilish muhimdir. “Tadqiqotchi talaba” yondashuvi orqali talabaga ma’lum bir adabiy muammoni mustaqil o‘rganish topshiriladi.

Masalan, talaba yozuvchining ijodiy faoliyati, muayyan asarning yaratilish tarixi, obrazlar tizimi, badiiy tasvir vositalari yoki asarning adabiy-tarixiy ahamiyati bo‘yicha qo‘shimcha materiallar to‘playdi. Keyinchalik o‘z izlanishlarini guruh oldida taqdim etadi.

Bu usul talabada axborot izlash, manbalarni saralash, ma’lumotlarni tahlil qilish va xulosa chiqarish ko‘nikmalarini rivojlantiradi. Eng muhimi, talaba bilimni tayyor holda qabul qilmaydi, balki uni mustaqil izlanish orqali egallaydi.

Savol-javob metodining imkoniyatlari

Savol-javob adabiyot ta’limida eng ko‘p qo‘llanadigan metodlardan biri bo‘lsa-da, uning mazmuni va shaklini to‘g‘ri tashkil etish katta ahamiyatga ega. Faqat faktlarni eslab qolishga qaratilgan savollar talabaning ijodiy fikrlashini yetarli darajada rivojlantirmaydi.

Shu sababli “Nima?”, “Qachon?”, “Kim?” kabi savollar bilan bir qatorda “Nima uchun?”, “Qanday qilib?”, “Sizningcha, nima sababdan?”, “Agar voqea boshqacha kechganida nima bo‘lardi?” kabi yuqori darajadagi fikrlashni talab qiladigan savollardan foydalanish maqsadga muvofiq.

Bunday savollar talabaning tahlil qilish, taqqoslash, baholash va ijodiy xulosa chiqarish qobiliyatini rivojlantiradi. Savollarning bosqichma-bosqich murakkablashib borishi esa talabaning o‘quv faoliyatiga qiziqishini saqlab qolishga yordam beradi.

Badiiy asarni boshqa san’at turlari bilan bog‘lash

Adabiyotning kino, teatr, musiqa va tasviriy san’at bilan uzviy aloqasi mavjud. Shu sababli adabiyot darslarida boshqa san’at turlaridan foydalanish talabalarning mavzuni yaxshiroq anglashiga yordam berishi mumkin.

Masalan, badiiy asar asosida suratga olingan film yoki sahna ko‘rinishidan foydalanib, talabalarga “Asar va ekran talqinining qanday farqli jihatlari mavjud?”, “Qaysi talqin qahramon xarakterini yaxshiroq ochib bergan?” kabi savollar beriladi.

Talabalar asarning yozma shakli bilan uning sahnaviy yoki ekran talqinini qiyoslash orqali badiiy tasvir imkoniyatlarini chuqurroq anglaydilar. Bu esa ularning estetik didi va tahliliy fikrlashini rivojlantiradi.

Loyiha metodining samaradorligi

Loyiha metodi talabalarning mustaqil va jamoaviy faoliyatini birlashtiruvchi samarali metodlardan biridir. Adabiyot darslarida loyiha ishlari individual yoki guruh shaklida tashkil etilishi mumkin.

Masalan, “Muayyan adibning ijodiy merosi”, “O‘zbek adabiyotida ayol obrazlari”, “O‘zbek she’riyatida Vatan mavzusi”, “Adabiy qahramon va zamonaviy inson” kabi mavzularda loyihalar tayyorlash mumkin.

Loyiha jarayonida talabalar mavzuni tanlash, ma’lumot to‘plash, materiallarni saralash, tahlil qilish va yakuniy mahsulotni yaratish bosqichlaridan o‘tadilar. Bu esa ularning mustaqilligi, mas’uliyati va ijodiy faolligini oshiradi.

Gamifikatsiya va ta’limiy o‘yinlardan foydalanish

Ta’lim jarayoniga o‘yin elementlarini kiritish ham talabalarning motivatsiyasini oshirishga xizmat qilishi mumkin. Adabiyot fanida viktorinalar, adabiy bellashuvlar, tezkor savol-javoblar, “Kim bu qahramon?”, “Asarni toping”, “Muallifni aniqlang” kabi o‘yinlardan foydalanish mumkin.

O‘yin jarayonida raqobat, hamkorlik va muvaffaqiyatga erishish istagi paydo bo‘ladi. Biroq o‘yin ta’limiy maqsadga bo‘ysundirilishi lozim. Ya’ni o‘yin shunchaki ko‘ngilochar faoliyat emas, balki bilimni mustahkamlash va yangi bilimlarni o‘zlashtirish vositasi bo‘lishi kerak.

Refleksiya orqali motivatsiyani mustahkamlash

Darsning yakunida refleksiya tashkil etish talabaning o‘z o‘quv faoliyatini baholashiga yordam beradi. Refleksiya orqali talaba dars davomida nimalarni o‘rganganini, qaysi masalalar unga qiziqarli bo‘lganini va qanday savollar tug‘ilganini anglaydi.

Buning uchun “Bugun men nimani o‘rgandim?”, “Menga eng qiziqarli bo‘lgan jihat qaysi?”, “Qaysi masala men uchun murakkab bo‘ldi?”, “Yana nimalarni o‘rganishni xohlayman?” kabi savollardan foydalanish mumkin.

Refleksiya talabaning o‘z-o‘zini baholash ko‘nikmasini shakllantiradi. U o‘z bilim va imkoniyatlarini anglagan sari keyingi o‘quv faoliyatiga nisbatan aniqroq maqsad qo‘ya boshlaydi.

Motivatsiyani baholash mezonlari

Talabalarning o‘quv-bilish motivatsiyasini faollashtirish samaradorligini aniqlash uchun muayyan mezonlardan foydalanish zarur. Bunday mezonlar sifatida darsdagi faollik, mustaqil topshiriqlarni bajarish, savol berish, munozaralarda ishtirok etish, qo‘shimcha manbalarni o‘rganish va ijodiy ishlarni bajarish darajasini ko‘rsatish mumkin.

Yuqori motivatsiyaga ega talaba odatda yangi mavzuga qiziqish bildiradi, mustaqil ravishda qo‘shimcha ma’lumot izlaydi, o‘z fikrini bayon qilishdan cho‘chimaydi va berilgan topshiriqlarni ijodiy bajarishga intiladi. Past motivatsiya esa darsdagi passivlik, faqat tayyor ma’lumotni kutish va topshiriqlarni faqat baho uchun bajarish kabi holatlarda namoyon bo‘lishi mumkin.

Shuning uchun o‘qituvchi faqat yakuniy bahoni emas, balki talabaning o‘quv jarayonidagi rivojlanish dinamikasini ham kuzatib borishi kerak.

Hamkorlikka asoslangan ta’lim muhiti

Talabalarning o‘quv-bilish motivatsiyasini rivojlantirishda guruhli ishlarning ahamiyati katta. Guruhli faoliyat davomida talabalar bir-birining fikrlarini tinglaydilar, vazifalarni taqsimlaydilar va umumiy xulosaga keladilar.

Adabiyot darsida guruhlar turli topshiriqlar asosida ishlashi mumkin. Bir guruh obrazlar tizimini tahlil qilsa, ikkinchi guruh asarning g‘oyaviy mazmunini, uchinchi guruh badiiy til xususiyatlarini o‘rganadi. Dars yakunida guruhlar o‘z natijalarini taqdim etadilar.

Bunday hamkorlik talabalarda jamoada ishlash, muloqot qilish, fikr almashish va o‘z nuqtayi nazarini himoya qilish ko‘nikmalarini shakllantiradi. Shu bilan birga, guruhdagi faol muhit passiv talabalarni ham dars jarayoniga jalb etishga yordam beradi.

Zamonaviy adabiy ta’limda kompetensiyaviy yondashuv

O‘quv-bilish motivatsiyasini faollashtirishda kompetensiyaviy yondashuv ham muhim o‘rin tutadi. Bunda talabaning faqat adabiy faktlarni bilishi emas, balki olgan bilimlarini amaliy va ijodiy vaziyatlarda qo‘llay olishi ko‘zda tutiladi.

Masalan, talaba asar mazmunini bilish bilan bir qatorda uning g‘oyasini tahlil qilishi, obrazlarga baho berishi, badiiy vositalarni aniqlashi, o‘z fikrini og‘zaki va yozma shaklda ifodalashi kerak. Bunday topshiriqlar talabaning bilimini real faoliyat bilan bog‘laydi.

Kompetensiyaviy yondashuv natijasida adabiyot fani talaba uchun faqat nazariy bilimlar majmuasi emas, balki mustaqil fikrlash, muloqot qilish, tahlil qilish va ijodiy yondashish imkonini beruvchi ta’lim sohasi sifatida namoyon bo‘ladi.

O‘qituvchi va talaba o‘rtasidagi pedagogik hamkorlik

Motivatsiyani shakllantirishning muhim shartlaridan biri o‘qituvchi va talaba o‘rtasida o‘zaro hurmat va ishonchga asoslangan munosabatni yaratishdir. Talaba o‘z fikri qadrlanishini his qilganida dars jarayonida faolroq ishtirok etadi.

O‘qituvchi barcha javoblarni darhol to‘g‘ri yoki noto‘g‘ri deb baholash o‘rniga, talabani o‘z fikrini asoslashga undashi maqsadga muvofiq. “Fikringizni qaysi dalil bilan asoslay olasiz?”, “Matnning qaysi qismi sizning qarashingizni tasdiqlaydi?” kabi savollar talabani chuqurroq fikrlashga yo‘naltiradi.

Bunday pedagogik muhitda talaba xato qilishdan qo‘rqmaydi, savol berishga va o‘z fikrini erkin ifodalashga intiladi. Natijada dars jarayoni ijodiy va hamkorlikka asoslangan faoliyatga aylanadi.

O‘quv-bilish motivatsiyasini uzoq muddatli shakllantirish

Motivatsiyani faqat bir yoki ikki dars davomida emas, balki butun ta’lim jarayonida izchil shakllantirish lozim. Buning uchun talabaga muntazam ravishda mustaqil izlanish, ijodiy topshiriq va muammoli vazifalar berib borish kerak.

Talabaning kichik yutuqlarini e’tirof etish, uning o‘sishini ko‘rsatish va keyingi rivojlanishi uchun aniq tavsiyalar berish ham muhim. Shuningdek, talabaga o‘z ta’lim maqsadlarini belgilash imkoniyatini berish uning ichki motivatsiyasini kuchaytiradi.

Demak, o‘zbek adabiyoti ta’limida motivatsiyani faollashtirish bir martalik metod emas, balki o‘qituvchi tomonidan muntazam va tizimli ravishda olib boriladigan pedagogik jarayondir.

O‘quv-bilish motivatsiyasini faollashtirishning metodik shartlari

O‘zbek adabiyoti ta’limida yuqori natijaga erishish uchun quyidagi metodik shartlarga amal qilish muhim:

1. Ta’lim mazmunini talabalarning yosh va individual xususiyatlariga moslashtirish.
2. Badiiy asarni hayotiy muammolar bilan bog‘lab o‘rganish.
3. Talabalarni mustaqil fikrlash va savol berishga undash.
4. Interfaol va muammoli ta’lim metodlaridan muntazam foydalanish.
5. Mustaqil va ijodiy topshiriqlarni ko‘paytirish.
6. Raqamli texnologiyalardan maqsadli foydalanish.
7. Talabalarning fikrini hurmat qilish va ularni rag‘batlantirish.
8. Baholash jarayonida bilim bilan bir qatorda ijodkorlik va faollikni ham e’tiborga olish.

Mazkur shartlarning uyg‘unligi adabiyot darslarini talaba uchun qiziqarli, mazmunli va faol o‘quv muhitiga aylantirish imkonini beradi.

Xulosa

Xulosa qilib aytganda, o‘zbek adabiyoti ta’limida talabalarning o‘quv-bilish motivatsiyasini faollashtirish ta’lim samaradorligini oshirishning muhim shartlaridan biridir. Adabiyot darsi faqat nazariy ma’lumotlarni yetkazish bilan cheklanib qolmasdan, talabaning mustaqil fikrlashi, ijodiy tafakkuri va estetik dunyoqarashini rivojlantirishga yo‘naltirilishi lozim.

Muammoli ta’lim, interfaol metodlar, badiiy matn bilan mustaqil ishlash, munozara va ijodiy topshiriqlar talabaning fan bilan faol munosabatga kirishishiga yordam beradi. Raqamli texnologiyalardan oqilona foydalanish esa adabiyot ta’limining imkoniyatlarini yanada kengaytiradi.

Eng muhimi, talaba badiiy asarni o‘rganish jarayonida o‘z fikriga ega bo‘lishi, savol berishi, dalillar izlash va mustaqil xulosa chiqarishi uchun sharoit yaratilishi kerak. Bunday yondashuv nafaqat adabiyot fanini chuqur o‘zlashtirishga, balki talabaning ma’naviy, estetik va intellektual rivojlanishiga ham xizmat qiladi.

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PSYCHOLOGICAL CHARACTERISTICS OF DEVELOPING ENGLISH SPEAKING SKILLS THROUGH DIGITAL TECHNOLOGIES IN COMPUTER ENGINEERING CONTEXT

Pardayeva Zulaykho Yusubjonovna
Associate professor. Ajou University
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Annotation. *This article analyzes the psychological characteristics of developing English-speaking skills through digital technologies in the context of computer engineering. The study explores the cognitive, motivational, and affective factors influencing learners’ acquisition of spoken English competence. It also emphasizes that digital tools such as virtual communication platforms, interactive simulations, and AI-based applications create a psychologically supportive environment that enhances learners’ confidence, independence, and engagement in the learning process. The article further substantiates the interrelation between analytical thinking abilities and communicative competence among computer engineering students.*

Key words: *Communication. digital, technology, psychology, computer engineering, anxiety, fear, challenges, self-confidence, motivation and Interest, gamification, self-assessment and reflective skills.*

Annotatsiya. *shbu maqolada kompyuter muhandisligi ta’limi kontekstida ingliz tili og‘zaki nutq ko‘nikmalarini raqamli texnologiyalar yordamida rivojlantirishning psixologik xususiyatlari tahlil qilinadi. Tadqiqotda o‘quvchilarning ingliz tilida so‘zlashuv kompetensiyasini egallash jarayoniga ta’sir etuvchi kognitiv, motivatsion va affektiv omillar o‘rganiladi. Shuningdek, virtual muloqot platformalari, interaktiv simulyatsiyalar va sun’iy intellekt asosidagi ilovalar kabi raqamli vositalar o‘quvchilarda ishonch, mustaqillik va o‘quv jarayoniga jalb etilganlikni kuchaytiruvchi psixologik jihatdan qulay muhit yaratishi ta’kidlanadi. Maqolada, shuningdek, kompyuter muhandisligi yo‘nalishidagi talabalar tahliliy fikrlash qobiliyati bilan kommunikativ kompetensiyasi o‘rtasidagi o‘zaro bog‘liqlik asoslab beriladi.*

Kalit so‘zlar: *muloqot, raqamli texnologiyalar, psixologiya, kompyuter muhandisligi, tashvish, qo‘rquv, qiyinchiliklar, o‘ziga ishonch, motivatsiya va qiziqish, o‘yinlashtirish, o‘z-o‘zini baholash va refleksiv ko‘nikmalar.*

Аннотация. *В настоящей статье рассматриваются психологические особенности формирования навыков устной речи на английском языке посредством использования цифровых технологий в процессе обучения студентов направления «Компьютерная инженерия». Особое внимание уделяется роли цифровых инструментов — таких как платформы виртуального взаимодействия, интерактивные симуляции и приложения, основанные на искусственном интеллекте, — в создании психологически комфортной образовательной среды, способствующей развитию уверенности, автономности обучающихся.*

Ключевые слова: *коммуникация, цифровые технологии, психология, компьютерная инженерия, тревожность, страх, трудности, уверенность в себе, мотивация и интерес, геймификация, самооценка и рефлексивные навыки.*

Introduction.

The development of English-speaking competence among computer engineering students is not limited solely to linguistic proficiency; it is also closely connected with psychological preparedness, emotional stability, self-confidence, and socio-psychological factors. Undoubtedly, the integration of digital technologies into English language instruction brings about important psychological transformations in the process of developing oral communication skills.

Reducing Speaking Anxiety and Social Inhibition

One of the common challenges students face in speaking activities is the fear of communication — anxiety about making mistakes, mispronouncing words, or speaking in front of others. Many learners feel embarrassed or hesitant to participate in face-to-face conversations during classroom activities. In this regard, the use of digital technologies can serve as an effective solution.

Digital platforms create a psychologically safe environment where students can express themselves more freely without the immediate pressure of a physical audience. For instance, video-based tools such as Flipgrid, VoiceThread, or AI-powered conversation apps allow learners to record, edit, and practice their speech at their own pace. This autonomy reduces performance anxiety, builds self-confidence, and encourages consistent verbal participation. As a result, digital integration in language learning not only enhances linguistic outcomes but also promotes positive emotional experiences, reduces communication apprehension, and supports the overall psychological well-being of non-philology students during English language acquisition.

According to English scholars **Derks, G.** and **Fischer** communication conducted through digital tools helps to reduce anxiety because it allows learners more time to think, reflect, and formulate their ideas—an advantage particularly beneficial for introverted or shy students. Digital interaction takes place not before an audience but within an algorithmic or mediated environment, which enables learners to feel more relaxed and less self-conscious.

The following digital solutions can effectively address these challenges:

- **AI-based conversational tools** (e.g., *ChatGPT*, *Replika*): enable learners to engage in realistic dialogues with virtual partners rather than real people, thereby reducing fear of judgment or error.
- **Audio recording practice**: allows students to record their speech, review it calmly, analyze areas for improvement, and re-record if necessary, fostering both reflective learning and confidence-building.

Flipgrid and Vocaroo provide safe, private virtual environments designed for independent practice without the interference or judgment of others. Such platforms allow students to record, reflect, and share their oral performances in a psychologically secure space. According to Krashen, S. states that speaking in a foreign language—particularly English—often represents the greatest psychological barrier for non-linguistic students. However, when learners practice in a safe and supportive environment, this psychological block can be gradually removed.

2. Enhancing Intrinsic Motivation and Interest

Motivation acts as the *internal engine* of language acquisition. Without a clear purpose, desire, or genuine interest in learning, even the most effective teaching methods fail to produce meaningful results. For computer engineering students, perceiving tangible progress and

experiencing personal achievement during the learning process can significantly strengthen their intrinsic motivation.

In traditional, teacher-centered classrooms, non-philology students often feel disengaged or bored, leading to low enthusiasm and weak psychological commitment to language learning. Vygotsky, L.S. emphasizes that interest in language serves as a *psychological driver* of linguistic development, and digital technologies can effectively stimulate this curiosity. One powerful strategy for increasing motivation is gamification, which integrates game-based elements into the educational process. In essence, the psychological impact of digital technologies lies in their ability to foster confidence, reduce anxiety, and ignite intrinsic motivation key components for developing sustainable oral communication skills in English.

Digital gamification applications create a psychologically safe space for learning, where students can experiment and make mistakes without fear of punishment or embarrassment. In online game-based environments, errors are viewed not as failures but as part of the learning process. According to **A**nderson, N. and West, M. A, digital gamification represents one of the most powerful psychological safety tools in language development, as it provides learners with the freedom to experiment, take risks, and learn from experience. The digitalization of gamification transforms lesson design into an engaging and interactive process, while the use of reward systems and game-like tasks removes boredom, monotony, and mental fatigue often associated with traditional learning.

Furthermore, Deterding, S., Dixon, D., Khaled, R., & Nacke, L. highlight that incorporating elements such as *feedback*, *badges*, and *achievement levels* into digitally integrated lessons for non-philology students significantly reduces cognitive (mental) and emotional (affective) stress. In line with this, Hamari, J., Koivisto, J., & Sarsa, H found that collaborative, gamified digital environments enable students to feel *connected, valued,* and *supported* within their learning community. Thus, digital gamification not only improves linguistic performance but also fosters psychological well-being, motivation, and social engagement — all of which are crucial for the successful development of oral communication skills.

One particularly effective method is Quest-Based Learning (QBL) — an instructional approach that involves tasks, quests, or problem-solving adventures designed to achieve specific goals. In this approach, learners act as participants in a narrative-driven mission, solving challenges along the way. This naturally enhances intrinsic motivation and fosters purposeful engagement. As Haskell, C. notes, task-based or quest-driven learning promotes *goal-oriented participation*, enabling students to take ownership of their learning process and become active agents rather than passive recipients of knowledge.

Similarly, role-playing (Role-play) activities guide non-philology students toward authentic, real-life communication. Through simulated scenarios, learners practice speaking skills in meaningful contexts — for example, welcoming guests at a hotel, booking a room, negotiating prices at a market, or participating in a job interview. Through this emotional connection, learners develop their intrinsic motivation to engage with the learning process. As Salen, K., & Zimmerman emphasize, storytelling- or narrative-based digital learning enables students to form an emotional attachment to the content or topic of the lesson. This emotional engagement enhances long-term memory retention of linguistic aspects and promotes active participation in the learning process.

3. Developing Self-Assessment and Reflective Skills

Many computer engineering students who are learning a foreign language often struggle to accurately evaluate their own knowledge or, simply put, to acknowledge their mistakes. From a psychological perspective, placing special emphasis on reflection is crucial. Reflection can be defined as a learner’s ability to recognize, analyze, and evaluate their own thoughts, actions, or mistakes. In the context of speaking skills, reflection involves analyzing one’s own speech, identifying pronunciation errors, and constructing meaningful and logical utterances.

According to Schön, D, *reflection is a conscious and deliberate approach to one’s own activity*, and digital technologies serve as effective tools to facilitate and enliven this process. Reflection represents a psychological mechanism underlying the deep learning of foreign languages, as it contributes not only to memory consolidation but also to the conscious internalization of specific language skills and competencies.

4. Personal Freedom and a Psychologically Safe Communication Environment

Some computer engineering students find it difficult to **express their opinions freely** due to **social influences**, such as **peer pressure** or **stereotypes**. In the process of learning a new language, every student should feel **comfortable**, **free from pressure**, and **protected from social anxiety**. This factor is particularly crucial for students who are **introverted**, **reserved**, or **socially withdrawn**, and who may find it challenging to engage actively in group communication.

As **Dörnyei, Z** asserts, a **personalized and psychologically safe environment** helps learners to **overcome psychological barriers** that hinder active language use. Digital technologies provide several effective solutions to establish such an environment:

- **Opportunities for anonymous participation:** Anonymous digital platforms and applications (such as **Padlet**, **online forums**, and **chatbots**) allow students to communicate and share ideas without fear of judgment or embarrassment.
- **Individualized tasks:** Each student completes speaking or writing tasks privately on their own digital interface, which helps reduce performance anxiety and encourages genuine self-expression.
- **Virtual role-playing activities:** Students engage in **simulated professional or social roles**—for instance, acting as a **doctor**, **engineer**, or **architect**—which helps them practice real-life communication in a psychologically secure context.

These digital practices enable **non-linguistic (non-philological) students** to express themselves freely, experiment with speech, and develop **oral fluency** without fear of making mistakes or being judged.

5. Encouraging Creativity and Self-Expression in Non-Philological Students

In traditional classroom settings, students are often **not provided with sufficient opportunities to develop and demonstrate their creative potential**. As **Larsen-Freeman** emphasizes, **technology can serve as a powerful medium for expressing learners’ creative abilities**. Through spoken interaction, the learner reveals their authentic “self” — conveying personal opinions, emotions, and perspectives through language use. Oral communication, therefore, extends beyond grammatical accuracy; it embodies the capacity to articulate personal viewpoints, express emotions, and construct meaning through **creative linguistic production**.

Several digital approaches can effectively foster creative self-expression among non-linguistic students:

- **Creating video blogs (vlogs):** Applications such as **Flipgrid** or **Loom** allow learners to narrate personal or professional experiences — for instance, *“Describe the challenges*

you face as a computer specialist” or *“Talk about the most recent difficulty you have overcome.”* These tasks promote **personal storytelling** and **authentic speech production**.

- **Scenario- or story-based learning:** Platforms like **Storybird**, **Book Creator**, and **Canva** encourage students to construct and share **narratives based on given prompts**, integrating both linguistic and visual creativity.
- **Open-ended dialogue with AI tools:** Engaging in **spontaneous conversation with ChatGPT** or similar language models on imaginative, adventurous, or critical topics helps students **develop fluency**, **generate original ideas**, and **experiment with language creatively**.

According to **Larsen-Freeman**, **creativity in language learning** is not merely an act of fantasy but a **process of synthesizing existing linguistic elements in new contexts** — a way for learners to **express their individuality through language**. This approach transforms language learning from a mechanical activity into an **innovative and identity-driven process**, particularly valuable for students in technical and scientific disciplines.

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BLENDED LEARNING MUHITIDA SUN’IY INTELLEKT VA RAQAMLI TA’LIM TEXNOLOGIYALARIDAN FOYDALANISHNING PEDAGOGIK MODELI

Polvonova Yulduzxon Saparboyevna
Xorazm viloyati pedagogik mahorat markazi
akademik faoliyat bo‘yicha direktor o‘rinbosari
https://doi.org/10.5281/zenodo.22896330

Annotatsiya. *Maqolada Blended Learning muhitida sun’iy intellekt va raqamli ta’lim texnologiyalaridan foydalanishning pedagogik modeli ilmiy-metodik jihatdan asoslangan. Tadqiqotda aralash ta’lim, sun’iy intellekt va raqamli pedagogik vositalarning o‘zaro integratsiyasi, ularning ta’lim jarayonini individuallashtirish, mustaqil ta’limni qo‘llab-quvvatlash, tezkor teskari aloqa va ta’lim natijalarini monitoring qilishdagi imkoniyatlari tahlil qilingan.*

Kalit so‘zlar: *Blended Learning, sun’iy intellekt, raqamli ta’lim texnologiyalari, pedagogik model, raqamli kompetensiya, adaptiv ta’lim, ta’lim analitikasi.*

Kirish

Raqamli transformatsiya jarayonlarining ta’lim tizimiga jadal kirib kelishi an’anaviy pedagogik yondashuvlarni zamonaviy raqamli texnologiyalar bilan uyg‘unlashtirishni talab etmoqda. Ayniqsa, Blended Learning - aralash ta’lim texnologiyasi auditoriya mashg‘ulotlari va raqamli ta’lim muhitining imkoniyatlarini integratsiyalash orqali ta’lim jarayonining moslashuvchanligi, individualligi va interaktivligini ta’minlovchi samarali yondashuvlardan biri sifatida namoyon bo‘lmoqda. Mazkur yondashuvda o‘qituvchi va talabaning bevosita muloqoti raqamli platformalar, multimedia resurslari, ta’lim analitikasi hamda interaktiv vositalar bilan uzviy bog‘lanadi.

Bugungi kunda sun’iy intellekt (SI) texnologiyalarining rivojlanishi Blended Learning muhitining didaktik imkoniyatlarini yanada kengaytirmoqda. Sun’iy intellekt asosidagi tizimlar talabalarning individual ehtiyojlarini aniqlash, o‘quv materiallarini moslashtirish, topshiriqlarni differensiallashtirish, tezkor teskari aloqa taqdim etish, ta’lim natijalarini tahlil qilish va individual ta’lim trayektoriyalarini shakllantirish imkonini beradi. Shu bilan birga, SI vositalaridan ta’limda foydalanish pedagogik maqsadga muvofiqlik, akademik halollik, ma’lumotlar maxfiyligi, raqamli xavfsizlik va o‘qituvchining nazoratini ta’minlash kabi masalalarni ham hisobga olishni talab qiladi.

Adabiyotlar tahlili

Blended Learning konsepsiyasining rivojlanishida C.Grahamning tadqiqotlari muhim o‘rin tutadi. Muallif aralash ta’limni an’anaviy yuzma-yuz ta’lim va kompyuter vositasidagi ta’limning uyg‘unlashuvi sifatida izohlaydi. Bonk va C.Graham esa blended learningni turli pedagogik muhitlar va texnologiyalarni integratsiyalash asosida tashkil etiladigan ta’lim shakli sifatida ko‘rib chiqadi [1].

Blended Learningning nazariy asoslari C.Christensen, Horn va Staker tomonidan ishlab chiqilgan aralash ta’lim modellari, C.Grahamning blended learning konsepsiyasi hamda Garrison va Kanemayer-Andersonning ta’lim muhitida texnologiya va pedagogik o‘zaro ta’sirni

uyg‘unlashtirishga oid qarashlari bilan bog‘liq. Bonk va C.Graham Blended Learningni turli ta’lim muhitlari va texnologiyalarini tizimli ravishda birlashtiruvchi yondashuv sifatida talqin qilgan. Sun’iy intellektning ta’limdagi imkoniyatlari esa Luckin va hammualliflar, Holmes, Bialik va Fadel kabi tadqiqotchilar tomonidan ta’limni individuallashtirish, intellektual qo‘llab-quvvatlash va yangi pedagogik imkoniyatlar nuqtayi nazaridan o‘rganilgan[2,8].

Sun’iy intellektning ta’limdagi rolini o‘rgangan Luckin va hammualliflar SI texnologiyalaridan foydalanish ta’limni individuallashtirish va o‘quvchilarning ta’lim imkoniyatlarini kengaytirishga xizmat qilishi mumkinligini asoslagan. Holmes, Bialik va Fadel esa sun’iy intellektning ta’limdagi imkoniyatlari bilan bir qatorda uning pedagogik, axloqiy va tashkiliy jihatlarini ham hisobga olish zarurligini ta’kidlaydi[5,6].

Metodika

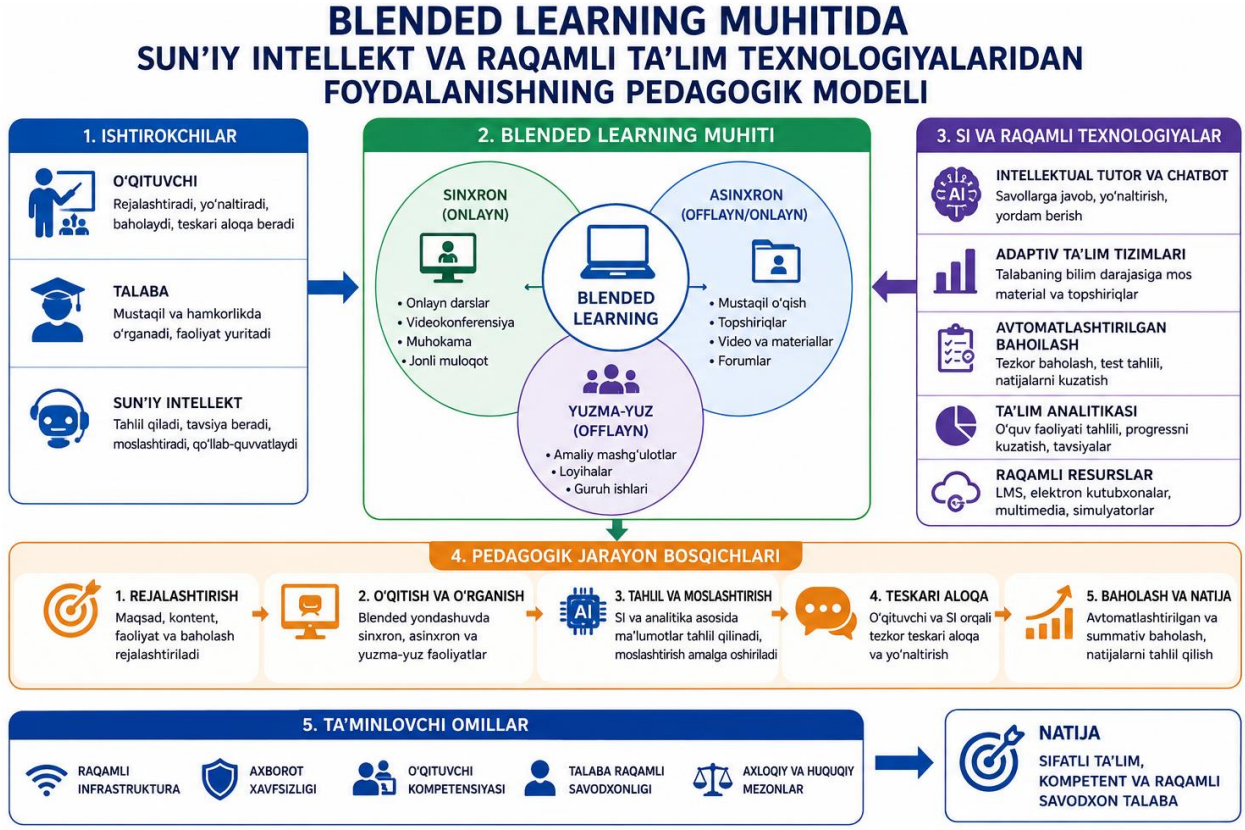
Tadqiqotda tizimli, kompetensiyaviy, shaxsga yo‘naltirilgan, faoliyatga asoslangan va texnologik yondashuvlar metodologik asos sifatida belgilandi. Tadqiqotning asosiy maqsadi Blended Learning muhitida sun’iy intellekt va raqamli ta’lim texnologiyalaridan foydalanishning pedagogik modelini ishlab chiqishdan iborat bo‘ldi.

Modelni amalga oshirish jarayoni diagnostika → rejalashtirish → raqamli va SI vositalarini tanlash → Blended Learning asosida ta’limni tashkil etish → monitoring → baholash → natijalarni tahlil qilish va korreksiyalash bosqichlari asosida tashkil etiladi.

Tadqiqot samaradorligini aniqlashda pedagogik kuzatuv, test, so‘rovnoma, ekspert baholash, o‘quv natijalarini taqqoslash va matematik-statistik tahlil usullaridan foydalanish mumkin. Bunda o‘quvchilarning bilim darajasi, mustaqil ta’lim ko‘nikmalari, raqamli kompetensiyasi, muammoli vaziyatlarni hal qilish qobiliyati va sun’iy intellekt vositalaridan pedagogik maqsadlarda foydalanish ko‘rsatkichlari asosiy mezonlar sifatida olinadi.

Mazkur metodik yondashuv Blended Learning muhitida sun’iy intellektni o‘qituvchining o‘rnini bosuvchi vosita sifatida emas, balki ta’lim jarayonini individuallashtiruvchi, pedagogik qarorlarni qo‘llab-quvvatlovchi va ta’lim natijalarini monitoring qilishga xizmat qiluvchi intellektual pedagogik vosita sifatida qo‘llashni nazarda tutadi.

Munozara.



“Blended Learning muhitida sun’iy intellekt va raqamli ta’lim texnologiyalaridan foydalanishning pedagogik modeli” - oliy ta’limda an’anaviy yuzma-yuz ta’limni onlayn va raqamli ta’lim imkoniyatlari hamda sun’iy intellekt vositalari bilan tizimli integratsiyalashga qaratilgan pedagogik tizimdir.

Modelning asosiy maqsadi - ta’lim jarayonini individuallashtirish, talabaning mustaqil va hamkorlikdagi faoliyatini qo‘llab-quvvatlash, o‘qituvchining pedagogik faoliyatini samarali tashkil etish hamda ta’lim natijalarini ma’lumotlarga asoslangan holda monitoring qilishdan iborat.

Model quyidagi asosiy tarkibiy qismlardan tashkil topadi:

1. Ishtirokchilar - o‘qituvchi, talaba va sun’iy intellekt. O‘qituvchi ta’lim jarayonini loyihalashtiradi, boshqaradi va baholaydi; talaba faol ta’lim subyekti sifatida mustaqil va hamkorlikda bilim egallaydi; SI esa tahlil, tavsiya, individual yondashuv va tezkor teskari aloqa vositasi sifatida xizmat qiladi.

2. Blended Learning muhiti - sinxron, asinxron va yuzma-yuz ta’lim shakllarining o‘zaro uyg‘unlashuvini ta’minlaydi. Bunda ma’ruza, videokonferensiya, mustaqil topshiriqlar, amaliy mashg‘ulotlar va guruh ishlari yagona ta’lim jarayoniga birlashtiriladi.

3. SI va raqamli texnologiyalar -intellektual tutorlar, chatbotlar, adaptiv ta’lim tizimlari, avtomatlashtirilgan baholash, ta’lim analitikasi, LMS, elektron kutubxonalar va multimedia resurslarini qamrab oladi. Ular talabaning individual ehtiyojlari va o‘zlashtirish darajasiga mos ta’limni tashkil etishga yordam beradi.

4. Pedagogik jarayon bosqichlari - rejalashtirish → o‘qitish va o‘rganish → tahlil va moslashtirish → teskari aloqa → baholash va natijalarni tahlil qilish ketma-ketligida amalga oshiriladi. Bu jarayonning siklik xarakterga ega ekanligi ta’lim natijalariga qarab keyingi pedagogik faoliyatni qayta moslashtirish imkonini beradi.

5. Ta’minlovchi omillar - raqamli infratuzilma, axborot xavfsizligi, o‘qituvchining raqamli kompetensiyasi, talabaning raqamli savodxonligi hamda axloqiy-huquqiy me’yorlardan iborat.

Modelning ilmiy-pedagogik mohiyati shundaki, sun’iy intellekt o‘qituvchining o‘rnini bosuvchi subyekt sifatida emas, balki o‘qituvchi va talaba faoliyatini qo‘llab-quvvatlovchi intellektual pedagogik vosita sifatida qaraladi. Shu orqali Blended Learning muhitida ta’limning individuallashuvi, moslashuvchanligi, teskari aloqaning tezkorligi va ta’lim natijalarini monitoring qilish samaradorligi oshiriladi.

Kutilayotgan natija: sifatli ta’lim, talabaning kasbiy va raqamli kompetensiyalarini rivojlantirish, mustaqil ta’lim olish imkoniyatlarini kengaytirish hamda zamonaviy raqamli ta’lim muhitiga mos pedagogik jarayonni shakllantirish.

Xulosa

Tadqiqot natijalari shuni ko‘rsatadiki, Blended Learning muhitida sun’iy intellekt va raqamli ta’lim texnologiyalarini integratsiyalash zamonaviy ta’lim jarayonining individualligi, moslashuvchanligi va samaradorligini oshirishga xizmat qiluvchi istiqbolli pedagogik yo‘nalish hisoblanadi. Blended Learningning an’anaviy va raqamli ta’lim imkoniyatlarini uyg‘unlashtirishi sun’iy intellekt vositalari orqali o‘quvchilarning individual ehtiyojlari, bilim darajasi va o‘zlashtirish sur’atlarini hisobga olgan holda ta’lim jarayonini tashkil etish imkonini beradi.

Tadqiqotda taklif etilgan pedagogik model maqsadli, mazmuniy, texnologik, sun’iy intellekt, pedagogik-faoliyat, baholash-analitik hamda etik-xavfsizlik komponentlarining o‘zaro integratsiyasi asosida shakllantirildi. Mazkur komponentlarning izchil bog‘lanishi raqamli texnologiyalardan foydalanishni faqat texnik jarayon sifatida emas, balki aniq pedagogik maqsad va kutilayotgan ta’lim natijalariga yo‘naltirilgan yaxlit metodik tizim sifatida tashkil etish imkonini beradi.

Sun’iy intellektdan foydalanish o‘qituvchining pedagogik faoliyatini almashtirish emas, balki uni qo‘llab-quvvatlash, ta’limni individuallashtirish, tezkor teskari aloqa berish, o‘quv natijalarini tahlil qilish va individual ta’lim trayektoriyalarini shakllantirish vositasi sifatida qaralishi lozim. Shu bilan birga, akademik halollik, shaxsiy ma’lumotlarni himoya qilish, raqamli xavfsizlik va SI texnologiyalaridan mas’uliyatli foydalanish modelning ajralmas tarkibiy qismi bo‘lishi zarur.

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XITOY TILINI O‘QITISHDA SUN’IY INTELLEKT TEXNOLOGIYALARIDAN FOYDALANISHNING FONETIK KOMPETENSIYANI SHAKLLANTIRISHDAGI METODIK IMKONIYATLARI

Raxmatullayeva Dilshada Maratovna
Toshkent davlat sharqshunoslik universiteti tayanch doktoranti
https://doi.org/10.5281/zenodo.22895929

Annotatsiya. *Maqolada xitoy tilini o‘rganuvchi talabalarda fonetik kompetensiyani shakllantirishda sun’iy intellekt texnologiyalaridan foydalanishning metodik imkoniyatlari tahlil qilinadi. Xitoy tilining tonal tizimi, shengmu va yunmu xususiyatlari hamda o‘zbek talabalarida yuzaga kelishi mumkin bo‘lgan fonetik interferensiya muammolari asosida sun’iy intellekt texnologiyalarining fonetik ta’limdagi o‘rni yoritiladi. Xususan, avtomatik nutqni tanish (ASR), avtomatlashtirilgan talaffuz bo‘yicha qayta aloqa, nutqni vizualizatsiya qilish va individual fonetik mashqlarni tashkil etish imkoniyatlari ko‘rib chiqiladi. Sun’iy intellekt vositalarini o‘qituvchining ekspert bahosi bilan uyg‘unlashtirish zarurligi asoslanadi. Shuningdek, O‘zbekiston oliy ta’lim muassasalari sharoitida mazkur texnologiyalardan foydalanishning metodik imkoniyatlari va cheklovlari tahlil qilinadi.*

Kalit so‘zlar: *sun’iy intellekt, fonetik kompetensiya, xitoy tili, avtomatik nutqni tanish (ASR), talaffuz, raqamli texnologiyalar, fonetik interferensiya, avtomatlashtirilgan qayta aloqa.*

Abstract. *This article analyzes the methodological potential of using artificial intelligence technologies in developing phonetic competence among students learning Chinese. The role of artificial intelligence technologies in phonetic education is examined based on the tonal system of Chinese, the characteristics of initials (shengmu) and finals (yunmu), as well as potential phonetic interference problems among Uzbek students. Particular attention is paid to automatic speech recognition (ASR), automated pronunciation feedback, speech visualization, and the organization of individualized phonetic exercises. The article substantiates the need to integrate artificial intelligence tools with teachers’ expert assessment. It also analyzes the methodological opportunities and limitations of using these technologies in the context of higher education institutions in Uzbekistan.*

Keywords: *artificial intelligence, phonetic competence, Chinese language, automatic speech recognition (ASR), pronunciation, digital technologies, phonetic interference, automated feedback.*

O‘zbekistonda xitoy tilini o‘rganishga bo‘lgan ehtiyoj so‘nggi yillarda sezilarli darajada oshdi. Bu Xitoy bilan savdo-iqtisodiy, madaniy va ta’lim sohalaridagi hamkorlikning kengayishi bilan bevosita bog‘liq. Xitoy tilini egallashda fonetik kompetensiya alohida o‘rin tutadi, chunki xitoy tili tonal til bo‘lib, talaffuzning aniqligi so‘z ma’nosini to‘g‘ri anglashga bevosita ta’sir qiladi. Xitoy tilining tonal tizimi, shengmu (声母) va yunmu (韵母) tizimi, shuningdek, aspiratsiya va burunli finallar kabi xususiyatlar o‘zbek talabalari uchun muayyan qiyinchiliklar tug‘diradi [1].

So‘nggi yillarda ta’limda sun’iy intellekt (AI) texnologiyalarining imkoniyatlari kengayib bormoqda. Xususan, avtomatik nutqni tanish (ASR) tizimlari, avtomatlashtirilgan talaffuz qayta

aloqasi va nutqni vizualizatsiya qilish vositalari fonetik ta’limda yangi metodik imkoniyatlar yaratmoqda [3]. Biroq ushbu texnologiyalarni xitoy tili fonetikasini o‘qitish jarayoniga qanday va qaysi metodik shartlar asosida integratsiya qilish masalasi yetarlicha ishlab chiqilmagan [6].

An’anaviy fonetik ta’limda individual mashq, ko‘p martalik takrorlash va har bir talabaga tezkor qayta aloqa (feedback) berish imkoniyati cheklangan. Bu, ayniqsa, guruhlarda talabalar soni ko‘p bo‘lganda yaqqol seziladi. AI texnologiyalari ushbu muammolarni qisman bartaraf etishi mumkin, biroq ularni xitoy tili fonetikasini o‘qitish jarayoniga integratsiya qilishning metodik shartlari, imkoniyatlari va cheklovlari hali to‘liq o‘rganilmagan.

Tadqiqot maqsadi xitoy tilini o‘qitishda sun’iy intellekt texnologiyalaridan foydalanishning fonetik kompetensiyani shakllantirishdagi metodik imkoniyatlarini aniqlash va ularni ta’lim jarayoniga integratsiya qilish bo‘yicha metodik tavsiyalar ishlab chiqish.

Tadqiqot vazifalari sifatida fonetik kompetensiyaning nazariy-metodik mazmunini aniqlash; xitoy tilining fonetik xususiyatlari va o‘zbek talabalarida yuzaga kelishi mumkin bo‘lgan qiyinchiliklarni tahlil qilish; AI texnologiyalarining fonetik ta’limdagi imkoniyatlarini o‘rganish; ASR va avtomatlashtirilgan qayta aloqaning talaffuz mashg‘ulotlaridagi o‘rnini aniqlash; AI vositalarini fonetik kompetensiyani shakllantirish jarayoniga integratsiya qilish modelini taklif etish; AI texnologiyalaridan foydalanishning metodik imkoniyatlari va cheklovlarini belgilash kabilarni sanab o‘tish mumkin. Tadqiqotda ilmiy adabiyotlar tahlili, qiyosiy-chog‘ishtirma tahlil, metodik tajribani umumlashtirish, AI asosidagi fonetik vositalarning metodik imkoniyatlarini tahlil qilish va pedagogik kuzatuv metodlaridan foydalanildi.

Fonetik kompetensiya va xitoy tili fonetikasining o‘ziga xosligi. FK bu o‘rganilayotgan tilning artikulyatsion va prosodik me’yorlariga muvofiq tovushlarni to‘g‘ri idrok etish va qayta ishlab chiqarish qobiliyatidir. Uning tarkibida ikki asosiy komponent ajratiladi: segmental daraja (alohida tovushlar artikulyatsiyasi) va suprasegmental daraja (urg‘u, ritm, intonatsiya va tonal tillarda — ton) [7]. Fonetik kompetensiyaning shakllanganligi nafaqat alohida tovushlarni to‘g‘ri talaffuz qilishni, balki ularning nutq oqimida to‘g‘ri ishlashini ham nazarda tutadi. Bu artikulyatsion ko‘nikmalarni avtomatlashtirishni va fonematik eshitishni rivojlantirishni talab qiladi. Xitoy tili bir qator tipologik xususiyatlarga ega bo‘lib, ular uni tonal bo‘lmagan tillar sohiblari uchun o‘zlashtirishni murakkablashtiradi. Putunxuada to‘rtta asosiy ton (阴平, 阳平, 上声, 去声) ajratiladi, ularning har biri barqaror balandlik konturiga ega. Ton ma’no farqlash vazifasini bajaradi: bir xil bo‘g‘in turli tonlarda talaffuz qilinsa, turli ma’nolarni anglatadi. Shengmu (声母) tizimi. Xitoy undoshlari o‘zbek tilida mavjud bo‘lmagan bir qator tovushlarni o‘z ichiga oladi: aspiratsiyali (p, t, k), affrikatalar (z, c, zh, ch, j, q), frikativlar (x, sh, r). Aspiratsiyali va aspiratsiyasiz undoshlarning qarama-qarshiligi alohida qiyinchilik tug‘diradi [1; 8]. Yunmu (韵母) tizimi. Xitoy finallari diftong va triftonglarni, shuningdek, burunli finallarni (an, ang, en, eng, in, ing, ong) o‘z ichiga oladi, ularning farqlanishi artikulyatsion apparatni nozik sozlashni talab qiladi.

O‘zbek va xitoy tillarining fonologik tizimlarini qiyosiy tahlil qilish potensial interferensiya zonalarini aniqlash imkonini beradi. O‘zbek tili tonal emas, shuning uchun talabalarda tonal farqlarni idrok etish va qayta ishlab chiqarish tajribasi yo‘q. Bu talabalarning tonlarni ko‘pincha e’tiborsiz qoldirishiga yoki ularni ona tilining intonatsion modellari bilan almashtirishiga (ohang interferensiyasiga) olib keladi. O‘zbek tilida aspiratsiyali undoshlar, affrikatalar va bir qator frikativlar mavjud emas. Talabalar xitoy tovushlarini ona tilidagi eng yaqin artikulyatsion analoglar bilan almashtirishga (artikulyatsion interferensiyaga) moyil

bo‘ladilar. Kuzatuvlar shuni ko‘rsatadiki, j [tɕ] tovushini talaffuz qilishda talabalar uni o‘zbek “j” yoki rus “ж” bilan aralashtiradilar, q [tɕʰ] va x [ɕ] talaffuzida esa xitoy tilidagi “q” ni “ch”, “x” ni “s” tovushi bilan talaffuz qiladilar [1]. O‘zbek nutqining ritmik tashkiloti xitoy tilidan farq qiladi, bu urg‘u va pauzalarning noto‘g‘ri taqsimlanishida (prosodik interferensiya) namoyon bo‘ladi. Zhao Tianhui va boshqalarning eksperimental tadqiqotlari shuni ko‘rsatdiki, o‘zbek talabalari [y], [ə], [ɳ] va [ɳ̩] unlilarini o‘zlashtirishda eng katta qiyinchiliklarga duch keladilar, [i], [u] va [a] unlilari esa nisbatan yaxshi o‘zlashtiriladi [9].

Kuzatuvlarimiz shuni ko‘rsatadiki, eng barqaror xatolar ikkinchi va uchinchi ton juftliklarini farqlashda, shuningdek, aspiratsiyali undoshlarni aspiratsiyasizlar bilan almashtirishda kuzatiladi. Bu o‘zbek tilida aspiratsiyaning ma’no farqlash vazifasini bajarmasligi bilan bog‘liq bo‘lishi mumkin. An’anaviy fonetik ta’lim bir qator metodik muammolarga ega. Auditoriya vaqti cheklanganligi sababli bir darsda har bir talabaga individual mashq qilish uchun yetarli vaqt ajratib bo‘lmaydi. Talabalar guruhda bir xil tezlikda mashq qilishga majbur bo‘ladilar, bu ularning individual ehtiyojlarini hisobga olmaydi. Fonetik ko‘nikmalarni avtomatlashtirish uchun ko‘p martalik takrorlash va tezkor qayta aloqa (feedback) zarur, ammo o‘qituvchi buni har bir talaba uchun ta’minlay olmaydi. Har bir talabaning ona tilidan kelib chiqadigan xatolari turlicha bo‘lib, ularni aniqlash va tuzatish uchun maxsus yondashuv talab qilinadi. Bu muammolar raqamli va AI vositalariga ehtiyojni keltirib chiqaradi.

Sun’iy intellektning fonetika ta'limdagi imkoniyatlari. Sun’iy intellekt til o‘qitishda individualizatsiya, adaptiv ta’lim va avtomatik qayta aloqa imkoniyatlarini yaratadi. Telezhko, Korovina va Salynskaya ta’kidlashlaricha, raqamli vositalar chet tillarini o‘qitish imkoniyatlarini sezilarli darajada kengaytiradi, ulardan foydalanish esa moslashuvchanlik, autentik materiallarga kirish, uzluksiz til amaliyoti va tezkor qayta aloqani ta’minlaydi.

ASR texnologiyalari fonetik ta’limda bir qator imkoniyatlarni yaratadi. Talaba o‘z talaffuzini cheksiz marta takrorlashi va har safar avtomatik tahlil olishi mumkin [4]. ASR tizimlari talabaning talaffuzidagi xatolarni avtomatik aniqlaydi va ular haqida ma’lumot beradi [10]. Talaba o‘z nutqini yozib olib, uni etalon bilan taqqoslashi mumkin [11]. ASR tizimlari o‘qituvchi har bir talabaga yetarli vaqt ajrata olmagan holatlarda qo‘shimcha mashq imkoniyatini yaratadi. Misol uchun, Pinyin Tutor tizimi diagnostik qayta aloqa asosida talabalarning pinyin bo‘yicha fonetik bilimlarini rivojlantirishga qaratilgan. Sona Speech II tizimi esa talabalarga o‘z talaffuzini etalon bilan vizual taqqoslash imkonini beradi. AI asosidagi talaffuz qayta aloqasi quyidagi bosqichlarda ishlaydi: talaba talaffuz qiladi, AI tahlil qiladi, qayta aloqa oladi, xatoni tuzatadi va qayta talaffuz qiladi. Bu jarayon turli darajalarda, masalan tovush, bo‘g‘in, so‘z, so‘z birikmasi, gap, dialog kabi darajalarda qo‘llanishi mumkin.

Nutqni vizualizatsiya qilish vositalari talabaga o‘z ovozining to‘lqin shaklini ko‘rish, ton konturini kuzatish, etalon va o‘z nutqini taqqoslash imkonini beradi. Xitoy tilini o‘qitishda bu ayniqsa muhim, chunki ton balandlik konturi bilan ifodalanadi. Talaba xatosini ko‘rib, uni tuzatishga harakat qiladi.

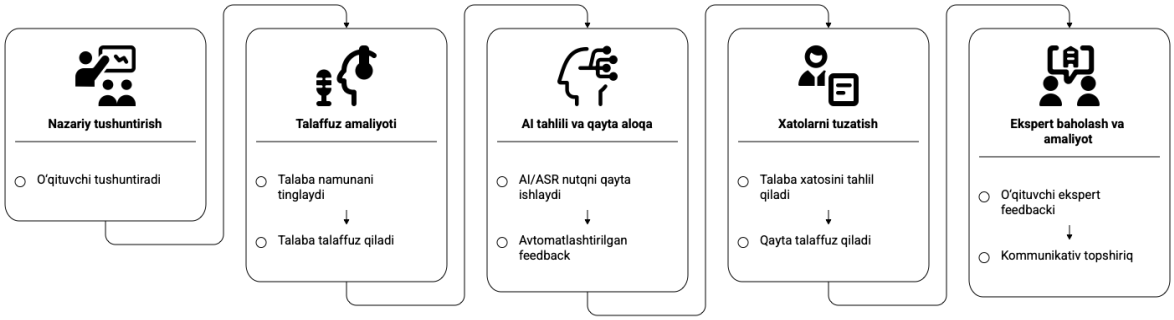
AI yordamida talabaning xatosiga qarab individual mashqlar tashkil etish mumkin. Har bir talaba o‘z xatosiga mos mashq oladi. Xato takrorlansa, AI qo‘shimcha mashq taklif qiladi. Talaba muvaffaqiyatga erishsa, AI murakkablikni oshiradi. Talaba muayyan tovushni o‘zlashtirmaguncha, AI unga qayta-qayta qaytadi [10]. Shu bilan birga AI texnologiyalari bir qator cheklovlarga ham ega. ASR tizimlari har doim ham to‘g‘ri ishlamaydi, ayniqsa tonal nutqni baholashda. Turli platformalar sifati farq qiladi. ASR tizimlari tonlarni har doim ham

to‘g‘ri baholay olmaydi. AI vositalaridan foydalanish uchun internet va texnik vositalar zarur. AI o‘qituvchini almashtira olmaydi, u faqat qo‘shimcha vosita bo‘lishi mumkin [5].

Xitoy tili fonetikasini o‘qitish jarayonida sun’iy intellekt texnologiyalaridan foydalanish fonetik mashqlarni individuallashtirish, talabaning talaffuzini muntazam nazorat qilish hamda tezkor qayta aloqa tashkil etish imkonini beradi. Bunda AI texnologiyalari o‘qituvchining o‘rnini bosuvchi vosita sifatida emas, balki fonetik mashg‘ulotlarni qo‘llab-quvvatlovchi va talabaning mustaqil faoliyatini faollashtiruvchi metodik vosita sifatida qaraladi. Mazkur yondashuvda avtomatik nutqni tanish (ASR), talaffuzni avtomatik tahlil qilish va qayta aloqa berish imkoniyatlari o‘qituvchining ekspert bahosi bilan uyg‘unlashtiriladi. Xitoy tili fonetikasini o‘qitishda AI texnologiyalaridan samarali foydalanish uchun bosqichma-bosqich fonetik mashg‘ulot modeli taklif etiladi. Mazkur modelda o‘qituvchi, talaba va AI texnologiyasi o‘rtasida funksional taqsimot amalga oshiriladi.

Dastlab, o‘qituvchi o‘rganilayotgan fonetik birlikning artikulyatsion va akustik xususiyatlarini tushuntiradi hamda to‘g‘ri talaffuz namunasini taqdim etadi. Keyingi bosqichda talaba namunani tinglaydi va uni mustaqil ravishda takrorlaydi. Talabaning nutqiy namunasi AI yoki ASR tizimi yordamida qayta ishlanib, talaffuz bo‘yicha avtomatlashtirilgan qayta aloqa taqdim etiladi. Ushbu qayta aloqa asosida talaba o‘z talaffuzidagi muammoli jihatlarni aniqlaydi va qayta talaffuz qilish orqali xatosini tuzatishga harakat qiladi. Shundan so‘ng o‘qituvchi talabaning natijasini ekspert nuqtayi nazaridan baholaydi va zarur hollarda qo‘shimcha izoh hamda tuzatishlar beradi. Mashg‘ulotning yakuniy bosqichida o‘rganilgan fonetik birlik kommunikativ vazifa doirasida qo‘llanadi. (1-rasm)

1-rasm.AI yordamida fonetik mashg‘ulot modeli



Shunday qilib, mazkur model tushuntirish, tinglash, talaffuz qilish, AI yordamida tahlil qilish, avtomatlashtirilgan qayta aloqa olish, o‘z-o‘zini tahlil qilish, qayta talaffuz qilish, o‘qituvchining ekspert bahosini olish va kommunikativ qo‘llash jarayonlarining izchil ketma-ketligiga asoslanadi. Ushbu ketma-ketlik fonetik ko‘nikmani faqat mexanik takrorlash darajasida emas, balki ongli nazorat va kommunikativ qo‘llash bilan bog‘liq holda shakllantirishga xizmat qiladi.

AI texnologiyalarining imkoniyatlari bilan birga cheklovlari ham mavjud. Ular qatoriga ASR xatosi, turli platformalar sifatining farqi, tonal nutqni baholashdagi cheklovlar, internet va texnik vositalarga bog‘liqlik, o‘qituvchining metodik nazorati zarurligi hamda “AI bahosi = yakuniy baho” emasligi kiradi. AI bahosi faqat qo‘shimcha ma’lumot sifatida qaralishi kerak. O‘zbekiston ta’lim sharoitida AI vositalaridan foydalanish bir qator omillarga bog‘liq: barqaror internet aloqasi mavjudligi, talabalarning smartfonlarga ega bo‘lishi, platformaning bepul yoki pullikligi, o‘qituvchining raqamli kompetensiyasi, talabaning texnik imkoniyati va universitet

infratuzilmasi. AI vositalarini tanlashda ularning fonetik ta’lim maqsadlariga mosligi, talaffuzni ishonchli baholash imkoniyati, tushunarli qayta aloqa berishi va takroriy mashqni qo‘llab-quvvatlashi asosiy mezonlar sifatida belgilanadi. Shuningdek, vositaning talabaning til darajasiga moslashishi, natijalarni kuzatish va tahlil qilish imkoniyati hamda texnik va moliyaviy jihatdan foydalanish uchun qulayligi hisobga olinishi lozim.

Xulosa quyidagi uch asosiy fikrga quriladi. Birinchidan, xitoy tilining tonal va segmental xususiyatlari fonetik kompetensiyani maxsus metodik yondashuv asosida shakllantirishni talab qiladi. Ikkinchidan, AI texnologiyalari, ayniqsa ASR va avtomatlashtirilgan feedback, fonetik mashq hajmini oshirish, individual amaliyotni tashkil etish va o‘z-o‘zini nazorat qilish imkoniyatlarini kengaytirishi mumkin. Uchinchidan, AI o‘qituvchini almashtiruvchi vosita emas, balki o‘qituvchi tomonidan pedagogik jihatdan boshqariladigan qo‘shimcha metodik vosita sifatida qo‘llanishi maqsadga muvofiq. Kelgusida ushbu modelning samaradorligini O‘zbekiston oliy ta’lim muassasalarida eksperimental tadqiqotlar orqali tekshirish, ayniqsa pre-test/post-test natijalari asosida AI yordamidagi fonetik mashg‘ulotlarning real ta’sirini aniqlash istiqbolli yo‘nalish hisoblanadi.

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BO‘LAJAK TARBIYACHILARNING MALAKAVIY PEDAGOGIK AMALIYOTINI 4+2 TARTIBIDA TASHKIL ETISHDA INNOVATSION PEDAGOGIK TEXNOLOGIYALAR VA METODIK TA’MINOTNI TAKOMILLASHTIRISH

Razoqova Hosilaoy
MTTDMQTMO instituti tayanch doktoranti
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Anotatsiya *Ushbu maqolada bo‘lajak tarbiyachilarni tayyorlashda zamonaviy yondashuvlar, ta’lim olish shakllari, maktabgacha ta’limda nazariy bilimlarning tahlili va uni amaliyot bilan integratsiyasi yoritib berilgan. Shu bilan birga ushbu maqolada dars jarayonini maqsadini to‘g‘ri belgilash hamda bo‘lajak tarbiyachining kasbiy kompetensiyasini rivojlantirish usullari haqida ham ma’lumotlar keltirib o‘tilgan.*

Kalit so‘zlar: *tarbiyachi, maktabgacha ta’lim, dual ta’lim, nazariya, amaliyot, ta’lim-tarbiya, kompetensiya, ta’lim mazmuni, bo‘lajak tarbiyachi, kasbiy mobillik, moderinizatsiya, mutaxassisslik.*

Abstract. *This article discusses modern approaches to preparing future preschool educators, forms of education, the analysis of theoretical knowledge in preschool education, and its integration with practical activities. At the same time, the article provides information on correctly defining the objectives of the educational process and methods for developing the professional competencies of future preschool educators.*

Keywords: *educator, preschool education, dual education, theory, practice, education and upbringing, competence, educational content, future educator, professional mobility, modernization, specialization.*

Bugungi kun talabasini sakson daqiqalik o‘quv mashg‘uloti davomida shunchaki tinglovchi sifatida auditoriyada ushlab turish mushkul. Negaki, u ko‘p xajmli, tezkor axborot oqimi mavjud bo‘lgan muhitda yashamoqda. Ta’lim berish jarayonida nazariya va amaliyot birligini ta’minlagan holda, innovatsion texnologiyalar, interfaol ta’lim usullari yordamida aynan manashu masalaga yechim topish mumkin. Ya’ni, bunda o‘qituvchi va talabaning birgalikdagi faoliyatini tashkil etish, talabaning ta’lim jarayonining faol ishtirokchisiga aylantirish, mustaqil fikrlashga undash, bilish extiyojlarini, olgan bilimlarini amaliyotda qo‘llay olish ko‘nikma va malakalarini shakllantirish kabi xususiyatlar yotadi. Buning uchun birinchi navbatda darslarning ta’limiy maqsadini belgilashda o‘zlashtirish darajalari asosida yondashish, belgilangan vaqt va mavjud sharoitda ko‘zlangan ta’limiy natijalarga kafolatli erishishni ta’minlash eng maqbul usullar va vositalarni tanlash va ularni qo‘llay bilish eng muxim vazifadir. Undan tashqari o‘quv mashg‘ulotlarining shakli va turlari bo‘yicha ta’lim texnologiyasi, darsning o‘qitish modeli, texnologik xaritasi va uni ilovalarini tayyorlash, ta’lim texnologiyasi elementlari hamda o‘qitishning loyiha usuli va keys texnologiyalaridan kengroq foydalanish zarur.

Bugungi kunda zamonaviy dars jarayonida quyidagi asosiy talablarni hisobga olish zarur;

-dars jarayonida qo‘llaniladigan usullarni talabalarning shaxsiy qobiliyatlariga yondoshuv asosida amalga oshirish;

-dars talaba shaxsiga yo‘naltirilgan bo‘lib, o‘qituvchi va talabaning o‘zaro faol munosabatlarda bo‘lishlarini ta’minlash;

-darsni talabalarning yuqori darajadagi qiziqishi, aqliy faolligi va muvoffaqiyatga erishuviga qaratish;

-dars beriladigan bilim mazmuniga ko‘ra, turli pedagogik usul va uslublardan foydalanish;

-darslarni nazariya va amaliyoni o‘zaro bog‘lagan holda tashkil etish;

-darsda vaqtdan unumli va maqsadli foydalanib, sifat va samaradorlikligini ta’min etuvchi nazorat turlaridan foydalanish.[22]

Maktabgacha ta’lim tizimini modernizatsiya qilish undagi ta’lim-tarbiya jarayonini bolalar faolligiga asoslangan holda ularni kattalar bilan birgalikdagi faoliyatini ta’minlashga yo‘naltirilgan modelini o‘zlashtirish zarurligini belgilaydi. Biroq, bugungi kunda bo‘lajak tarbiyachi-pedagoglarning maktabgacha yoshdagi bolalar ta’limini tashkil etishda o‘quv va intizomiy modeli doirasida ish tutishlari ustunligini ko‘rishimiz mumkin. Ular ta’lim-tarbiya jarayonida bolalar bilan qadriyatli mazmunga ega bo‘lgan tenglikni nazarda tutadigan faoliyat modelini qabul qilishda qiyinchiliklarga duch keladilar. Qadriyatli mazmunga ega ta’limda shaxsning xulqatvori mo‘ljalga olinib, ularning insonparvarlikka yo‘nalganligi aniqlanadi.

Ma’lumki, maktabgacha ta’lim tashkilotlari bo‘lajak tarbiyachi-pedagoglarning oliy ta’lim muassasalarida tayyorlash jarayonida kasbiy mobilligini pedagogik-psixologik jihatdan maqsadga muvofiq shakllantirish tizimli-faollik, kompetensiyaga asoslangan, andragogik va akmeologik yondashuvlarni amalga oshirish orqali ta’minlanadi. Tizimli-faollik yondashuvi bo‘lajak tarbiyachi-pedagoglarni kasbiy tayyorlash jarayonining yangi sharoitlariga moslashtirishga yo‘naltirilgan “Maktabgacha ta’lim tashkilotlari tarbiyachi pedagoglarning kasbiy mobilligi” dasturiga muvofiq amalga oshirishni ta’minlaydi. Kompetensiyaga asoslangan yondashuv bo‘lajak tarbiyachipedagoglarning oliy ta’lim muassasalarida egallayotgan bilimlarini ijtimoiy va kasbiy tayyorlash jarayonining yangi vaziyatlariga yo‘naltirilganligini ta’minlaydi. Akmeologik yondashuv bo‘lajak tarbiyachi-pedagoglarning oliy ta’lim muassasalarida kasbiy tayyorlash jarayonida faol usul va metodlar – davra suhbatlari, ijodiy guruhlarda ishlash, ishbilarmonlik o‘yinlari, muammoli pedagogik o‘yinlardan foydalanish orqali kasbiy professionalizmi va kasbiy faoliyatga ijodiy munosabatini shakllantirishga yordam beradi. Andragogik yondashuv ta’lim-tarbiya jarayonida muammoni yaratish va uni bartaraf etish bo‘lajak tarbiyachi-pedagoglarning kasbiy kompetensiyalarini shakllantirishni ta’minlaydi. Ya’ni, bunda jamoaviy aqliy faoliyatni tashkil qiluvchi texnologiyalardan foydalanish maqsadga muvofiqdir.[23]

Nazariya – professionallikka qo‘yilgan dastlabki qadam asosida nazariy bilim yotadi. Avvalo talabalarni muayyan fan yoki fan sohasini o‘qitish nazariyasiga tegishli bo‘lgan pedagogik bilimlar bilan tanishtiriladi. Bunda talabalarga ta’lim berish inklyuziv tarzda amalga oshiriladi ya’ni talabalarning qobiliyatlari va holatidan qat’i nazar, ularning barchasiga sifatli ta’lim taqdim etishdan iborat. Maktabgacha ta’lim yo‘nalishi talabalariga pedagogika va psixologiya fanlari chuqurlashtirilgan tarzda o‘qitiladi. Chunki, ular jamiyatimizning eng yosh va eng nozik qatlamiga ta’lim va tarbiya berishni o‘z oldilariga maqsad qilib qo‘yishgan. Ertangi

[22] Sayfuddinov R. TA’LIM BERISH JARAYONIDA NAZARIYA VA AMALIYOT BIRLIGINI TA’MINLASH.B-1214

[23] To‘ychiyeva S. Salayeva M. BO‘LAJAK TARBIYACHI-PEDAGOGLARNING KASBIY MOBILLIGINI SHAKLLANTIRISH. B-93

faoliyat uchun, bugun berilayotgan ta’lim sifatli bo‘lishi kerak. Bundan tashqari berilayotgan bilimlar ilmiy jihatdan o‘z isbotini topgan bo‘lishi va zamonaviy ta’lim tizimiga mos bo‘lishi lozim. Amaliyot – pedagogik amaliyot talabalar kommunikativ qobiliyatlarini rivojlantirishning ajralmas qismi bo‘lib, ma’ruza, eksperimental ish, ekskursiya, nazorat va baholash kabi o‘qitishning barcha turlarini o‘z ichiga oladi. Pedagogik amaliyot doirasida o‘qituvchilar o‘qitish orqali talabalarning bilim olishini faol qo‘llab – quvvatlaydi. Amaliyot jarayonining yuqori sifatini ishlab chiqish shu bosqichda amalga oshiriladi va nazariy bilimlar amaliyotga tatbiq etiladi. Bunda talabalar kelgusidagi kasbiy faoliyatlari bilan yaqindan tanishish imkoniga ega bo‘ladilar.[24]

Talabalarda 4+2 malakaviy amaliyot davrida shakllanadigan kompetensiyalar:

1. Mutaxassislik bo‘yicha olgan nazariy bilimini amaliy tajriba bilan mustahkamlash. Yuqori malakali, ko‘p yillik ish tajribasiga ega pedagoglarning ish tajribalarini o‘rganish. Mashg‘ulotlar tashkil etishi o‘rganish va olib borish ko‘nikmasiga ega bo‘lish.

2. Maktabgacha ta’lim tashkilotidagi ta’lim-tarbiya jarayoni bilan tanishish, ta’lim tashkilotidagi ta’lim-tarbiya ishlarda faol ishtirok etish, mustaqil ish yuritish malakasini hosil qilish.

3. Mashg‘ulotlardan tashqari olib boriladigan ishlarni o‘rganish va tashkil etishda ishtiroki.

4. Tarbiyalanuvchilar bilan individual ishlash usullarini o‘rganish.

5. Amaliyot davomida tarbiyachilarning ish uslubini o‘rganish, tarbiyaviy ish rejasiga mos tadbirlar tashkil etish. Maktabgacha ta’lim tashkiloti miqyosida o‘tadigan tadbirlarda faol qatnashish.

6. Maktabgacha ta’lim tashkilotida o‘quv xonalarini jihozlash, ko‘rgazmali qurollar, metodik qo‘llanmalar bilan boyitishga yaqindan yordam berish.

Amaliyotchi talabalarda malakaviy amaliyot davrida rivojlanadigan asosiy kompetensiyalardan biri kasbiy kompetentsiyadir. Kasbiy kompetentsiya - kasbiy vazifalarni samarali bajarish uchun zarur bo‘lgan bilim, ko‘nikma va shaxsiy fazilatlar yig‘indisidir. Amaliyotchi talabalar mavzu bo‘yicha bilimlarni turli vaziyatlarda qo‘llash qobiliyatini ham o‘z ichiga oladi. Amaliyot davomida talabalar muammolarni tahlil qilish, qarorlar qabul qilish va ish natijalari uchun mas'uliyatni o‘z zimmalariga olishni o‘rganadilar, bu ularning kelajakdagi kasbiy faoliyati uchun muhim sanaladi.Bundan tashqari, malakaviy amaliyot talabalarga muloqot ko‘nikmalari, jamoada ishlash va tanqidiy fikrlash kabi shaxsiy kompetensiyalarni rivojlantirishga yordam beradi.[25]

Amaliy-faoliyat bo‘lajak tarbiyachining kasbiy tayyorgarligining asosiy tayanch qismi hisoblanadi, chunki aynan ushbu jarayonda bilimlar real faoliyatga bog‘lanadi.

- Amaliyot vaqtida talabalar mashg‘ulot ishlanmalarini tuzish;
- ta’lim-tarbiya jarayonini tashkil etish;
- individual yondashuvni amalga oshirish;
- ta’limiy va tarbiyaviy tadbirlar o‘tkazish;
- metodik hujjatlarni yuritish;

[24] Sattorova M.A. BO‘LAJAK TARBIYACHILARNI TAYYORLASH JARAYONIDA KOMMUNIKATIV QOBILIYATLARNI RIVOJLANTIRISHNING PEDAGOGIK MODELI. B-324
[25] Mirzakulova N. I TALABALARDA 4+2 MALAKAVIY AMALIYOT DAVRIDA RIVOJLANADIGAN KOMPETENSIYALAR. B-215

•ota-onalar bilan ishlash kabi faoliyatlarni amalda sinab ko‘rib bajaradilar.Mazkur jarayon orqali talabalar kasbiy mas’uliyat, mustaqillik, tashabbuskorlik va muammoli vaziyatlarda tezkor qaror qabul qilish ko‘nikmalarini rivojlantiradilar.

Nazariy-metodik komponent bo‘lajak tarbiyachilarning kasbiy faoliyatni ilmiy asosda tashkil etishiga xizmat qiluvchi bilimlar tizimini shakllantiradi. Mazkur komponent doirasida talabalar maktabgacha pedagogikaning asosiy qonuniyatlarini; bolalar rivojlanishining yosh xususiyatlarini; didaktik tamoyillarni; ta’lim metodlarini; inno-vatsion texnologiyalarni; tarbiyaviy ish shakllarini puxta o‘zlashtiradilar.Bu bilimlar talabalarga pedagogik jarayonni tasodifiy emas, balki ongli, maqsadli va rejalashtirilgan tarzda tashkil etish imkonini beradi. Nazariy-metodik tayyorgarlik yetarli bo‘lmagan pedagog amaliy faoliyatda ko‘plab qiyinchiliklarga duch keladi, pedagogik xatolarga yo‘l qo‘yadi va ta’lim samaradorligini pasaytiradi.[26]

Xulosa qilib aytganda bo‘lajak maktabgacha ta’lim tashkiloti tarbiyachilarining malakaviy pedagogik amaliyotini takomillashtirish bo‘lajak mutaxassislarda kasbiy kompetensiyalarni shakllantirish, nazariy bilimlarni amaliyot bilan integratsiya qilish va pedagogik mahoratni oshirishning ilmiy-metodik tizimi hisoblanadi. Bu faoliyat bo‘lajak tarbiyachilarni kasbiy tayyorgarlik sifatini kafolatlaydi. Malakaviy pedagogik amaliyot orqali bo‘lajak tarbiyachilarning kasbiy kompetentligini rivojlantirish texnologiyalari ilmiy asoslangan bo‘lib, tizimli va integrativ pedagogik mexanizm, har bir texnologiya talabaning nazariy bilimlarini amaliy faoliyat bilan birlashtirish, pedagogik tafakkur va ijodiy faoliyatni rivojlantirish, innovatsion yondashuvni rag‘batlantirish hamda shaxsiy va ijtimoiy kompetensiyalarini shakllantirishga xizmat qiladi.

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2. To‘ychiyeva S. Salayeva M. Bo‘lajak tarbiyachi-pedagoglarning kasbiy mobilligini shakllantirish. B 93
3. Tohirjonova H. B. Malakaviy amaliyot orqali bo‘lajak tarbiyachilarni kasbiy kompetentligini rivojlantiruvchi texnologiyalari. B-283
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[26] Tohirjonova H. B. MALAKAVIY AMALIYOT ORQALI BO‘LAJAK TARBIYACHILARNI KASBIY KOMPETENTLIGINI RIVOJLANTIRUVCHI TEXNOLOGIYALARI. B-283

MIKROBIOLOGIYA FANIDAN LABORATORIYA MASHG‘ULOTLARINI TASHKIL ETISHDA RAQAMLI VA INNOVATSION TEXNOLOGIYALARNING AHAMIYATI

Reymova Erkinay Atabaevna
(Qoraqalpoq davlat universiteti mustaqil tadqiqotchisi)
erkinay.atabaevna27@gmail.com
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Annotatsiya. *Ushbu maqolada mikrobiologiya fanidan laboratoriya mashg‘ulotlarini zamonaviy raqamli va innovatsion texnologiyalar asosida tashkil etishning pedagogik imkoniyatlari yoritilgan. Mikrobiologiya fanini o‘qitishda laboratoriya mashg‘ulotlari talabalarning nazariy bilimlarini amaliy ko‘nikmalar bilan bog‘lash, mikroorganizmlarning morfologik va fiziologik xususiyatlarini bevosita kuzatish, tajriba natijalarini tahlil qilish hamda ilmiy-tadqiqot kompetensiyalarini shakllantirishda muhim ahamiyatga ega. Maqolada raqamli mikroskoplar, virtual laboratoriyalar, videodarslar, interaktiv taqdimotlar, elektron testlar, QR-kodlar, ta’lim platformalari va sun’iy intellekt vositalaridan foydalanish imkoniyatlari tahlil qilingan. Raqamli texnologiyalar an’anaviy laboratoriya mashg‘ulotlarini to‘liq almashtirish emas, balki ularni mazmunan boyitish, xavfsizlikni ta’minlash, individual ta’lim imkoniyatlarini kengaytirish va talabalarning mustaqil ishlash faolligini oshirish vositasi sifatida qaraladi. Shuningdek, mikrobiologiya laboratoriya mashg‘ulotlarini raqamlashtirishning afzalliklari, mavjud muammolari va samarali tashkil etish shartlari ko‘rsatib berilgan.*

Kalit so‘zlar*: mikrobiologiya, laboratoriya mashg‘uloti, raqamli texnologiyalar, innovatsion ta’lim, virtual laboratoriya, raqamli mikroskopiya, sun’iy intellekt, interaktiv ta’lim, talaba kompetensiyasi.*

Abstract. *This article discusses the pedagogical possibilities of organizing microbiology laboratory classes using modern digital and innovative technologies. Laboratory classes in microbiology play an important role in connecting theoretical knowledge with practical skills, observing the morphological and physiological characteristics of microorganisms, analyzing experimental results, and developing students’ research competencies. The article analyzes the use of digital microscopes, virtual laboratories, video lessons, interactive presentations, electronic tests, QR codes, educational platforms, and artificial intelligence tools. Digital technologies are considered not as a complete replacement for traditional laboratory work, but as a means of enriching it, improving safety, expanding individual learning opportunities, and increasing students’ independent learning activity. The advantages, challenges, and organizational conditions for digital transformation of microbiology laboratory classes are also discussed.*

Keywords: *microbiology, laboratory class, digital technologies, innovative education, virtual laboratory, digital microscopy, artificial intelligence, interactive learning, student competency.*

Bugungi kunda oliy ta’lim tizimida raqamli texnologiyalardan foydalanish ta’lim sifatini oshirishning muhim omillaridan biriga aylanmoqda. Ayniqsa, tabiiy va biologik fanlarni o‘qitishda raqamli vositalardan samarali foydalanish murakkab biologik jarayonlarni talabalarga

tushunarli, ko‘rgazmali va interaktiv tarzda yetkazish imkonini beradi. Mikrobiologiya fani ham mazkur jarayonda alohida o‘rin tutadi.

Mikrobiologiya fanining o‘ziga xos jihati shundaki, uning ko‘plab obyektlari oddiy ko‘z bilan ko‘rinmaydi. Mikroorganizmlarning morfologiyasi, hujayra tuzilishi, bo‘yalish xususiyatlari, koloniyalarining shakli va boshqa belgilarini o‘rganishda mikroskopik tekshiruvlar hamda laboratoriya tajribalari muhim hisoblanadi. Shu sababli laboratoriya mashg‘ulotlari mikrobiologiya fanini o‘zlashtirishning asosiy tarkibiy qismlaridan biridir.

O‘zbek tilidagi mikrobiologiya bo‘yicha o‘quv adabiyotlarida ham laboratoriya va amaliy mashg‘ulotlarning mazmuni, mikroorganizmlarni o‘rganish usullari, mikroskop bilan ishlash hamda laboratoriya xavfsizligi masalalariga katta e’tibor qaratilgan. Jumladan, Sh.R. Aliyev va hammualliflarning “Mikrobiologiyadan laboratoriya mashg‘ulotlariga doir qo‘llanma” asari mikrobiologiyani o‘zbek tilida amaliy o‘rganish uchun muhim manbalardan biri hisoblanadi. Z.J. Shapulatovaning “Mikrobiologiya fanidan amaliy va laboratoriya mashg‘ulotlari” o‘quv qo‘llanmasida esa laboratoriyada ishlash qoidalari hamda mikrobiologik va immunologik usullar yoritilgan.

Raqamli texnologiyalarning ta’lim jarayoniga jadal kirib kelishi mikrobiologiya laboratoriya mashg‘ulotlarini ham yangi pedagogik yondashuvlar asosida tashkil etishni talab qilmoqda. Raqamli mikroskoplar, videomateriallar, virtual laboratoriyalar, elektron topshiriqlar va sun’iy intellekt asosidagi ta’lim vositalari an’anaviy laboratoriya mashg‘ulotlarining imkoniyatlarini kengaytirishi mumkin.

Tadqiqotning asosiy maqsadi mikrobiologiya fanidan laboratoriya mashg‘ulotlarini tashkil etishda raqamli va innovatsion texnologiyalardan foydalanishning pedagogik imkoniyatlarini aniqlash hamda ularni samarali qo‘llash bo‘yicha metodik tavsiyalar ishlab chiqishdan iborat.

Mazkur maqsaddan kelib chiqib quyidagi vazifalar belgilandi:

mikrobiologiya laboratoriya mashg‘ulotlarining ta’limiy ahamiyatini aniqlash;

laboratoriya mashg‘ulotlarida qo‘llaniladigan zamonaviy raqamli texnologiyalarni tahlil qilish;

raqamli mikroskopiya va virtual laboratoriyalarning imkoniyatlarini ko‘rsatish;

interaktiv va multimedia vositalaridan foydalanishning pedagogik samaradorligini asoslash;

sun’iy intellekt texnologiyalaridan foydalanish imkoniyatlarini ko‘rib chiqish;

raqamli texnologiyalarni laboratoriya mashg‘ulotlariga integratsiya qilish bo‘yicha metodik yondashuvlarni taklif etish.

Tadqiqotda ilmiy-pedagogik adabiyotlarni tahlil qilish, taqqoslash, umumlashtirish, kuzatish va metodik modellashtirish usullaridan foydalanildi. Mikrobiologiya faniga oid o‘zbek tilidagi darslik va o‘quv qo‘llanmalar, shuningdek, ta’limda axborot texnologiyalaridan foydalanishga oid manbalar tahlil qilindi.

Q.D. Davranovning “Mikrobiologiya” darsligida mikrobiologiyaning nazariy va amaliy jihatlari, mikroorganizmlarning asosiy xususiyatlari yoritilgan bo‘lib, mazkur fan bo‘yicha amaliy bilimlarni shakllantirish uchun nazariy asos vazifasini bajaradi. P. Mirhamidova, A.H. Vahobov, Q. Davranov va G. Tursunboyevalarning “Mikrobiologiya va biotexnologiya asoslari” darsligida esa mikroorganizmlarning morfologiyasi, fiziologiyasi, genetikasi va biotexnologik jarayonlar bilan bog‘liq masalalar keng yoritilgan.

Laboratoriya mashg‘uloti talabaning nazariy bilimlarini amaliy faoliyat bilan bog‘laydigan ta’lim shaklidir. Ma’ruza mashg‘ulotida mikroorganizmlarning tuzilishi va biologik xususiyatlari haqida ma’lumot berilsa, laboratoriya mashg‘ulotida talaba ushbu bilimlarni amaliy faoliyat orqali mustahkamlaydi.

Mikrobiologiya laboratoriya mashg‘ulotlarida mikroskop bilan ishlash, vaqtinchalik va doimiy preparatlarni tayyorlash, mikroorganizmlarning morfologik xususiyatlarini kuzatish, bo‘yash usullaridan foydalanish, mikroorganizmlarni o‘stirish va natijalarni tahlil qilish kabi amaliy ko‘nikmalar shakllanadi.

E.H. Eshaboyevning “Mikrobiologiyadan amaliy mashg‘ulotlar” qo‘llanmasida mikroorganizmlar morfologiyasi va fiziologiyasi, ularning tabiatda tarqalishi kabi masalalar bilan bir qatorda amaliy mashg‘ulotlarga oid materiallar berilgan.

Shu nuqtayi nazardan laboratoriya mashg‘ulotlarini raqamli vositalar bilan boyitish talabalarning kuzatuvchanligi, mustaqil fikrlashi, tajriba natijalarini tahlil qilish va xulosa chiqarish ko‘nikmalarini rivojlantirishga xizmat qiladi.

Mikrobiologiya laboratoriyasida eng muhim vositalardan biri mikroskop hisoblanadi. An’anaviy mikroskop yordamida olingan tasvirni faqat mikroskop oldida turgan talaba kuzatishi mumkin. Raqamli mikroskop esa tasvirni kompyuter, planshet yoki interaktiv doskaga uzatish imkonini beradi.

Bunday texnologiyadan foydalanish natijasida:

mikroskop ostidagi obyektni barcha talabalar bir vaqtning o‘zida kuzatishi;

tasvirni kattalashtirish va kichraytirish;

tasvirni saqlash;

kuzatilgan obyektlarni taqqoslash;

laboratoriya natijalarini elektron shaklda qayd etish;

talabaning mustaqil ishlashi uchun mikroskopik tasvirlar bazasini yaratish imkoniyati paydo bo‘ladi.

Raqamli mikroskopiya, ayniqsa, mikroorganizmlarning morfologik xususiyatlarini o‘rganishda samarali vosita bo‘la oladi. O‘qituvchi real vaqtda mikroskop ostidagi tasvirni katta ekranga chiqarib, kerakli obyektni tushuntirishi mumkin.

Virtual laboratoriya — laboratoriya tajribalarining raqamli muhitda modellashtirilgan shaklidir. U real laboratoriya mashg‘ulotini to‘liq almashtirmaydi, ammo talabaning tajribaga tayyorgarlik ko‘rishi va murakkab jarayonlarni oldindan tushunib olishi uchun samarali vosita bo‘lib xizmat qiladi.

Masalan, mikrobiologiya laboratoriyasida talaba tajriba bajarishdan oldin virtual muhitda:

laboratoriya jihozlari bilan tanishadi; tajriba ketma-ketligini o‘rganadi; xavfsizlik qoidalarini takrorlaydi; kerakli reagent va materiallarni tanlaydi; tajriba natijasini kuzatadi; xatolarni aniqlaydi va qayta urinib ko‘radi.

Bunday yondashuv ayniqsa murakkab yoki ko‘p vaqt talab qiladigan laboratoriya jarayonlarini tushuntirishda foydalidir.

Mikrobiologiyaga oid ko‘plab jarayonlarni faqat og‘zaki tushuntirish orqali o‘zlashtirish qiyin. Masalan, bakterial hujayraning tuzilishi, spora hosil bo‘lishi, mikroorganizmlarning ko‘payishi yoki metabolik jarayonlarni animatsiya va videolar yordamida tushuntirish talabaning mavzuni yaxshiroq tasavvur qilishiga yordam beradi.

Interaktiv taqdimotlarda rasm, video, animatsiya, sxema va test topshiriqlarini birlashtirish mumkin. Laboratoriya mashg‘uloti boshida qisqa videodars orqali tajriba bosqichlari ko‘rsatilsa, talabalar amaliy ishni bajarishda kamroq xatoga yo‘l qo‘yadi.

Ta’limda axborot texnologiyalariga oid o‘zbek tilidagi darsliklarda zamonaviy axborot-kommunikatsiya texnologiyalari, amaliy dasturiy vositalar va kommunikatsion texnologiyalardan ta’lim jarayonida foydalanish masalalari yoritilgan.

Biroq sun’iy intellektdan foydalanishda akademik halollik tamoyillariga rioya qilish muhim. Talaba sun’iy intellekt tomonidan berilgan javobni tayyor bilim sifatida qabul qilmasligi, uni darslik, o‘qituvchi ko‘rsatmalari va laboratoriya natijalari bilan taqqoslashi lozim. Shuning uchun sun’iy intellektni “tayyor javob beruvchi vosita” emas, balki talabaning fikrlashini qo‘llab-quvvatlovchi yordamchi vosita sifatida qo‘llash maqsadga muvofiq.

Mikrobiologiya laboratoriya mashg‘ulotlariga raqamli va innovatsion texnologiyalarni joriy etish quyidagi natijalarga olib kelishi mumkin:

Raqamli vosita	Ta’limiy imkoniyati
Raqamli mikroskop	Mikroskopik tasvirni umumiy ekranda kuzatish
Virtual laboratoriya	Tajribani xavfsiz raqamli muhitda modellashtirish
Videodars	Laboratoriya jarayonini bosqichma-bosqich ko‘rsatish
QR-kod	Elektron yo‘riqnomaga tezkor kirish
Elektron test	Bilimni tezkor baholash
Interaktiv doska	Mikroorganizmlar tasvirlarini ko‘rgazmali namoyish etish
Sun’iy intellekt	Qo‘shimcha tushuntirish va savol-javob
Elektron portfolio	Talabaning laboratoriya ishlarini tizimli saqlash

Ushbu vositalarning uyg‘unlashtirilishi natijasida laboratoriya mashg‘ulotlari faqat “tajribani bajarish” jarayonidan talabaning kuzatishi, tahlil qilishi, muhokama qilishi va xulosa chiqarishini nazarda tutuvchi faol ta’lim jarayoniga aylanishi mumkin.

Raqamli texnologiyalardan foydalanish bir qator muammolarni ham yuzaga keltiradi. Jumladan, laboratoriyalarni zamonaviy texnik vositalar bilan jihozlash uchun moliyaviy resurslar talab etiladi. Bundan tashqari, o‘qituvchilarning raqamli kompetensiyalarini rivojlantirish, internet va texnik infratuzilmani ta’minlash ham muhim masalalardandir.

Yana bir muhim jihat — raqamli texnologiyalar real laboratoriya tajribasining o‘rnini to‘liq egallamasligi kerak. Mikrobiologiya fanida talaba real mikroskop bilan ishlashi, laboratoriya jihozlarini tanishi, tajriba jarayonida xavfsizlik qoidalariga amal qilishi va real tajriba natijalarini tahlil qilishi zarur.

Shuning uchun eng maqbul model — an’anaviy laboratoriya + raqamli texnologiyalar uyg‘unligidir.

Xulosa sifatida shuni aytish mumkinki, Mikrobiologiya fanidan laboratoriya mashg‘ulotlarini raqamli va innovatsion texnologiyalar asosida tashkil etish zamonaviy oliy ta’limning muhim yo‘nalishlaridan biridir. Raqamli mikroskoplar, virtual laboratoriyalar, multimedia materiallari, QR-kodlar, elektron testlar va sun’iy intellekt vositalaridan maqsadli foydalanish laboratoriya mashg‘ulotlarining ko‘rgazmaliligi, interaktivligi va samaradorligini oshirishga xizmat qiladi.

Raqamli texnologiyalarning asosiy afzalligi shundaki, ular mikrobiologik obyekt va jarayonlarni talaba uchun yanada tushunarli ko‘rinishga keltiradi. Ayniqsa, mikroskopik tasvirlarni katta ekranda namoyish etish, laboratoriya tajribalarini videolar va virtual modellar orqali oldindan o‘rganish hamda elektron topshiriqlar yordamida bilimlarni nazorat qilish ta’lim jarayonining samaradorligini oshiradi.

Shu bilan birga, raqamli vositalardan foydalanish laboratoriya tajribalarini butunlay virtual muhitga ko‘chirishni anglatmasligi kerak. Mikrobiologiya fanining amaliy mohiyatidan kelib chiqib, real laboratoriya tajribasi va raqamli texnologiyalar o‘zaro uyg‘unlashtirilishi lozim.

Umuman olganda, mikrobiologiya laboratoriya mashg‘ulotlarini raqamlashtirish talabalarda nafaqat fan bo‘yicha bilim va amaliy ko‘nikmalarni, balki raqamli kompetensiya, mustaqil ta’lim olish, axborotni tahlil qilish, muammoli vaziyatlarda qaror qabul qilish va ilmiy fikrlash ko‘nikmalarini ham rivojlantirish imkonini beradi.

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FIZIKANI O‘QITISH METODIKASINI RAQAMLI TEXNOLOGIYALAR ASOSIDA TAKOMILLASHTIRISH

Saparova Gulmira Baxtiyorovna
Guliston davlat universiteti tayanch doktoranti
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Annotatsiya. *Ushbu maqolada umumta'lim va oliy ta'lim tizimida fizika fanini o‘qitish jarayonini raqamli texnologiyalar asosida takomillashtirish muammolari tahlil qilingan. Zamonaviy axborot-kommunikatsiya texnologiyalari, virtual va kengaytirilgan reallik vositalari, interaktiv simulyatsiyalar, masofaviy ta'lim platformalari hamda sun'iy intellektga asoslangan ta'lim vositalarining fizika ta'limi sifatiga ta'siri ilmiy jihatdan asoslangan. Tadqiqot davomida pedagogik eksperiment natijalari keltirilgan, raqamli vositalardan foydalangan va foydalanmagan guruhlar o‘rtasidagi o‘zlashtirish ko‘rsatkichlari qiyosiy tahlil qilingan. Maqola yakunida fizika o‘qitish metodikasini takomillashtirish bo‘yicha amaliy tavsiyalar ishlab chiqilgan.*

Kalit so‘zlar*: fizika ta'limi, raqamli texnologiyalar, o‘qitish metodikasi, virtual laboratoriya, interaktiv simulyatsiya, masofaviy ta'lim, pedagogik texnologiya, kompetentsiyaviy yondashuv, STEAM ta'lim, sun'iy intellekt.*

KIRISH

O‘zbekiston Respublikasida ta'lim sifatini tubdan yaxshilash, raqamli iqtisodiyot talablariga mos kadrlar tayyorlash davlat siyosatining ustuvor yo‘nalishlaridan biri hisoblanadi. "Yangi O‘zbekiston taraqqiyot strategiyasi" va "Raqamli O‘zbekiston – 2030" dasturlarida belgilangan vazifalarga muvofiq, umumta'lim va oliy ta'lim muassasalarida tabiiy-matematik fanlarni, jumladan fizikani o‘qitish sifatini raqamli texnologiyalar asosida yangi bosqichga ko‘tarish zaruriyati yuzaga kelmoqda.

Fizika – tabiat hodisalarini o‘rganuvchi fundamental fan bo‘lib, uning o‘zlashtirilishi o‘quvchi va talabalarning tabiiy-ilmiy dunyoqarashini shakllantirishda, texnik va muhandislik yo‘nalishlarida muvaffaqiyatli faoliyat yuritishida hal qiluvchi ahamiyatga ega. Biroq an'anaviy o‘qitish metodikasi ko‘pincha nazariy bilimlarni amaliyot bilan bog‘lashda, murakkab fizik jarayonlarni vizuallashtirishda, shuningdek, o‘quvchilarning individual qobiliyatlarini hisobga olgan holda differensiallashtirilgan ta'lim berishda yetarli samara bermayapti.

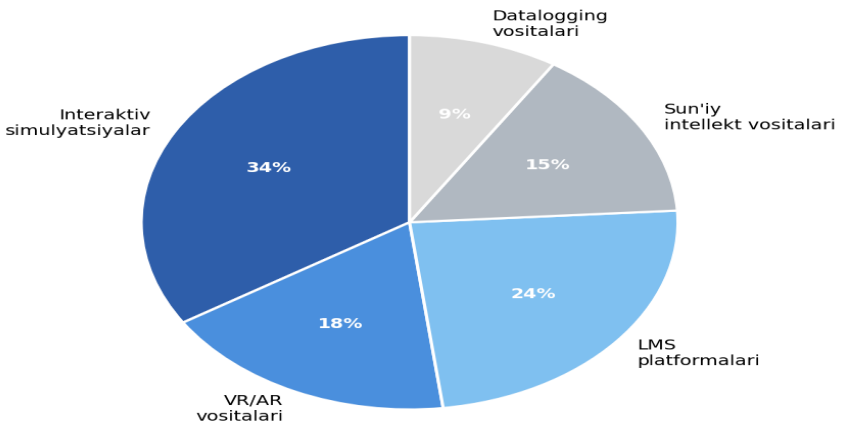
Zamonaviy raqamli texnologiyalar – virtual va kengaytirilgan reallik (VR/AR), interaktiv simulyatsiyalar, masofaviy ta'lim platformalari, sun'iy intellektga asoslangan intellektual tizimlar, big data va ta'lim analitikasi vositalari – ushbu muammolarni bartaraf etishda katta salohiyatga ega. Ular yordamida o‘quvchilarga murakkab fizik jarayonlarni real vaqt rejimida modellashtirish, eksperimentlarni xavfsiz sharoitda takrorlash, individual o‘quv traektoriyasini shakllantirish imkoniyati yaratiladi. Interaktiv simulyatsiya va modellashtirish dasturlari. Mexanika, elektr va magnetizm, optika, molekulyar fizika bo‘limlarini o‘rganishda PhET, Algodoo kabi dasturlar orqali fizik jarayonlarni vizual tarzda, parametrlarni real vaqtda o‘zgartirgan holda kuzatish imkoniyati yaratiladi. Bu, ayniqsa, real sharoitda kuzatib bo‘lmaydigan yoki xavfli hisoblangan tajribalarni (yuqori kuchlanishli elektr zanjirlari, yadro reaksiyalari) xavfsiz tarzda modellashtirishda muhim ahamiyat kasb etadi. Virtual va

kengaytirilgan reallik (VR/AR) texnologiyalari. Ushbu vositalar o‘quvchiga fizik hodisani uch o‘lchamli fazoda, "ichkarisidan" kuzatish imkonini beradi. Masalan, atom tuzilishi, elektromagnit maydon liniyalari, sayyoralar harakati kabi mavhum tushunchalarni AR ilovalari yordamida jonli tarzda ko‘rish o‘quvchining kontseptual tushunchasini sezilarli darajada chuqurlashtiradi. Masofaviy ta'lim platformalari va LMS tizimlari. Moodle, Google Classroom kabi tizimlar orqali o‘quv materiallarini tarqatish, uy vazifalarini nazorat qilish, o‘quvchilarning progressini kuzatib borish imkoniyati kengaymoqda. Sun'iy intellektga asoslangan ta'lim vositalari. So‘nggi yillarda adaptiv o‘qitish tizimlari o‘quvchining bilim darajasiga qarab topshiriqlar murakkabligini avtomatik moslashtirish, xatolar tahlili asosida individual tavsiyalar berish imkoniyatini taqdim etmoqda.

Raqamli o‘lchov va ma'lumot yig‘ish vositalari (datalogging). Harorat, bosim, tezlanish kabi fizik kattaliklarni raqamli sensorlar orqali real vaqtda o‘lchash va grafik ko‘rinishda tahlil qilish o‘quvchilarda tadqiqotchilik ko‘nikmalarini rivojlantiradi.

O‘tkazilgan so‘rovnoma natijalariga ko‘ra, fizika o‘qituvchilari tomonidan darslarda qo‘llanilgan raqamli vositalarning nisbiy ulushi quyidagi diagrammada aks ettirilgan.

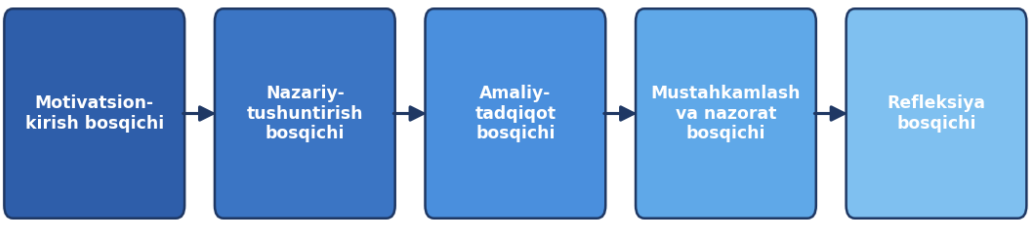
4-diagramma. Fizika darslarida qo'llanilgan raqamli vositalar tuzilishi (so'rovnoma, %)



2. Raqamli texnologiyalar asosida fizika darsini tashkil etish metodikasi

Tadqiqot natijalariga tayangan holda, fizika darsini raqamli texnologiyalar asosida tashkil etishning quyidagi metodik modeli ishlab chiqildi. Metodik model besh izchil bosqichdan iborat bo‘lib, ular quyidagi diagrammada sxematik tarzda tasvirlangan.

3-diagramma. Raqamli texnologiyalar asosida fizika darsini tashkil etish metodik modeli



Motivatsion-kirish bosqichi. Dars mavzusiga oid qiziqarli video-tajriba yoki interaktiv animatsiya orqali o‘quvchilarning e'tibori jalb qilinadi, muammoli vaziyat yaratiladi.

Nazariy-tushuntirish bosqichi. Yangi mavzu interaktiv taqdimotlar, simulyatsiyalar yordamida tushuntiriladi, mavhum fizik jarayonlar vizuallashtiriladi.

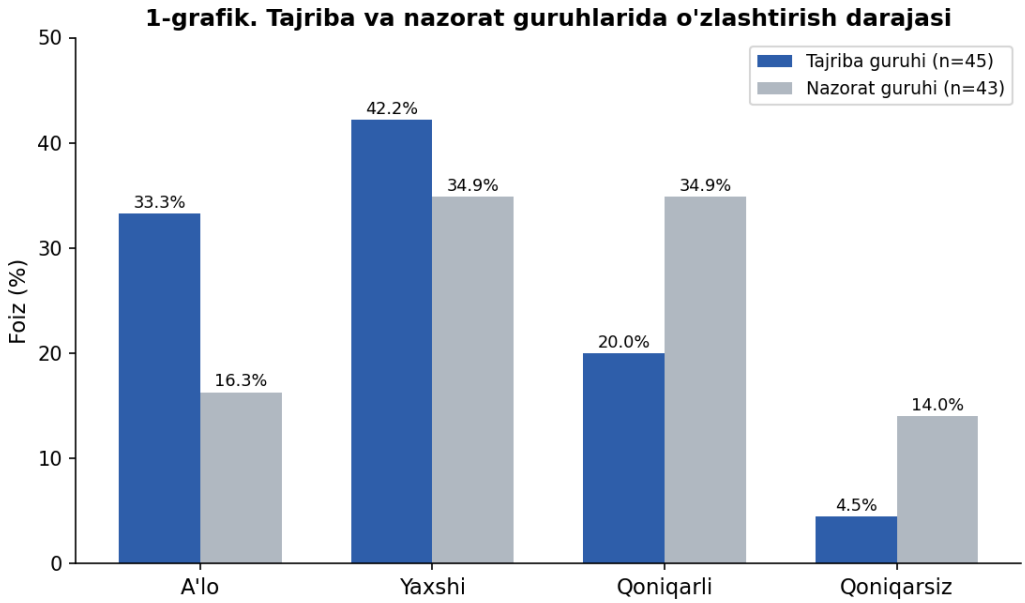
Amaliy-tadqiqot bosqichi. O‘quvchilar virtual laboratoriya vositalarida mustaqil yoki kichik guruhlarda tajriba o‘tkazadilar, parametrlarni o‘zgartirib, natijalarni kuzatadilar va xulosa chiqaradilar. Mustahkamlash va nazorat bosqichi. Onlayn test tizimlari (Kahoot, Quizizz, Google Forms) yordamida bilim darajasi tezkor baholanadi, natijalar asosida individual yondashuv ta'minlanadi. Refleksiya bosqichi. O‘quvchilar o‘zlashtirilgan bilimlarni kundalik hayot va texnika bilan bog‘lab, mustaqil xulosalar chiqaradilar, elektron portfolio yoki loyiha ishlari orqali bilimlarini mustahkamlaydilar.

3. Pedagogik eksperiment natijalari

Eksperiment yakunida tajriba va nazorat guruhlarida o‘tkazilgan yakuniy test natijalari quyidagi jadvalda umumlashtirildi.

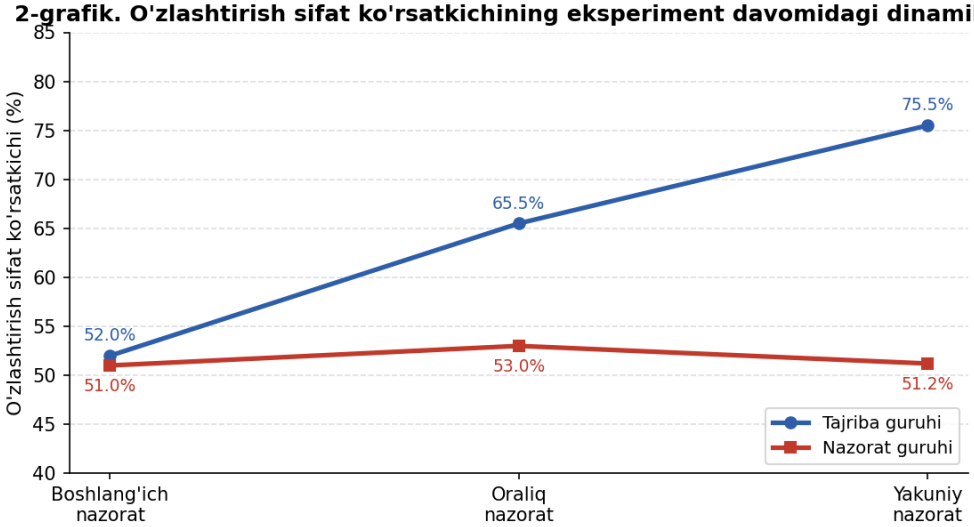
Ko‘rsatkich	Tajriba guruhi (n=45)	Nazorat guruhi (n=43)
"A'lo" baho olganlar	33,3%	16,3%
"Yaxshi" baho olganlar	42,2%	34,9%
"Qoniqarli" baho olganlar	20,0%	34,9%
"Qoniqarsiz" baho olganlar	4,5%	14,0%
O‘zlashtirish sifat ko‘rsatkichi	75,5%	51,2%

Jadvalda keltirilgan ma'lumotlarning vizual tasviri quyidagi grafikda berilgan.



O‘zlashtirish sifat ko‘rsatkichining eksperimentning uchala bosqichi (boshlang‘ich, oraliq, yakuniy nazorat) davomidagi o‘zgarish dinamikasi quyidagi grafikda tasvirlangan.

2-grafik. O'zlashtirish sifat ko'rsatkichining eksperiment davomidagi dinamikasi



Statistik tahlil natijalari (Styudent t-mezoni bo‘yicha t=2,74, erkinlik darajasi p<0,05) tajriba va nazorat guruhlari o‘rtasidagi farqning ishonchli, ya'ni tasodifiy emasligini ko‘rsatdi. Bundan tashqari, tajriba guruhida o‘tkazilgan so‘rovnoma natijalariga ko‘ra, o‘quvchilarning 87 foizi raqamli vositalar yordamida fizikani o‘rganish jarayoni qiziqarli va tushunarli bo‘lganini, 79 foizi esa mavzuni chuqurroq anglab yetganini ta'kidladi. Shuningdek, tajriba guruhida o‘quvchilarning fanga bo‘lgan motivatsiyasi, mustaqil fikrlash va tadqiqotchilik ko‘nikmalari sezilarli darajada oshgani, laboratoriya ishlarini bajarishda xatoliklar soni kamaygani kuzatildi. Bu, ayniqsa, murakkab hisoblangan elektrodinamika va molekulyar-kinetik nazariya bo‘limlarida yaqqol namoyon bo‘ldi.

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INGLIZ TILI TALAFFUZINING NUTQ AKTLARIGA ASOSAN FONOPRAGMATIK XUSUSIYATLARI

Satimboyeva Onorxon Anvarjon qizi
Katta o‘qituvchi, University of economics and pedagogy NOTM
Mustaqil izlanuvchi, O‘zbekiston davlat jahontillari universiteti
satimboyevaonorxon@gmail.com
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Annotatsiya. *Ushbu maqolada ingliz tili talaffuz birliklarining nutq aktlariga asosan qanday fonopragmatik ma’no anglatishlari haqida ma’lumotlar berilgan. Shuningdek Maqolada intonatsiya, urg‘u, temp, pauza, melodiya va tembr kabi suprasegment vositalarning nutq aktlarining illokutiv kuchini belgilashdagi roli yoritilgan bo‘lib Jon Ostin va Jon Serl tomonidan asos solingan nutq aktlari nazariyasiga tayangan holda, direktiv, komissiv, ekspressiv, assertiv va deklaratsion nutq aktlarining o‘ziga xos fonopragmatik profillari tahlil qilingan.*

Tadqiqotda ingliz tilida bir xil leksik-grammatik tarkibga ega bo‘lgan sintaktik qurilmalar turli fonopragmatik markerlar ya’ni ohangning ko‘tarilishi yoki pasayishi orqali mutlaqo qarama-qarshi nutq aktlarini shakllantirishi mumkinligi isbotlangan. Xususan, buyruq va iltimos, va’da va tahdid, samimiy minnatdorchilik va rasmiyatchilik kabi nutq aktlari o‘rtasidagi farqlar ko‘pincha so‘z darajasida emas, balki intonatsion kontur darajasida hal bo‘lishi ko‘rsatilgan.

Kalit so‘zlar: *direktiv, komissiv, ekspressiv, assertiv va deklaratsion nutq aktlari, intonatsiya, urg‘u, temp, to‘xtam.*

Abstract. *This article examines the phonopragmatic meanings conveyed by English pronunciation units within the context of speech acts. It highlights the role of suprasegmental features—such as intonation, stress, tempo, pause, melody, and timbre—in determining the illocutionary force of speech acts. Drawing on speech act theory established by John Austin and John Searle, the article analyzes the distinct phonopragmatic profiles of directive, commissive, expressive, assertive, and declarative speech acts.*

The study demonstrates that English syntactic structures sharing identical lexico-grammatical content can give rise to diametrically opposed speech acts through the use of different phonopragmatic markers, specifically rising or falling intonation. In particular, it shows that distinctions between speech acts—such as commands versus requests, promises versus threats, and sincere gratitude versus mere formality—are often determined not at the lexical level, but at the level of intonational contours.

Keywords: *directive, commissive, expressive, assertive, and declarative speech acts; intonation, stress, tempo, pause.*

Zamonaviy tilshunoslikda tildagi lisoniy birliklarga nisbatan faqat tizimli-strukturaviy belgilar sifatida qarash jihatdan o‘rganish davri ortda qolib, endilikda tilni muloqot jarayonida, ya’ni diskurs va nutqiy faoliyat kontekstida tadqiq etish yetakchi yo‘nalishga aylanmoqda. Bu borada esa pragmalingvistika va fonetika kesishuviga asosan yuzaga kelgan fonopragmatika sohasi alohida ahamiyat kasb etmoqda. Fonopragmatika bu nutqiy jarayonda so‘zlovchining kommunikativ maqsadini, uning tinglovchiga ko‘rsatmoqchi bo‘lgan ta’sirini va his-tuyg‘ularini

ifodalashda ishtirok etuvchi suprasegment vositalar (intonatsiya, urg‘u, temp, melodiya, pauza) ning rolini o‘rganuvchi tilshunoslikning bir sohasi hisoblanadi.

Bu borada gapdagi intonatsiya, urg‘u, temp hamda pauzalar sezilarli ahamiyatga ega bo‘lib, ular ingliz tili talaffuz tizimida shunchaki grammatik ma’noni shakllantirish yoki gap turlarini farqlash (darak, so‘roq, buyruq) bilan cheklanib qolmaydi. Ular shuningdek nutq aktlarining illokutiv kuchini belgilashda boshqaruvchi mexanizm vazifasini o‘tashga xizmat qiladi. Jon Ostin va Jon Serl tomonidan asos solingan nutq aktlari nazariyasiga asosan esa, har bir aytilgan gap ma’lum bir harakatni ya’ni va’da berish, buyruq berish, ogohlantirish, uzr so‘rash kabilarni ifodalaydi. Ingliz tilida mazkur nutqiy harakatlarning muvaffaqiyati esa ko‘p jihatdan segment va suprasegment birliklarning fonopragmatik jihatdan to‘g‘ri tanlanishiga ham bog‘liq hisoblanadi.

Nutq aktining illokutiv maqsadi va undagi fonopragmatik vositalar o‘rtasida uzviy dialektik aloqalar ham mavjud bo‘lib bir xil leksik va grammatik tarkibga ega bo‘lgan sintaktik qurilma turli fonopragmatik markerlar ya’ni belgilar orqali ya’ni ohangning ko‘tarilishi yoki pasayishi yordamida mutlaqo qarama-qarshi nutq aktlarini ham shakllantirishi mumkin.

Ingliz tili fonetik holatiga ko‘ra, fonopragmatik xususiyatlar quyidagi komponentlar evaziga amalga oshadi. Bularga melodik yo‘nalish ya’ni ohangning ko‘tarilishi yoki pasayishi muloqotdagi pragmatik kichik matnlarni (shubha, ishonch, qat’iyat) yuzaga chiqaradi. Shuningdek, nutq tempi ya’ni tezlashgan yoki sekinlashgan nutq so‘zlovchining psixologik holatini va nutq aktining muhimlik darajasini ko‘rsatadi. Keyingi komponent esa pauza ya’ni emotsional va mantiqiy pauzalar tinglovchining diqqatini jalb qilish hamda illokutiv maqsadni kuchaytirish uchun xizmat qiladi. Tembr va ovoz balandligi ham katta ahamiyat kasb etadi, ya’ni qo‘pollik, muloyimlik, rasmiylik kabi pragmatik kategoriyalarni modellashtiradi.

Nutq aktlari borasidagi Jon Serl tasnifiga ko‘ra, nutq aktlarining har bir turi o‘ziga xos fonopragmatik profilga ega hisoblanadi. Direktiv nutq aktlari (buyruq, iltimos, talab, maslahat) nomidan ham bilinib turgan holda tinglovchini biror-bir harakatni bajarishga undashni maqsad qiladi. Ingliz tilida buyruq va iltimos o‘rtasidagi chegara nafaqat talaffuzida balki, madaniyatida ham ko‘pincha so‘z darajasida emas, balki intonatsiya darajasida hal bo‘ladi.

Buyruq ohangida keskin pasayuvchi ton ya’ni high fall yetakchilik qiladi. Bu ton esa so‘zlovchining yuqori statusini va nutq aktining qat’iyligini anglatadi. Masalan: “Sit down!” [\Sit \down]. Bu yerda ohangning keskin pasayishi tinglovchiga e’tiroz bildirishga imkon qoldirmagan. Agar bu gap past pasayuvchi ton ya’ni low fall) bilan talaffuz qilinsa, u sovuq va rasmiy buyruqqa aylanadi.

Iltimos nutq aktlarida esa ingliz tilida ko‘tariluvchi ton ya’ni low rise yoki fall-rise) qo‘llaniladi. Bu fonopragmatik marker tinglovchiga tanlov imkoniyatini qoldiradi va muloyimlik pragmatik kategoriyasini ta’minlaydi. Masalan: “Open the window, please.” [\Open the /window, please] fall-rise (pasayib-ko‘tariluvchi) ohangi iltimosning samimiyligini hamda diplomatik xarakterini ko‘rsatadi. Agar leksik jihatdan *“please”* so‘zi ishlatilsa-yu, lekin u qat’iy high fall bilan aytilsa, nutq akti pragmatik jihatdan iltimos emas, balki yashirin buyruq yoki kesatiq ma’nosiga aylanadi.

Shuningdek Ingliz tili diskursida imperativ ya’ni buyruq gaplar strukturaviy jihatdan verbal dominantlik, ya’ni yetakchi fe’lning gap boshida kelishi hamda intonatsion jihatdan pasayuvchi ya’ni falling yoki ko‘tarilib-pasayuvchi rise-fall ton bilan xarakterlanadi. Biroq, imperativ va interrogativ ya’ni so‘roq konstruksiyalarning funksional-semantik chatishuvi natijasida yuzaga keluvchi gibrid gaplarda esa ohang o‘zgarish holatlari kuzatiladi. Masalan,

"Found anything interesting yet? My word, damn fine show. Carry on, chaps" kabi nutqiy namunalarda so‘roq va buyruq modalligining sintezi fonopragmatik ma’no ko‘chishini ya’ni illokativ maqsadning transformatsiyasini yuzaga keltirib, so‘zlovchining emotsional-ekspressiv munosabatini va nutqiy situatsiyaga adaptatsiyasini ta’minlashga xizmat qilgan.

Komissiv nutq aktlari asosan so‘zlovchining kelajakda biror ishni bajarish majburiyatini ya’ni va’da, qasamyod va tahdidni ifodalaydi. Va’da berishda samimiylikni aks uchun ingliz tilida odatda silliq, o‘rtacha muvozanatlashgan ohang tizimi qo‘llaniladi. Biroq, tahdid nutq aktida esa fonopragmatik manzara tubdan o‘zgaradi. Masalan: “If you do that again, you'll be sorry.” Bunday nutq aktida gapning birinchi qismida (shart qismida) keskin High Rise ya’ni yuqori ko‘tarilish, ikkinchi qismida esa chuqur low fall past pasayish holati kuzatiladi. Nutq tempi esa sekinlashadi, har bir so‘z ta’kidli urg‘u bilan aytiladi. Bu esa tinglovchida xavf hissini uyg‘otishga qaratilgan pragmatik strategiya hisoblanadi va uning anglashilishida fonologik jarayon ishtirok etadi.

Ekspressivlar so‘zlovchining ruhiy holatini ifodalashga ko‘proq e’tibor qaratadi. Bunda ko‘proq minnatdorchilik, uzr so‘rash, tabriklash, hamdardlik kabi hissiyotlar o‘z aksini topadi. Ushbu nutq aktlarida fonopragmatika asosiy yukni o‘z zimmasiga oladi, chunki mexanik tarzda aytilgan “I am sorry” gapi muvaffaqiyatsizlikka olib keladi. Ekspressiv nutq aktlaridan uzr so‘rash haqiqiy, samimiy uzr so‘rash aktida ingliz tilida fall-rise ohangi va past ovoz diapazoni foydalaniladi. Ohangning keng diapazonda o‘ynashi esa so‘zlovchining pushaymonligini ko‘rsatadi. Minnatdorchilik ekspressiv nutq aktiga kelsak, “Thank you” iborasi agar oddiy low fall bilan aytilsa, bu shunchaki rasmiyatchilik yoki loqaydlikni anglatadi. Agar u high fall yoki hearty rise bilan talaffuz etilsa, chin dildan minnatdorchilik nutq akti yuzaga keladi.

Ingliz tili diskursida ekspressiv nutq aktlarining reallashuvi ko‘pincha sifat birliklarning semantik salmog‘i va ularning prosodic xususiyatlari bilan uzviy bog‘liqdir. Leksik-semantik jihatdan ijobiy konnotatsiyaga ega bo‘lgan sifatlar odatda ko‘tariluvchi ya’ni rising, salbiy konnotatsiyali sifatlar esa pasayuvchi ya’ni falling intonatsion kontur orqali dominantlik kasb etadi. Biroq, emotsionallik darajasi yuqori bo‘lgan kontekstlarda prognoz qilinmagan ya’ni kutilmagan semantik yukni ifodalash uchun intonatsion amplituda keskin o‘zgarishi ham mumkin. Xususan, *“A woman gave Sara an official letter implying the animal could be suffering from a rare form of mouth disease, which was surprising because normally one would only expect to see a dog or a goat”* o‘tilgan nutqiy vaziyatda subyektning intonatsion drayvi *“which was surprising”* sintagmasida yaqqol namoyon bo‘ladi. Ushbu parentetik konstruksiya ya’ni kiritmaning baland ohang registry orqali akustik modifikatsiyaga uchrashi so‘zlovchining pragmatik munosabatini – hayrat va kognitiv dissonans hissini ekspressiv-kuchaytiruvchi funksiyada namoyon etadi.

Ingliz tilidagi nutqiy muloqot tizimida emotsional-sensor leksika ya’ni his-tuyg‘uni ifodalovchi so‘zlar semantikasi va ularning fonetik realizatsiyasi o‘rtasida to‘g‘ridan-to‘g‘ri prosodik korrelyatsiya kuzatiladi. Intonatsion konturning shakllanishi muayyan leksemaning denotativ va konnotativ ma’nosiga, ya’ni u ifodalayotgan emotsiya tipiga ya’ni stenik yoki astenik xarakteriga bog‘liq hisoblanadi. Xususan, gipostetik holatlar ya’ni depressiya, tushkunlik, g‘amginlik astenik his-tuyg‘ular silsilasiga kirib, nutqda ohang registrining pasayishi ya’ni low pitch hamda pasayuvchi ya’ni falling ton bilan xarakterlanadi. Buning aksi o‘laroq, giperstetik ya’ni hayajon, quvonch kabi emotsiyalar yuqori akustik amplituda bilan reallashadi.

Ushbu qonuniyat kontekstual tahlilda ham o‘z ifodasini topadi: *“A woman gave Sara an official letter implying the animal could be suffering from a rare form of mouth disease, which*

was surprising because normally one would only expect to see a dog or a goat. Sara was sentimental”. Mazkur diskursiv parchada qo‘llangan *“sentimental”* leksemasi subyektning kognitiv va psixologik holatini — kutilmagan xabardan ta’sirlanish, xavotir hamda ma’yuslik modalligini ochib berishga xizmat qilgan. Bu kabi astenik affektlar ta’sirida ushbu leksemaning pasayuvchi ohang dinamikasida (low-falling tone) talaffuz etilishi nutqning fonopragmatik jozibasini hamda so‘zlovchi ichki kechinmalarining ekspressiv interpretatsiyasini ta’minlashga xizmat qiladi.

Shuningdek, Ingliz tili diskursida so‘zlovchining sodir bo‘lgan voqea-hodisalarga nisbatan subyektiv-baho munosabatini ifodalashida sifat birliklardan oldin keluvchi daraja ko‘rsatkichlari – intensifikatorlarning prosodik jihatdan alohida bo‘yoqlanishi muhim pragmatik funksiyani bajaradi. Ushbu modifikatorlar muloqot jarayonida fonetik jihatdan yuqori ohang registri va mantiqiy urg‘u bilan ajratilib, axborotning ekspressiv semantikasini kuchaytirishga xizmat qiladi.

Mazkur qonuniyat quyidagi nutqiy parchada o‘z ifodasini topadi: *"Well, here is a story for you: Sara Pari was a veterinary nurse who had been working daily in an old zoo in a deserted district. [...] So she was very happy starting a new job in a private practice... "*. Ushbu kontekstda daraja bildiruvchi *“very”* so‘zi *“happy*” sifati oldidan kelib, lokutsiyaning umumiy fonetik konturida intonatsion cho‘qqini yuzaga keltirgan. Bu kabi prosodik urg‘u so‘zlovchining subyektiv daxldorligini bo‘rttirib ifodalash, tinglovchining diqqatini muayyan hissiy holatga yo‘naltirish hamda voqelikning pragmatik salmog‘ini oshirishga xizmat qilgan fonopragmatik marker hisoblanadi.

Ingliz tili spontan nutqida so‘zlovchining subyektiv-baholovchi va emotsional munosabatini ifodalashda sifat birliklar oldidan keluvchi *“so”, “too”, “very’* kabi advebial intensifikatorlar ya’ni daraja-miqdor ko‘rsatkichlari markaziy o‘rin tutadi. Ushbu leksik birliklar diskursiv zanjirda nafaqat semantik, balki keskin prosodik modifikatsiya vositasi sifatida ham namoyon bo‘ladi. Nutq traektoriyasida odatda bir tekis, neytral ohang fonida ushbu intensifikatorlar qo‘llanganda intonatsion amplitudaning to‘satdan yuqoriga sakrashi kabi holatlar ham kuzatiladi.

Mazkur prosodik fenomen quyidagi eksperimental namunada aniq aks etgan: *“People attempting to imitate middle-class English are so prone to making it... are too plummy and a bit nasal, which is more typical of an aristocratic accent”* Ushbu kontekstda *“so”* va *“too”* modifikatorlarining akustik jihatdan lokal ravishda kuchaytirilishi va baland ohang registri (high pitch) orqali alohida belgilanishi muloqotning ekspressiv funksiyasini faollashtiradi. Bu kabi dinamik ohang o‘zgarishi subyektning voqelikka nisbatan bo‘rttirilgan ya’ni giperbolik hissiy munosabatini ifodalab, tinglovchi idrokini yashirin illokativ maqsadga yo‘naltirishga xizmat qiluvchi invariant fonopragmatik marker bo‘lib xizmat qiladi.

Ingliz tili spontan nutqida toponimik atoqli otlar ya’ni joy nomlari lokutsiyaning sintaktik va semantik tuzilishida ko‘pincha rematik dominantlik kasb etadi. Bu turdagi leksik birliklar gapdagi boshqa komponentlarga nisbatan yuqori akustik intensivlik, keng ohang diapazoni va mantiqiy urg‘u bilan xarakterlanadi. Prosodik jihatdan bunday markerlash muloqot jarayonida axborot markazini ya’ni information fokusni shakllantirishga xizmat qiladi.

Ushbu fenomen quyidagi nutqiy parchada yaqqol kuzatilgan: *“My father, who was a diplomat, hailed from Cornwall, and my mother from Berkshire. Neither of them had regional dialects. I was dispatched to boarding school in Surrey, in Southeast England”*. Mazkur diskursiv kontekstda *“Cornwall”*, *“Berkshire”*, *“Surrey”* va *“England”* toponimlarining yuqori

ohang registri ya’ni high pitch orqali akustik modifikatsiyaga uchrashi tinglovchiga voqelik sodir bo‘lgan geografik makon haqidagi birlamchi va eng muhim lokal axborotni muvaffaqiyatli yetkazish maqsadini ko‘zlaydi. Bu kabi fonetik urg‘u lisoniy muloqotda kognitiv adresatni makon koordinatalariga yo‘naltiruvchi invariant fonopragmatik marker vazifasini bajargan.

So‘zlovchining biror fakt yoki holatga bo‘lgan ishonchini, xabardorligini tasdiqlash, inkor etish, ma’lumot berish kabilarni ifodalovchi nutq aktlari assertive nutq aktlari hisoblanadi. Ingliz tilida ma’lumotni neytral yetkazish uchun odatda tushuvchi ohang qo‘llaniladi. Biroq, agar so‘zlovchi o‘z fikrining mutloqligiga shubha qilsa yoki tinglovchining reaksiyasini tekshirmoqchi bo‘lsa, fonopragmatik jihatdan gap oxirida ohang yuqoriga qarab yo‘nalish holatlari ham kuzatiladi. Masalan:”The meeting starts at five.” Ushbu misolda neytral xabar – fall ya’ni tushuvchan ohangda qo‘llanilsa, “The meeting starts at five?” Shubha yoki tasdiqlashni talab qilish ma’nosida esa ko‘tarilish ohangida talaffuz qilinadi.

Ingliz tili og‘zaki diskursida voqea-hodisalar rivojini xronologik tartibda ifodalash va matndagi ko‘p xillikni ta’minlashda kirish birliklari, ya’ni diskursiv markerlar muhim kompozitsion vazifani bajaradi. Ushbu birliklarning fonetik realizatsiyasi ularning matndagi xronotopik funksiyasi bilan uzviy bog‘liq bo‘lib, lokal prosodik konturning shakllanishiga zamin yaratadi. Xususan, suhbatning boshlanishini ko‘rsatuvchi initsial markerlar ya’ni *“firstly”, “first of all”, “at the beginning”*kabi leksik birliklar tinglovchining diqqat-e’tiborini jalb qilish uchun yuqori akustik intensivlik va keskin ko‘tariluvchi ya’ni rising ohang toni bilan xarakterlanadi. Voqelikning keyingi bosqichini ko‘rsatuvchi kontinuativ markerlar ya’ni *“after that”, “then”, “next”* esa diskursiv davomiylikni ta’minlash maqsadida tematik pauzalar hamda vokal cho‘ziqlik asosida reallashadi.

Mazkur dinamik holat korpus tahlilida ham o‘z ifodasini topadi: *“First she tried gently stroking the goose's lower back with her palm, then singing a tune to her. Finally she administered either”.* Ushbu sintaktik butunlikda har bir diskursiv marker o‘z semantik-pragmatik yukiga muvofiq differensial ohang konfiguratsiyasiga ega: *“First”* boshlang‘ich konnektori progressiv ko‘tariluvchi ohang bilan vaziyat startini belgilasa; *“then”* tranzit elementi kontinuativ dinamikani aks ettirib, o‘rtacha ko‘tariluvchi ohang bilan talaffuz qilingan; *“finally’* yakunlovchi markeri esa narrativning tugallanganligini ko‘rsatish uchun aniq pasayuvchi intonatsion konturga ega. Bu kabi prosodik gradient matndagi xronologik ketma-ketlikni lingvistik sathdan fonopragmatik sathga olib chiqib, tinglovchi kognitiv tizimida voqelik skriptini tartibli shakllantirishga xizmat qiladi.

Ingliz tili diskursida tartib sonlar ya’ni ordinal numerals pragmatik va prosodik jihatdan alohida differensial xususiyatga ega bo‘lib, matn shakllanishida mantiqiy-semantik urg‘u ya’ni logical-semantic focus vazifasini bajaradi. So‘zlovchi nutqiy intentsiyani samarali yetkazish hamda voqea-hodisalar xronologiyasini qat’iy fiksatsiya qilish maqsadida *first, second, third* kabi leksemalarni fono-akustik jihatdan ustun ya’ni balandroq va qat’iy ohangda talaffuz etadi.

Masalan, *“Even though on her first morning she felt stressed, she ate a ball of porridge, checked herself in the mirror, washed up her face in a hurry”* gapida *first* tartib soni konseptual aktuallashuv markazida turganiga guvoh bo‘lishimiz mumkin. Ushbu mikromatnda mazkur son nafaqat xronologik tartibni ifodalagan, balki fonopragmatik va matn hosil qiluvchi (text-forming) funksiyani ham bajargan. Ya’ni, so‘zlovchi prosodik vositalar yordamida dinamik jarayonning aynan shu nuqtadan boshlanganini alohida ta’kidlagan holda tinglovchining diqqatini asosiy voqelik motiviga yo‘naltirgan.

Ingliz tili nutqiy diskursida xronologik tartibda ketma-ket sodir bo‘lgan voqea-hodisalarni bayon etishda prosodik vositalar, xususan, intonatsion bir xillik va unifikatsiyalashgan ohang dinamikasi muhim o‘rin tutadi. Vaqt mezoniga ko‘ra ketma-ketlikni ifodalovchi ushbu sintaktik birliklar nutqiy oqimda fono-akustik jihatdan teng muvozanatlashgan ton va barqaror registrlar orqali realizatsiya qilinadi.

Ushbu holatni *“Even though on her first morning she felt stressed, she ate a ball of porridge, checked herself in the mirror, washed up her face in a hurry”* mikromatni misolida kuzatishimiz mumkin. Berilgan ko‘p qismli qo‘shma gap tarkibidagi predikativ birliklar eksplitsit ya’ni ochiq tarzda kon’yunktiv vositalarsiz, faqatgina tekis va unifikatsiyalashgan intonatsiya yordamida o‘zaro birikkan. Gap qismlari orasidagi sintaktik va semantik aloqa teng miqdorda taqsimlangan pauzalar orqali neytrallashgan. Natijada, ushbu prosodik tuzilma voqealarning parallel hamda izchil davomiyligini ko‘rsatuvchi fonopragmatik ma’no va funksional relevantlikni kasb etgan.

Ingliz tili sintaktik tizimida qo‘shma gap tarkibiy qismlarining o‘zaro bog‘lovchilar yordamida birikishi sindetik va prosodik vositalarning sinergetik aloqadorligi asosida yuzaga keladi. Xususan, ergash gapli qo‘shma gaplar tarkibida keluvchi *when* leksemasining interrogativ ya’ni so‘roq funksiyasidan uzilib, subordinatsiya ya’ni tobe bog‘lanish munosabatini shakllantiruvchi bog‘lovchi vositaga transformatsiyalashuvi diskursiv jihatdan o‘ziga xos akustik xususiyatlarni namoyon etadi. Mazkur tarkibiy birlik sintaktik strukturaning inisial ya’ni boshlanish pozitsiyasida kelganda, u aksentual va intonatsion jihatdan alohida aktuallashadi.

Ushbu qonuniyatni *“When she got there, there was a woman with a goose waiting for her”* mikromatni misolida tahlil qilish mumkin. Gap boshida kelgan *when* subordinatori intonatsion konturning ko‘tariluvchi toni (rising tone) bilan modulyatsiyalansada, u nutqiy oqimda izolyatsiyalanmaydi, aksincha, sintagmatik jihatdan o‘zi mansub bo‘lgan predikativ qism bilan intensiv fono-akustik qo‘shilib talaffuz etilishni hosil qiladi. Natijada, ushbu prosodik intensivlik va intonatsion yaxlitlik matnda temporal ya’ni vaqt munosabatlarini kuchaytirishga, xabarning axborot sig‘imini oshirishga va spetsifik fonopragmatik ma’noning reallashuviga xizmat qiladi.

Ingliz tili diskursiv amaliyotida nisbiy ergash gaplar ya’ni relative clauses qo‘shimcha va periferik axborotni sintaktik struktura tarkibiga integratsiya qilishning muhim funksional-semantik vositasi hisoblanishi barchaga ma’lum. Matnga bunday ekspozitsion birliklarning kiritilishi esa nutq oqimining chiziqli dinamikasini modifikatsiyaga uchratib, intonatsion konturning vertikal yo‘nalishda keskin o‘zgarishiga, ya’ni ton registrining ko‘tarilishi yoki pasayishiga olib keluvchi jarayon hisoblanadi.

Ushbu prosodik qonuniyatni quyidagi mikromatn misolida ham tahlil qilish mumkin: *“I was born in 1942 in Salusbery of England which is south-west and I was there because my father was in the army during the war and the Salusbery is a plane where is all the military training went on and still does.”*. Mazkur sintaktik butunlikdagi *which* subordinatoridan oldin pre-pauza kuzatilib, nisbiy ergash gap tarkibida akustik tonning qisman ko‘tarilishi holati reallashadi.

Biroq nisbiy va atributiv konstruktsiyalarning barchasini ham nutq oqimida bir xil prosodik statusga ega deb bo‘lmaydi. Masalan, ushbu kontekstning davomida kelgan va *where* nisbiy olmoshi orqali bog‘langan atributiv qism dzyunktura qonuniyatiga ko‘ra hech qanday fiksatsiyalangan pauzalarsiz va qo‘shimcha modulyatsiyalarsiz, tekis fonetik rejimda ya’ni flat intonationda asosiy matn oqimiga sinkretik tarzda birikib ketgan. Bu holat ingliz tili sintaktik

birliklarida restriktiv ya’ni cheklovchi va norestriktiv ya’ni tavsiflovchi nisbiy ergash gaplarning differensial fonopragmatik xususiyatlarini belgilashda muhim metodologik ahamiyat kasb etadi.

Ingliz tili spontan nutqiy diskursida polipredikativ ya’ni ko‘p qismli sintaktik butunliklar tarkibidagi teng huquqli komponentlarning fono-akustik realizatsiyasi o‘ziga xos konstitutiv xususiyatlarga ega. So‘zlovchi tomonidan retrospektiv narrativ ya’ni o‘tmishdagi voqealar bayonining zanjirini shakllantirish jarayonida har bir predikativ blokning yakuniy qismi unifikatsiyalashgan terminal ton hamda segmentar darajadagi sintagmatik oxirgi urg‘u (phrasal/nuclear stress) bilan modulyatsiyalanadi. Mazkur akustik hodisa so‘zlovchining uzatilayotgan axborot bloklarini tugallangan va to‘liq semantik invariant sifatida tinglovchiga yetkazish borasidagi nutqiy intentsiyasini aks ettirib, pragmatik jihatdan kommunikativ makonni barqarorlashtirishga xizmat qiluvchi fonopragmatik ma’nonini yuzaga keltiradi.

Ushbu lingvistik qonuniyatni quyidagi diskursiv parcha misolida kuzatish mumkin: *“I was born in Hongkong, and I lived there for a year, so I don’t remember anything about it then I went to move Bahrain to Middle East for four years, Then I moved to Antigua in the west Indies for three years then I moved to St.Lucia, which is also in the west Indies, that was very short”*. Mazkur ko‘p qismli murakkab sintaktik konstruktsiyaning har bir komponenti, makon va vaqt koordinatalarining o‘zgarishiga qaramay, intonatsion konturning pasayuvchi yakuniy toni orqali realizatsiya qilingan. Gap tarkibidagi predikativ birliklarning har biri mustaqil kommunikativ va intonatsion yaxlitlik kasb etib, umumiy polipredikativ zanjirda axborotning interpretatsion izchilligini va semantik tugallanganligi haqidagi fonopragmatik ma’noni ta’minlamoqda.

Deklaratsiyalar ya’ni hukm chiqarish, urush e’lon qilish, nom berish kabilar institutlar va ijtimoiy qonunlar bilan bog‘liq bo‘lib, ular ko‘pincha rasmiy va qat’iy fonetik qoliplarga ega hisoblanadi. Bu yerda nutq tempi me’yorlashtirilgan bo‘ladi, ritm tekis, har bir bo‘g‘in aniq talaffuz qilinadi. Ohang asosan markazlashtirilgan Low Fall ko‘rinishida bo‘ladi, bu jarayon esa nutqqa institutsional salmoq va qonuniy kuch bag‘ishlaydi.

Nutq jarayonida leksik-sintaktik daraja bilan fonopragmatik daraja o‘rtasida nomuvofiqlik yuzaga kelish holatlari ham mavjud. Bu holat tilda piching, kesatiq (irony, sarcasm) va yashirin ma’nolarni yuzaga keltiruvchi asosiy omillardan biri hisoblanadi.

Ingliz tilida istehzo va piching bilan aytilgan nutq aktlarida quyidagi fonopragmatik markerlar kuzatilish holatlari mavjud, ya’ni nutq tempining keskin sekinlashishi va cho‘ziq unlilar; ovoz tembrining monotonlashishi; ohang kontrastlarining sun’iy ravishda oshirilishi.

Masalan, biron bir yomon bajarilgan ishga nisbatan aytilgan *“Great job!”* reprezentativ nutq akti, agar u cho‘ziq unlilar va tekis-past ohang bilan talaffuz qilinsa, uning illokutiv kuchi teskari tomonga o‘zgaradi va u tanqidiy ya’ni kesatiq nutq aktiga aylanadi. Bu holat fonopragmatika til tizimidagi pragmatik ma’noni aniqlashda yakuniy hakam ekanligini yana bir bor isbotlashiga guvoh bo‘lishimiz mumkin.

Ingliz tilida so‘zlashuvchilarning spontan nutqiy diskursida *and* subordinatorining (bog‘lovchisining) fono-akustik realizatsiyasi o‘ziga xos pragmatik va integrativ xususiyatlarni bayon etadi. Sintaktik sathda mazkur bog‘lovchi turli leksik birliklarni o‘zaro biriktirish vazifasini bajarsa-da, prosodik sathda ko‘p hollarda reduksiyaga ya’ni akustik kuchsizlanishga uchrab, nutqiy oqimda “akustik ko‘rinmaslik” ya’ni acoustic reduction yoki elision holatini yuzaga keltiradi. So‘zlovchi tomonidan *and* leksemasining to‘liq fono-akustik shaklini eksplitsit ya’ni ochiq talaffuz etmasdan, qo‘shni segmentlar bilan sinkretik tarzda ulab ketilishi diskursning chiziqli dinamikasini tezlashtirishga xizmat qiladi. Natijada, ushbu prosodik eliziyaning asosi bo‘lgan dzyunktura hodisasi axborot bloklarining uzluksiz va yaxlit

interpretativ zanjirini hosil qilib, voqea-hodisalar rivojining bir butunligini ta’kidlovchi o‘ziga xos fonopragmatik ma’noni reallashuvini ta’minlaydi.

Ushbu qonuniyatni quyidagi mikromatn misolida ham kuzatishimiz mumkin: *“And then at the age of eleven I moved to Northern Ireland and had lived there.”* Mazkur sintaktik butunlikda kontekstual bog‘liqlikni hosil qiluvchi *and* bog‘lovchisi fono-akustik jihatdan minimal darajada talaffuz qilinib, keyingi keluvchi temporal va predikativ elementlar tarkibiga fonetik dzyunktura ya’ni qo‘shilib ketish qonuniyatiga ko‘ra integratsiyalashgan. Bu esa so‘zlovchining nutqiy oqimdagi axborot intensivligini saqlash va xabarning dinamik mohiyatini tinglovchi idrokiga to‘g‘ridan-to‘g‘ri yo‘naltirish kabi fonopragmatik maqsadni aks ettiradi.

Avvalgi kontekstda ko‘rib chiqilgani kabi reduksiya holatining aksincha, ingliz tili spontan nutqiy diskursida *and* subordinatorining fono-akustik jihatdan alohida aktuallashuvi, ya’ni uning cho‘zib talaffuz qilinishga uchrashi va mustaqil intonatsion urg‘u olish holatlari ham kuzatiladi. Prosodik sathda mazkur bog‘lovchining kuchli pozitsiyada namoyon bo‘lishi hamda undan keyin keluvchi fiksatsiyalangan diskursiv pauza so‘zlovchining kognitiv-baho faoliyatini aks ettiradi. Bu holatda prosodik vositalar nutq oqimida xabarni eslash, axborotni kognitiv qayta ishlash yoki keyingi voqealar rivojini rejalashtirish jarayoni kechayotganini ko‘rsatuvchi o‘ziga xos fonopragmatik ma’noni shakllantiradi.

Ushbu lingvistik hodisani quyidagi mikromatn misolida tahlil qilish mumkin: *“And…. I teased a lot for because of my accent because I was Irish but I had this very posh accent, used to be much, much posher”*. Mazkur nutqiy parchaning boshlanish pozitsiyasida kelgan *and* bog‘lovchisi prolongetsiya qilinishi natijasida cho‘zilgan tempor-ritmik o‘lchov kasb etgan va undan so‘ng davomli nutqiy to‘xtam yuzaga kelgan. Ushbu prosodik model so‘zlovchining retrospektiv xotira jarayonini aktuallashtirib, tinglovchining diqqatini keyingi keluvchi hissiy-emosional va avtobiografik axborot blokiga ya’ni ijtimoiy status va aksent muammosiga tayyorlash borasidagi ekspressiv-fonopragmatik ma’nosini reallashishiga xizmat qiladi.

Ingliz tili nutqiy diskursida adversativ ya’ni zidlov munosabatini shakllantiruvchi kon’yunktiv vositalar (*but, however, although, though, even though*) matnning fonopragmatik arxitektonikasini belgilashda muhim modulyativ funksiyani bajaradi. Mazkur bog‘lovchilar orqali birikkan polipredikativ strukturalar semantik-pragmatik sathda kontrastlik ya’ni ijobiy-salbiy yoki aksincha qonuniyatiga asoslansa, prosodik sathda o‘ziga xos antonimik intonatsion modellar vositasida reallashadi.

Ushbu qonuniyatni quyidagi diskursiv parcha misolida kuzatish mumkin: *“Even though it was her first morning, she ate a ball of porridge, checked herself in the mirror, washed her face in the mirror and she put on a yellow dress and fleece jacket, picked up her kit and headed for work. But she got there, there was a woman with a goose waiting for her* [27]*”*.Mazkur mikromatnda *even though* subordinatorining boshlang‘ich predikativ qismida intonatsion konturning ko‘tariluvchi toni faollashgan bo‘lib, ushbu fono-akustik intensivlik sintaktik to‘xtamga ya’ni vergulgacha bo‘lgan chegaraga qadar davom etadi. Gapning davomiy qismida esa ton registrining keskin pasayishi va intonatsion neytrallashuv kuzatiladi. Xuddi shunday prosodik transformatsiya *but* adversative bog‘lovchisi bilan bog‘langan segmentda ham reallashadi: bog‘lovchi ishtirok etgan boshlang‘ich sintagma yuqori registrda aktuallashib, yakuniy predikativ blokda pasayuvchi terminal ton orqali yakunlanadi. Ushbu bipolyar ohang modulyatsiyasi so‘zlovchining nutqiy voqelikka nisbatan sub’ektiv-baho munosabatini hamda

[27] https://www.dialectsarchive.com/england-63

implitsit ya’ni yashirin pragmatik intentsiyasini aks ettiruvchi fonopragmatik vosita sifatida xizmat qiladi.

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OLIY TA’LIMDA INSON VA SUN’IY INTELLEKT HAMKORLIGI ASOSIDA MUSTAQIL TA’LIMNI TASHKIL ETISH

Sattorov Abdumalik Abduraxmon o‘g‘li
O‘zbekiston Respublikasi Markaziy banki
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Annotatsiya. *Maqolada oliy ta’limda generativ sun’iy intellektdan foydalanishda talabalarning mustaqil fikrlash va egallagan bilimlarini amalda qo‘llash qobiliyatini saqlab qolish masalasi tahlil etiladi. Tadqiqotning maqsadi o‘qituvchi, talaba va sun’iy intellektning ta’lim jarayonidagi vazifalarini aniq belgilaydigan hamda talabaning o‘zlashtirish darajasini baholashga xizmat qiladigan pedagogik modelni taklif etishdan iborat. Mavzuga oid tanlangan ilmiy manbalar va xalqaro tavsiyalarni qiyosiy o‘rganish asosida besh bosqichli model ishlab chiqildi. U topshiriqni dastlab mustaqil bajarishga urinish, yo‘naltiruvchi savollar asosida sun’iy intellekt bilan muloqot qilish, olingan javoblarni tekshirish, bilimni yangi topshiriqda qo‘llash va o‘z faoliyatini tahlil qilishni qamrab oladi. Modelni amaliyotga tatbiq etish uchun topshiriq namunasi va baholash mezonlari tavsiya etiladi. Tahlil natijasida sun’iy intellekt yordamida bajarilgan ishning sifatini talabaning mustaqil ravishda namoyish etgan bilimi bilan birgalikda baholash zarurligi haqida xulosa chiqariladi. Model nazariy asosda ishlab chiqilgan bo‘lib, uning samaradorligini keyingi tadqiqotlarda tajriba-sinov orqali tekshirish lozim.*

Kalit so‘zlar: *oliy ta’lim, generativ sun’iy intellekt, inson va sun’iy intellekt hamkorligi, mustaqil ta’lim, akademik halollik, tanqidiy fikrlash, o‘zlashtirishni baholash.*

Abstract. *This article examines how students' ability to think independently and apply acquired knowledge can be preserved when generative artificial intelligence is used in higher education. The study aims to propose a pedagogical model that clearly defines the roles of teachers, students, and artificial intelligence in the learning process and supports the assessment of student learning. A five-stage model was developed through a comparative analysis of selected scholarly sources and international recommendations. It comprises an initial independent attempt at a task, interaction with artificial intelligence through guiding questions, verification of the responses received, application of knowledge to a new task, and reflection on one's learning activities. A sample task and assessment criteria are proposed to support practical implementation of the model. The analysis concludes that the quality of work completed with artificial intelligence assistance should be assessed alongside the knowledge students demonstrate independently. The model is theoretical, and its effectiveness requires empirical testing in future studies.*

Keywords: *higher education, generative artificial intelligence, human-AI collaboration, independent learning, academic integrity, critical thinking, assessment of learning.*

Kirish

Oliy ta’limda mustaqil topshiriqning pedagogik qiymati talabaning muammoni anglash, yechim tanlash va o‘z qarorini asoslash jarayonida namoyon bo‘ladi. Generativ sun’iy intellekt matn, tushuntirish va dasturiy kod yaratishga yordam berganida, topshirilgan mahsulot sifati bilan uni tayyorlagan talabaning bilimi o‘rtasidagi bog‘liqlikni alohida tekshirish zarurati

tug‘iladi. Shu sababli ushbu maqolada inson va sun’iy intellekt hamkorligi mustaqil ta’limni tashkil etish hamda o‘zlashtirishni baholash muammosi doirasida ko‘rib chiqiladi.

YUNESKOning ta’lim va tadqiqotlarda generativ sun’iy intellekt bo‘yicha tavsiyalari insonning faol subyekt sifatidagi o‘rnini, ta’lim vositalarining pedagogik muvofiqligini va ma’lumotlar himoyasini ustuvor masalalar sifatida belgilaydi [1]. Bu yondashuvdan kelib chiqib, universitetdagi sun’iy intellekt amaliyotini topshiriqning o‘quv maqsadiga bog‘lash taklif etiladi. Talaba qaysi fikrni mustaqil ishlab chiqqani, qanday yordam olgani va yakuniy xulosani nima asosida qabul qilganini tushuntira olishi hamkorlikning tekshiriladigan belgisi bo‘lishi mumkin.

Maqolaning tadqiqot savoli quyidagicha: sun’iy intellekt bilan ishlash jarayoni qanday tashkil etilganda talabaning mustaqil o‘zlashtirishi kuzatiladigan dalillar orqali baholanadi? Maqsad ushbu savolga javob beradigan pedagogik model va amaliy baholash mezonlarini taklif etishdan iborat. Ishning amaliy hissasi hamkorlik bosqichlarini o‘qituvchi kuzata oladigan natijalar bilan bog‘lashda ifodalanadi. Model bakalavriatdagi mustaqil topshiriqlarga mo‘ljallangan; uning fanlarga tatbiqi tegishli o‘quv natijalariga qarab moslashtiriladi.

Tadqiqot metodologiyasi

Tadqiqot nazariy-tahliliy yondashuv asosida bajarildi. Tahlil uchun 2002–2025-yillarda chop etilgan o‘n bitta manba maqsadli tanlandi. Ular YUNESKOning to‘rtta tavsiya va metodik hujjati [1; 2; 7; 8], Avstraliya oliy ta’lim sifati va standartlari agentligi tomonidan e’lon qilingan ikkita tavsiyalar to‘plami [5; 6], ta’limdagi sun’iy intellekt yordamiga oid ikkita tajriba-sinov maqolasi [3; 4] hamda mustaqil o‘rganish, baholash va til modellariga bag‘ishlangan uchta nazariy-tahliliy maqoladan [9–11] iborat. Tanlash mezonlari manbaning tadqiqot maqsadiga aloqadorligi, asl nashr yoki rasmiy tashkilot tomonidan e’lon qilingani hamda tekshiriladigan bibliografik ma’lumotlarga egaligidan iborat bo‘ldi. Mazkur tanlov mavzuga oid barcha tadqiqotlarni qamrab oladigan tizimli sharh hisoblanmaydi.

Manbalar sun’iy intellekt yordamining vazifasi, o‘quvchi yoki talabaning mustaqilligi, o‘qituvchi mas’uliyati va baholash dalillari bo‘yicha qiyoslandi. Metodik tavsiyalar tajriba-sinov natijalaridan alohida talqin qilindi. Maktab ta’limiga oid natija va tavsiyalar oliy ta’limga bevosita tatbiq etilmadi. Tahlildan pedagogik talablar ajratilib, ular asosida hamkorlik bosqichlari va baholash jadvali shakllantirildi. Ushbu ish doirasida so‘rovnoma, kuzatuv yoki tajriba o‘tkazilmadi; quyidagi model va topshiriq namunasi metodik takliflar hisoblanadi.

Ilmiy manbalar tahlili

Kasneci va hammualliflar katta til modellarining ta’limdagi imkoniyatlarini o‘quv materiallarini yaratish, muloqotni qo‘llab-quvvatlash va ta’limni o‘rganuvchining ehtiyojiga moslashtirish bilan bog‘laydi. Shu bilan birga, ular bunday vositalarning cheklovlarini tushunish, ma’lumotlarni tekshirish va inson nazoratini saqlash zarurligini ta’kidlaydi [9]. Ushbu nazariy tahlil mazkur maqolada sun’iy intellekt bilan ishlashni tanqidiy fikrlash va manbalarni tekshirish bilan birga tashkil etish uchun asos sifatida qo‘llanadi.

Kestin va hammualliflar universitet talabalarini tasodifiy guruhlarga ajratib o‘tkazgan nazoratli tadqiqotda maxsus ishlab chiqilgan sun’iy intellekt o‘quv yordamchisi bilan o‘rganishni auditoriyadagi faol ta’lim mashg‘uloti bilan taqqoslagan. Mualliflar sun’iy intellekt o‘quv yordamchisi bilan ishlagan sharoitda o‘zlashtirish natijalari yuqoriroq, sarflangan vaqt esa kamroq bo‘lganini qayd etgan [3]. Mazkur dalil pedagogik tamoyillar asosida ishlab chiqilgan muayyan vositaga tegishli. Undan barcha sun’iy intellekt vositalari, fanlar yoki talabalar guruhlarida bir xil samara olinadi degan xulosa chiqarib bo‘lmaydi.

Bastani va hammualliflarning o‘rta maktab matematikasi bo‘yicha amaliy tajribasida umumiy yordam beruvchi sun’iy intellekt vositasi bilan mashq bajarishdagi natija yaxshilangan, biroq sun’iy intellekt yordamisiz o‘tkazilgan keyingi baholashda o‘zlashtirishga salbiy ta’sir kuzatilgan. Mustaqil o‘rganishni qo‘llab-quvvatlovchi ko‘rsatmalar asosida tuzilgan sun’iy intellekt o‘quv yordamchisi bu salbiy ta’sirni sezilarli darajada yumshatgan [4]. Mazkur natija oliy ta’lim uchun to‘g‘ridan-to‘g‘ri samaradorlik bahosi bo‘la olmaydi. U yordam bilan bajarilgan ish va keyingi mustaqil topshiriq natijalarini alohida tekshirish zarurligini ko‘rsatadi.

O‘qituvchi tayyorgarligi masalasida YUNESKOning 2024-yilgi kompetensiyalar tizimi besh yo‘nalishdagi 15 kompetensiyani belgilaydi. Ular inson manfaatlarini ustuvor qo‘yish, sun’iy intellekt etikasi, sun’iy intellekt asoslari va qo‘llanilishi, SIdan ta’limda hamda kasbiy rivojlanishda foydalanishni qamrab oladi [2]. Mazkur yo‘nalishlar ushbu maqolada taklif etiladigan model uchun o‘qituvchini tayyorlash mazmunini belgilashga xizmat qiladi. Universitet sharoitiga moslashtirishda fan mazmunining to‘g‘riligini tekshirish va baholash topshiriqlarini ishlab chiqish ko‘nikmalariga alohida e’tibor berish tavsiya etiladi.

Talabaning tayyorgarligi ham alohida e’tiborni talab qiladi. YUNESKOning o‘quvchilar uchun ishlab chiqilgan kompetensiyalar tizimida inson manfaatlari, sun’iy intellekt etikasi, texnologiyani tushunish va undan foydalanish masalalari o‘zaro bog‘liq holda yoritiladi [8]. Hujjat maktab ta’limiga mo‘ljallangan bo‘lsa-da, undagi yo‘nalishlardan universitet talabalarining boshlang‘ich tayyorgarligini belgilashda foydalanish mumkin. Ushbu maqolada talabaning sun’iy intellekt imkoniyati va cheklovlarini tushunishi, javobni tekshirishi hamda yordamdan foydalanishini ochiq ko‘rsatishi zarur tayyorgarlik sifatida taklif etiladi.

Lodge va hammualliflarning 2023-yilgi tavsiyalarida talaba bilimini ishonchli baholash uchun turli shakldagi dalillarni birlashtirish, o‘rganish jarayonini hisobga olish va mas’uliyatli sun’iy intellekt amaliyotini o‘quv maqsadlariga bog‘lash taklif etiladi [5]. 2025-yilgi davomiy hujjat esa baholashni butun ta’lim dasturi, alohida fan yoki ushbu ikki daraja uyg‘unligida qayta tashkil etish yo‘llarini muhokama qiladi [6]. Ushbu ishda mazkur tavsiyalar alohida mustaqil topshiriq darajasida talqin qilinadi; ularni O‘zbekiston uchun majburiy me’yor sifatida qabul qilish nazarda tutilmaydi.

Mustaqil o‘rganishning nazariy asosini yoritishda Zimmerman ta’lim oluvchining o‘z faoliyatini boshqarishini oldindan rejalashtirish, bajarish jarayonini nazorat qilish va natijani tahlil etish bilan bog‘laydi [10]. Nicol va Macfarlane-Dick esa o‘qish jarayonidagi baholash hamda berilgan izohlar talabaning o‘z o‘rganishiga faol munosabatini qo‘llab-quvvatlashi mumkinligini ko‘rsatadi [11]. Ushbu yondashuvlardan kelib chiqib, taklif etilayotgan modelda dastlabki urinish, olingan izohni baholash va keyingi mustaqil vazifa bir-biriga bog‘lanadi. Bu bog‘lanish mazkur maqolaning metodik talqini bo‘lib, uning samarasi alohida tekshirilishi lozim.

Manbalarni qiyoslashdan chiqarilgan talqin shundan iboratki, hamkorlik modeli yordamning qaysi bosqichda berilishini va undan keyin qanday mustaqil faoliyat talab etilishini birgalikda belgilashi kerak. Tadqiqotlar turli ta’lim bosqichlari va vositalarni qamrab olgani sababli ularning natijalari umumiy samaradorlik ko‘rsatkichiga birlashtirilmadi. Keyingi bo‘limda mazkur talqin topshiriqni tashkil etishning amaliy ketma-ketligiga aylantiriladi.

Taklif etilayotgan pedagogik model

Modelda o‘qituvchi o‘quv maqsadi, yordam chegarasi va baholash mezonlarini belgilaydi. Talaba dastlabki yechimni yaratadi, olingan yordamni tekshiradi va yakuniy qarorini asoslaydi. Sun’iy intellekt vositasiga savol berish, misol taklif etish yoki dastlabki fikr yuzasidan

izoh yaratish vazifasi yuklanadi. Fan mazmunining to‘g‘riligi va baholash bo‘yicha yakuniy qaror o‘qituvchida qoladi. Hamkorlik besh bosqichda tashkil etilishi tavsiya etiladi.

Birinchi bosqichda talaba topshiriqni sun’iy intellekt yordamisiz bajarishga urinadi. Dastlabki javob, yechim rejasi yoki tushunilmagan savol yozib olinadi. O‘qituvchi mazkur materialdan boshlang‘ich tushuncha va qiyinchiliklarni aniqlash uchun foydalanadi. Bosqichning davomiyligi topshiriq murakkabligiga mos belgilanadi. Kuzatiladigan natija talabaning yordam olishdan oldingi fikri bo‘lib, keyingi o‘zgarishlar aynan shu dalil bilan taqqoslanadi.

Ikkinchi bosqichda talaba sun’iy intellekt bilan o‘qituvchi belgilagan chegaralar doirasida muloqot qiladi. Tavsiya etiladigan so‘rov shakli tayyor javobdan oldin tushuntiruvchi savol, ishora yoki muqobil yo‘lni so‘rashga asoslanadi. Masalan, talaba o‘z yechimidagi zaif joyni ko‘rsatishni va keyingi qadamni mustaqil tanlash uchun savol berishni so‘rashi mumkin. Bunday ko‘rsatmaning o‘zi vosita xatosiz ishlashini kafolatlamaydi; o‘qituvchi topshiriqni oldindan sinab ko‘rishi va zarur holatda aralashishi lozim.

Uchinchi bosqichda sun’iy intellekt bergan izoh tekshiriladi. Keltirilgan ma’lumot darslik, ilmiy maqola yoki tegishli asl manba bilan solishtiriladi; hisob yoki dasturiy kod esa qayta hisoblash va sinov orqali tekshiriladi. Talaba qabul qilgan hamda rad etgan tavsiyalarining sababini qayd etadi. sun’iy intellekt ko‘rsatgan manbaning mavjudligi va uning mazmuni javobdagi fikrni tasdiqlashi alohida tekshiriladi. Bu bosqich natijasi tuzatilgan yechim va tuzatish asoslarining qisqa yozuvidan iborat bo‘ladi.

To‘rtinchi bosqichda talaba shu o‘quv natijasini tekshiradigan yangi topshiriqni sun’iy intellekt yordamisiz bajaradi. Yangi vazifa avvalgisining faqat sonlari o‘zgartirilgan nusxasi bo‘lib qolmasligi, tushunchani boshqa sharoitga tatbiq etishni talab qilishi kerak. O‘qituvchi yozma ish, amaliy namoyish yoki qisqa og‘zaki izoh orqali mustaqil o‘zlashtirish dalilini yig‘adi. Vazifa murakkabligi va ajratilgan vaqt barcha talabalar uchun taqqoslanadigan tarzda belgilanadi.

Beshinchi bosqichda talaba dastlabki javobi bilan yakuniy tushunchasini solishtiradi. Qaysi xato tuzatilgani, qaysi sun’iy intellekt tavsiyasi foydali bo‘lgani va qanday savol ochiq qolgani izohlanadi. O‘qituvchi talabaning ushbu tahlilini mustaqil topshiriq natijasi bilan birga ko‘rib, keyingi mashqni belgilaydi. Agar talaba yordam bilan to‘g‘ri javob olgan bo‘lsa-yu, yangi vazifada tushunchani qo‘llay olmasa, shu tushuncha bo‘yicha qo‘shimcha mashq rejalashtiriladi.

Modelni qo‘llash namunasi

Modelni tushuntirish uchun dasturlash fanidagi ro‘yxat elementlarini qayta ishlash topshirig‘i taklif etiladi. O‘quv natijasi talabaning algoritm mantiqini izohlashi va chegara holatlarini aniqlashidir. Dastlab talaba kirish ma’lumotlarini tekshirish hamda natijani hisoblash algoritmini yozadi. Keyin SIdan tayyor kod o‘rniga mavjud algoritmdagi ehtimoliy xatolarni savollar orqali aniqlashga yordam berishni so‘raydi. Ushbu topshiriq namunasi amalda o‘tkazilgan tajriba tavsifi emas.

Tekshirish bosqichida talaba oddiy ro‘yxat, bitta elementli ro‘yxat va bo‘sh ro‘yxat uchun kutiladigan natijani oldindan belgilaydi. So‘ng yechimni sinaydi va sun’iy intellekt izohlarini dasturlash tili hujjatlari bilan tekshiradi. O‘qituvchi yakuniy kod bilan birga tanlangan sinovlar sababini ham so‘raydi. Mustaqil bosqich uchun kiritish sharti o‘zgartirilgan yangi masala berilib, talabaning avvalgi algoritmni qanday moslashtirishi kuzatiladi. Baholashda faqat kodning ishlashi bilan cheklanilmaydi.

Xuddi shu ketma-ketlikni boshqa fanlarga moslashtirish mumkin. Masalan, pedagogika fanida talaba avval dars topshirig‘ini tuzadi, sun’iy intellekt taklif qilgan muqobil variantlarni o‘quv maqsadlari bilan solishtiradi va keyin boshqa auditoriya uchun yangi topshiriqni mustaqil ishlab chiqadi. Har ikki holatda ham o‘qituvchi tekshiriladigan kompetensiyani oldindan belgilashi lozim. Fanlar o‘rtasida umumiy qoladigan jihat yordamdan oldingi urinish va yordamdan keyingi mustaqil dalilning mavjudligidir.

Baholash mezonlari

Baholash uchun 1-jadvaldagi 100 ballik mezonlar tizimi taklif etiladi. Ballar taqsimoti tajriba-sinov asosida tasdiqlanmagan; u modelni sinash uchun boshlang‘ich metodik yechimdir. Mustaqil izohlash va yangi vazifani bajarishga jami 55 ball ajratilishi talabaning shaxsiy bilimiga ustuvor ahamiyat beradi. Fan o‘qituvchilari ushbu mezonlarni qo‘llashdan oldin yuqori, o‘rta va quyi darajadagi ish namunalarini birgalikda muhokama qilib, baholash talablari bo‘yicha kelishib olishi kerak.

1-jadval. Mustaqil ta’lim topshirig‘ini baholash mezonlari

Mezon	Ball	Kuzatiladigan dalil
Tushunchani mustaqil izohlash	25	Asosiy tushunchani to‘g‘ri sharhlash va qarorini asoslash
Manba va natijani tekshirish	20	Da’voni asl manba, hisob yoki sinov bilan tekshirish
Sun’iy intellekt yordamiga tanqidiy munosabat	15	Tavsiyani qabul qilish yoki rad etish sababini ko‘rsatish
Yangi vazifani mustaqil bajarish	30	O‘rganilgan usulni sun’iy intellekt yordamisiz yangi sharoitda qo‘llash
Jarayon qaydi va o‘z faoliyatini tahlil qilish	10	Dastlabki fikr, o‘zgarish va yordam hissasini tushuntirish

Jami: 100 ball. Jadval maqolada taklif etilgan metodik mezonlar asosida tuzildi.

Baholashning aniqligi uchun bir nechta ish ikki o‘qituvchi tomonidan mustaqil ko‘rib chiqilishi va tafovutlar muhokama qilinishi tavsiya etiladi. Mustaqil bajarish ballari umumiy balldan tashqari alohida ham qayd etiladi. Natijada puxta rasmiylashtirilgan, biroq talaba izohlay olmaydigan ish bilan mazmunan o‘zlashtirilgan ish o‘rtasidagi farq ko‘rinadi. Sun’iy intellekt xizmatidan foydalanishning o‘zi yuqori yoki past baho qo‘yish uchun asos qilib olinmaydi.

Joriy etishning pedagogik shartlari

Kurs boshlanishida sun’iy intellekt yordamiga ruxsat beriladigan vazifalar va mustaqil bajariladigan baholash qismlari yozma tarzda tushuntirilishi tavsiya etiladi. Talaba topshiriqqa vosita nomi, foydalanilgan sana, yordamning maqsadi va natijaga kiritilgan o‘zgarishlar haqidagi qisqa qaydni ilova qilishi mumkin. Ushbu qayd baholash dalillarini to‘ldiradi. O‘qituvchi bahoni belgilashda talabaning tushuntirishi, amaliy ishi va yangi vazifadagi natijasiga tayanadi.

YUNESKO tavsiyalarida shaxsiy ma’lumotlarni himoya qilish, adolat va teng imkoniyatlarni ta’minlashga e’tibor qaratiladi [1; 7]. Ushbu tamoyillar taklif etilayotgan modelda ikki amaliy talab orqali ifodalanadi. Birinchidan, tashqi sun’iy intellekt xizmatiga yuboriladigan topshiriqlarda shaxsni aniqlashga imkon beradigan yoki yopiq tadqiqot ma’lumotlari ishlatilmasligi lozim. Ikkinchidan, baholanadigan faoliyat uchun vositadan foydalanish imkoniyati ta’minlanadi yoki ayni o‘quv natijasini namoyish etishga teng sharoit beradigan muqobil usul belgilanadi. Talabaning texnik imkoniyati uning bilimiga qo‘yiladigan bahoni belgilab bermasligi zarur.

O‘qituvchi uchun tayyorgarlik mashg‘ulotini o‘z fanidagi bitta topshiriq asosida tashkil etish taklif qilinadi. Unda sun’iy intellekt javobini tekshirish, yordam chegarasini belgilash va mustaqil baholash vazifasini ishlab chiqish birgalikda mashq qilinadi. O‘zbek tilidagi javoblarda atamalar o‘quv dasturi va tavsiya etilgan adabiyotlar bilan solishtiriladi. Bu mahalliy sun’iy intellekt vositalarining sifati haqida oldindan chiqarilgan hukm emas, kurs mazmuni bilan muvofiqlikni tekshirish tartibidir.

Model o‘qituvchi ish hajmini ham hisobga olishi kerak. Har bir muloqotning to‘liq nusxasini o‘qish o‘rniga, topshiriqqa tegishli qisqa dalillar to‘plamini belgilash taklif etiladi: dastlabki urinish, bitta muhim tuzatishning asosi va mustaqil bajarilgan yakuniy vazifa. Og‘zaki izoh talab etilsa, uning muddati va savollar mezoni oldindan kelishiladi. Maxsus ta’lim ehtiyojlari mavjud talabalar uchun shu kompetensiyani namoyish etadigan mos baholash shakli tanlanadi.

Muhokama va tadqiqot cheklovlari

Taklif etilgan modelning asosiy jihati sun’iy intellekt bilan hamkorlikni o‘qituvchi kuzata oladigan o‘quv faoliyatlari ketma-ketligi sifatida tashkil etishdir. Bunda yordamdan foydalanish sifati va mustaqil o‘zlashtirish haqida alohida dalil yig‘iladi. Talabaning o‘z faoliyati haqidagi tahlili uning fikrlash jarayonini tushunishga yordam berishi mumkin, biroq bu yozuvning o‘zi bilimni tasdiqlash uchun yetarli deb olinmaydi. U yangi topshiriqda ko‘rsatilgan natija bilan solishtiriladi.

Ishning asosiy cheklovi model mahalliy universitet sharoitida sinovdan o‘tkazilmaganidir. O‘n bitta manbaning maqsadli tanlanishi barcha tadqiqotlarni qamrab olishni ta’minlamaydi. Manbalar turli ta’lim bosqichlariga tegishli, foydalanilgan sun’iy intellekt vositalari va baholash shakllari ham farqlanadi. Shu bois maqolada model baholarni muayyan foizga oshirishi yoki barcha fanlar uchun bir xil samara berishi haqida xulosa chiqarilmaydi.

Keyingi tajriba-sinov ishlarida boshlang‘ich tayyorgarligi qayd etilgan taqqoslanadigan guruhlar, bir xil o‘quv maqsadlari va teng mashq vaqti bilan ishlash taklif etiladi. Imkon bo‘lsa, guruhlarga taqsimlash tasodifiy amalga oshiriladi. Natijalar sun’iy intellekt yordamisiz bajariladigan yakuniy va kechiktirilgan topshiriqlar orqali o‘lchanadi; ishlarni baholovchi shaxs guruhni bilmasligi maqsadga muvofiq. Bilim natijasi bilan birga o‘qituvchi sarflagan vaqt, vositaga kirish imkoniyati va talabalar qiyinchiliklari ham tahlil qilinishi kerak.

Xulosa

Oliy ta’limda inson va sun’iy intellekt hamkorligini mustaqil ta’lim maqsadlariga bog‘lash uchun yordamning chegarasi, inson mas’uliyati va bilimni namoyish etish usuli oldindan belgilanishi zarur. Ushbu maqolada taklif etilgan model mustaqil urinish, sun’iy intellekt bilan yo‘naltirilgan muloqot, javobni tekshirish, bilimni yangi vazifada qo‘llash va o‘z faoliyatini tahlil qilish bosqichlarini qamrab oladi. Har bir bosqich o‘qituvchi ko‘ra oladigan dalil bilan yakunlanadi.

Amaliy jihatdan kursdagi bitta mustaqil topshiriqni ushbu ketma-ketlik asosida qayta loyihalash, baholash mezonlarini talabalarga oldindan taqdim etish va mustaqil bajarish natijasini alohida qayd etish tavsiya qilinadi. Modelning samaradorligi tajriba-sinov orqali aniqlanishi kerak. Shunday tekshiruvdan olingan natijalar uni qaysi fanlarda, qanday yordam chegaralari va qanday ish yuklamasi bilan qo‘llash mumkinligini asoslashga xizmat qiladi.

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XALQARO TEXNIK STANDARTLAR TILIDA MODAL FE'LLARNING QO‘LLANISH XUSUSIYATLARI VA ULARNI O‘ZLASHTIRISHDAGI TIPOLOGIK QIYINCHILIKLAR

Sultonova Marvarid Abdulvohid qizi
O‘zbekistov davlat jahon tillari universiteti tayanch doktoranti (PhD)
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Annotatsiya. *Tezisda xalqaro texnik standartlar matnida modal fe’llarning qo‘llanish qonuniyatlari tahlil qilinadi. ISO/IEC Direktivalari va RFC 2119 hujjatlari materialida “shall”, “should”, “may” va “can’ fe’llarining huquqiy-semantik farqlari ko‘rsatiladi. Ingliz va o‘zbek tillarida modallik ifodalanishining tipologik tafovuti hamda undan kelib chiqadigan interferensiya hodisalari o‘rganiladi. Muallif tomonidan modal fe’llarni kasbiy kommunikativ funksiyalar bo‘yicha tizimlashtirish sxemasi taklif etiladi.*

Kalit so‘zlar: *modal fe’llar, texnik standartlar, deontik modallik, epistemik modallik, xedjing, til interferensiyasi, maxsus maqsadlar uchun ingliz tili, grammatik kompetensiya.*

Abstract. *The abstract analyzes the usage patterns of modal verbs in the text of international technical standards. Based on ISO/IEC Directives and RFC 2119 documents, legal-semantic differences between the verbs “shall”, “should”, “may”, and “can” are demonstrated. The typological differences in expressing modality in English and Uzbek, along with the resulting language interference phenomena, are examined. The author proposes a framework for systematizing modal verbs according to professional communicative functions.*

Keywords: *modal verbs, technical standards, deontic modality, epistemic modality, hedging, language interference, English for Specific Purposes (ESP), grammatical competence.*

Texnik hujjat tarjimasi bilan shug‘ullangan har bir kishi bir savolga duch kelgan bo‘lsa kerak: “shall” va “should” so‘zlarini o‘zbek tiliga qanday farqlab o‘girish kerak? Ikkalasi ham “kerak” deb tarjima qilinaveradi, lekin bu ikki so‘z hujjatning huquqiy mazmunini butunlay o‘zgartiradi. Biri bajarilishi shart bo‘lgan talabni, ikkinchisi esa faqat tavsiyani bildiradi. Quyida ana shu farqning lingvistik tabiati, uning standartlar tilidagi maqomi va o‘zbek auditoriyasi tomonidan o‘zlashtirilishidagi to‘siqlar haqida so‘z boradi.

Modal fe’llarning standartlar tilidagi maqomi

Xalqaro standartlashtirish tashkilotlari fe’l shakllarini ochiq qoldirmagan. ISO va IEC Direktivalarining 2-qismida bandlarni ifodalash uchun qaysi shakl ishlatilishi alohida jadvallarda qat’iy belgilangan, “shall” majburiy talabni (requirement), “should” tavsiyani (recommendation), “may” ruxsatni (permission), “can” esa imkoniyat va qobiliyatni (possibility and capability) bildiradi[28]. Bu uslubiy maslahat emas. Standart matnini tayyorlayotgan mutaxassis uchun bu majburiy qoida. Hujjatda ekvivalent variantlar ham berilgan - masalan, “shall” o‘rniga “is to”, “is required to” yoki “it is necessary” konstruksiyalarini qo‘llash mumkin.

Bu yerda bir nozik jihat bor. Direktivalar (Bu ISO va IEC tashkilotlarining “ichki konstitutsiyasi” yoki standartlarni yaratish va rasmiylashtirish qoidalar toplamidir) ayrim shakllarni standart matnida ishlatishni to‘g‘ridan-to‘g‘ri cheklaydi. Xususan, “must” fe’li tavsiya

[28] ISO/IEC Directives, Part 2: Principles and Rules for the Structure and Drafting of ISO and IEC Documents. 9th ed. – Geneva: ISO/IEC, 2021. – Clause 7, Tables 3–6.

etilmaydi, chunki u standartning o‘z talabini emas, qonunchilikdan kelib chiqadigan tashqi majburiyatni ifodalaydi. O‘quv jarayonida bunday nozikliklar deyarli tilga olinmaydi, holbuki kasbiy amaliyotda ular hal qiluvchi ahamiyatga ega bo‘lishi mumkin.

Axborot texnologiyalari sohasida ham shunga o‘xshash tartib amal qiladi. IETF ning RFC 2119 hujjatida “MUST” mutlaq talabi, “MUST NOT” mutlaq taqiq, “SHOULD” ayrim holatlarda chetlanish mumkin bo‘lgan tavsiya, “MAY” esa elementning haqiqatan ixtiyoriy ekanligini anglatishi belgilangan[29]. Hujjatda alohida ta’kidlanadiki, ushbu kalit so‘zlar faqat bosh harflar bilan yozilgandagina belgilangan maxsus ma’noni oladi. Amalda bu shuni bildiradi: spetsifikatsiyada “may” o‘rniga “must” yozib yuborilsa, ishlab chiquvchi zimmasiga qo‘shimcha majburiyat tushadi va bu shartnoma munosabatlariga ta’sir qilishi mumkin.

Demak, texnik hujjatda modal fe’l tanlash uslubiy emas, huquqiy-mazmuniy qaror hisoblanadi. Shu sababli, mazkur kategoriyani kasbiy ta’lim kontekstida jiddiy e’tibor bilan o‘rgatish talab etiladi.

Korpus tadqiqotlari nima ko‘rsatadi

Modal fe’llarning ilmiy-texnik matndagi o‘rni korpus tahlillari bilan tasdiqlangan. D. Biber va hammualliflarining fundamental grammatikasida to‘qqizta markaziy modal ajratiladi va ular semantik jihatdan uch guruhga bo‘linadi: imkon, ruxsat va qobiliyat (can, could, may, might); majburiyat va zarurat (must, should); iroda hamda bashorat (will, would, shall)[30]. Mualliflar akademik nasrda “can” fe’lining ayniqsa ko‘p ma’noli ekanini qayd etadilar: uni ham mantiqiy imkoniyat, ham qobiliyat sifatida o‘qish mumkin[31].

Registrlar bo‘yicha taqsimot ham qiziqarli manzarani beradi. Og‘zaki nutqda modal fe’llar chastota jihatidan ustun, biroq akademik nasrda ularning funksional yuklamasi boshqacha: bu yerda modallar mantiqiy munosabatlarni va tadqiqotchining o‘z xulosalariga ishonch darajasini ifodalaydi. Muhandislik hujjatchiligida esa yana bir vazifa qo‘shiladi - normativ talablarni darajalashtirish. Bir xil grammatik shakl uch xil diskursda uch xil yuk tashiydi.

Modal fe’llar texnik matnda muallif pozitsiyasini yumshatish uchun ham ishlatiladi. K. Hyland tadqiqotlarida “may”, “might”, “could” shakllari ilmiy diskursning asosiy epistemik xedjing (hedging) vositalari qatorida ko‘rsatilgan[32]. Farqni oddiy misolda ko‘rish mumkin “the failure was caused by overheating” qat'iy tasdiq “the failure may have been caused by overheating” - ehtiyotkor taxmin. Muhandislik hisobotida bu ikki jumla muallifning javobgarlik darajasini turlicha belgilaydi.

Tipologik tafovut va interferensiya

Endi masalaning o‘zbek auditoriyasiga taalluqli tomoniga o‘tamiz. Ingliz tilida modallik alohida yordamchi fe’llar sinfi orqali beriladi. O‘zbek tilida esa u asosan affikslar va modal so‘zlar zimmasiga tushadi. Ana shu tafovutning asosiy ko‘rinishlari quyidagi jadvalda umumlashtirilgan.

1-jadval. Ingliz va o‘zbek tillarida modallik ifodalanishining qiyosi

Modal ma’no	Ingliz tilida	O‘zbek tilida
Majburiyat	must, shall, have to	-ishi kerak, -ishi shart, -ishi lozim

[29] Bradner S. RFC 2119: Key Words for Use in RFCs to Indicate Requirement Levels. – IETF, 1997. – P. 1–2.
[30] Biber D., Johansson S., Leech G., Conrad S., Finegan E. Longman Grammar of Spoken and Written English. – Harlow: Longman, 1999. – P. 483–485.
[31] O‘sha asar. – P. 492.
[32] Hyland K. Hedging in Scientific Research Articles. – Amsterdam: John Benjamins, 1998. – P. 103.

Modal ma’no	Ingliz tilida	O‘zbek tilida
Zarurat yo‘qligi	need not, do not have to	-masa ham bo‘ladi
Taqiq	must not, shall not	-masligi kerak, -masligi shart
Ruxsat	may, can	-sa bo‘ladi, -shi mumkin
Qobiliyat	can, be able to	-a olmoq, -y olmoq
Ehtimollik	may, might, could	-sa kerak, -ishi mumkin, ehtimol
Tavsiya	should, ought to	-gani ma’qul, -sa yaxshi bo‘lardi

Jadval bir muhim holatni ko‘rsatadi: bir tildagi bitta shaklga ikkinchi tilda bir necha vosita to‘g‘ri keladi va bu munosabat teskari yo‘nalishda ham amal qiladi. Ingliz tilidagi “may” ham ruxsat, ham ehtimollik beradi, o‘zbekcha “-ishi mumkin” ham xuddi shu ikki ma’noni qamraydi. Lekin ularning kontekstlar bo‘yicha taqsimoti ikki tilda mos tushmaydi. Bundan tashqari, o‘zbek tilida modal ma’no ko‘pincha fe’l o‘zagiga qo‘shiladigan affiks orqali beriladi va alohida so‘z sifatida ajralib turmaydi, ingliz tilida esa modal fe’l gap tuzilishida aniq sintaktik o‘rinni egallab, yordamchi fe’l vazifasini bajaradi.

Talabalar ishlarini kuzatish natijasida xatolarning bir necha turg‘un turini ajratish mumkin bo‘ldi. Eng ko‘p uchraydigani bu sintaktik xatolar bo‘lib, modal fe’ldan keyin “to” yuklamasining ortiqcha qo‘shilishi “must to check”, “should to verify”, uchinchi shaxs birlikda “-s” qo‘shimchasining ishlatilishi “the system must” inkor va so‘roq shakllarini yasashda yordamchi fe’l qo‘shib yuborish “does not can” “do you must”. Bular ona tilidagi model ta’sirining bevosita natijasi.

Semantik xatolar kamroq ko‘zga tashlanadi, ammo oqibati og‘irroq. Talaba “The cover may be removed” jumlasini “qopqoq olib tashlanishi mumkin (ehtimol)” deb tarjima qiladi, holbuki bu yerda ruxsat nazarda tutilgan. Xavfsizlik yo‘riqnomasida bunday xato jiddiy oqibatga olib kelishi mumkin.

Uchinchi turdagi xatolar murakkab konstruksiyalarga bog‘liq. “Must have been damaged” iborasi o‘tgan zamondagi majburiyat deb tushuniladi” shall be tested” yoki “may be adjusted” kabi majhul nisbatdagi shakllar faol nisbat sifatida o‘qiladi.

Alohida qiyinchilik epistemik va deontik ma’nolarni ajratishda paydo bo‘ladi. “The valve must be closed” jumlasini kontekstga qarab ikki xil o‘qish mumkin “yopilishi shart” (ko‘rsatma) yoki “yopiq bo‘lsa kerak” (xulosa). O‘zbek tilida bu ikki ma’no turli affikslar bilan aniq ajratilgani uchun talaba ingliz tilida ham shunday aniq chegara borligini kutadi. Kutilgan chegara topilmagach, xato yuzaga keladi.

Darsliklardagi bo‘shliq

Masalaning ta’limga oid tomoni ham bor. Umumiy maqsadlarga mo‘ljallangan darsliklarda modal fe’llar odatda maishiy vaziyatlar doirasida beriladi: ruxsat so‘rash, taklif qilish, maslahat berish, o‘tmish haqida taxmin qilish. Standart matni, spetsifikatsiya, xavfsizlik yo‘riqnomasi yoki texnik hisobot kabi janrlar deyarli qamrab olinmaydi.

Oqibati shunday bo‘ladi: talaba “May I open the window?” tipidagi konstruksiyani ishonchli o‘zlashtiradi, ammo “The cover may be removed only after power-off” jumlasini noto‘g‘ri o‘qiydi. Ikkala holatda ham bir xil modal fe’l turibdi, lekin uning funksiyasi va

matndagi og‘irligi tubdan farq qiladi. Nofilologik yo‘nalish talabalari bilan ishlashda bu bo‘shliq ayniqsa seziladi, chunki ular uchun ingliz tili avvalo kasbiy axborot bilan ishlash quroli.

D. Larsen-Freeman grammatikani shakl, ma’no va qo‘llanish o‘lchamlarining birligi sifatida talqin qiladi[33]. Modal fe’llar bu qarashning to‘g‘riligini yaqqol tasdiqlaydi: shaklni bilish - modaldan keyin infinitiv “to” siz kelishini eslab qolish deyarli hech narsani hal qilmaydi, chunki asosiy qiyinchilik ma’no va qo‘llanish o‘lchovlarida yotadi. Shundan kelib chiqib, mazkur kategoriyani o‘rgatishda autentik texnik matnlarga tayanish zarur bo‘ladi.

T. Hutchinson va A. Watersning maqsadli ehtiyojlar tahlili konsepsiyasi ham shu xulosaga olib keladi[34]: texnika yo‘nalishi talabasi uchun grammatik minimum umumiy kursdan emas, muhandisning real ish vaziyatidan kelib chiqib belgilanishi lozim. Modal fe’llar bunday tanlovga yaxshi misol bo‘la oladi ular bir vaqtning o‘zida ham grammatik jihatdan murakkab, ham kasbiy amaliyot uchun zarur. Chet til o‘qitish metodikasining umumnazariy asoslari, jumladan grammatik minimumni belgilash tamoyillari J.J. Jalolovning ishlarida batafsil yoritilgan[35].

Funksional tizimlashtirish tajribasi

Kuzatishlarimiz modal fe’llarni shakl bo‘yicha emas, kasbiy kommunikativ funksiyalar bo‘yicha guruhlash foydaliroq degan xulosaga olib keldi. Bunday taqsimotda talaba “modal fe’llar mavzusi”ni emas, “talabni qanday ifodalash kerak” degan amaliy savolga javobni o‘zlashtiradi. Farq kichikdek tuyuladi, lekin materialga munosabatni o‘zgartiradi.

2-jadval. Modal fe’llarning texnik kommunikativ funksiyalar bo‘yicha taqsimoti

Kommunikativ funksiya	Modal vosita	Texnik matndagi misol
Majburiy talab	shall, must	The device shall comply with IEC 60950.
Taqiq	shall not, must not	The valve must not be opened under pressure.
Tavsiya	should	The cable should be shielded.
Ruxsat, imkon	may	The user may select an alternative mode.
Qobiliyat	can	The sensor can detect motion up to 10 m.
Ehtimollik, xedjing	may, might, could	This may cause overheating.

Shu sxema asosida tuzilgan mashqlar autentik manbalarga tayanishi kerak: standart parchalari, jihoz qo‘llanmalari, xavfsizlik yo‘riqnomalari. Talaba matndagi modal ma’nolarni aniqlash, spetsifikatsiya parchasini modallik darajasini o‘zgartirib qayta yozish, noto‘g‘i tuzilgan hujjatdagi xatolarni topish kabi topshiriqlar orqali kategoriyani amaliy o‘zlashtiradi.

Xulosa

Tahlil natijalarini quyidagicha umumlashtirish mumkin. Modal fe’llar xalqaro texnik standartlar tilida provizsiyalarning huquqiy maqomini belgilaydi, ISO/IEC Direktivalari va RFC

[33] Larsen-Freeman D. Teaching Language: From Grammar to Grammaring. – Boston: Thomson/Heinle, 2003. – P. 143.
[34] Hutchinson T., Waters A. English for Specific Purposes: A Learning-centred Approach. – Cambridge: Cambridge University Press, 1987. – P. 54.
[35] Jalolov J.J. Chet tili o‘qitish metodikasi. – Toshkent: O‘qituvchi, 2012. – B. 195–210.

2119 hujjatlarida ularning ma’nolari qat’iy tartibga solingan. Bu holat mazkur kategoriyani kasbiy ta’limda alohida e’tibor bilan o‘rgatishni talab qiladi.

O‘zbek tilida modallikning affiksal ifodalanishi ingliz tilidagi yordamchi fe’llar tizimidan tipologik jihatdan farq qiladi. Shu sababli interferensiya hodisalari qonuniy tarzda yuzaga keladi va sintaktik, semantik hamda konstruksiyaviy xatolar ko‘rinishida namoyon bo‘ladi.

Umumiy maqsadlarga mo‘ljallangan darsliklarda modal fe’llarning kasbiy janrlar doirasida yoritilmasligi esa didaktik bo‘shliq keltirib chiqaradi. Uni to‘ldirish uchun mazkur kategoriyani autentik texnik matnlar materialida, kommunikativ funksiyalar bo‘yicha tizimlashtirilgan holda o‘rgatish maqsadga muvofiq deb hisoblaymiz.

Muammoning metodik jihatlari - tegishli mashqlar tizimini ishlab chiqish va uni ta’lim jarayoniga joriy etish masalalari - muallifning keyingi tadqiqotlarida yoritiladi.

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INGLIZ TILINI O‘QITISHDA CHATGPT VA BOSHQA SUN’IY INTELLEKT VOSITALARIDAN SAMARALI FOYDALANISH

Shamsuvaliyeva E.A.
Toshkent shahridagi Adju universiteti Ingliz tili filologiyasi va menejmenti fakulteti dotsenti v.b.
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Annotatsiya. *Ushbu maqola oliy ta’lim muassasalarida ingliz tilini o‘qitish jarayonida ChatGPT va boshqa sun’iy intellekt vositalaridan samarali foydalanish masalalari tahlil qilingan. Sun’iy intellekt texnologiyalarining o‘qituvchi va talabalar hamda til o‘rganivchilar faoliyatidagi o‘rni, ularning dars jarayonini tashkil etish, o‘quv materiallarini yaratish, tilning to‘rtta asosiy ko‘nikmasini (listening, reading, writing, speaking) rivojlantirish hamda ta’lim sifatini oshirishdagi imkoniyatlari yoritilgan. Shuningdek, ChatGPT, Gemini, Grammarly, EnglishScore va Canva kabi platformalarning afzalliklari, ulardan oqilona foydalanish tamoyillari hamda sun’iy intellektni ta’lim jarayoniga integratsiya qilish bo‘yicha amaliy tavsiyalar keltirilgan. Sun’iy intellekt vositalaridan maqsadli va mas’uliyatli foydalanish ingliz tilini o‘qitish samaradorligini oshirish, talabalarning mustaqil ta’lim ko‘nikmalarini rivojlantirish va ta’lim sifatini takomillashtirishga xizmat qilishini ko‘rsatadi.*

Kalit so‘zlar: *sun’iy intellekt, ChatGPT, Gemini, Grammarly, English Score, Canva, ingliz tili, oliy ta’lim, raqamli ta’lim texnologiyalari, kommunikativ kompetensiya, mustaqil ta’lim.*

Аннотация. *В данной статье рассматриваются педагогические возможности эффективного использования ChatGPT и других инструментов искусственного интеллекта в процессе обучения английскому языку в высших образовательных учреждениях. Проанализирована роль технологий искусственного интеллекта в планировании учебных занятий, разработке учебно-методических материалов, развитии четырех основных языковых навыков (аудирование, чтение, письмо и говорение), поддержке самостоятельной работы обучающихся и повышении качества образования. Особое внимание уделено преимуществам использования таких платформ, как ChatGPT, Gemini, Grammarly, English Score и Canva, а также вопросам их рационального и ответственного применения в образовательном процессе. Представлены практические рекомендации по интеграции инструментов искусственного интеллекта в обучение английскому языку с целью повышения эффективности преподавания и формирования коммуникативной компетенции обучающихся.*

Ключевые слова: *искусственный интеллект, ChatGPT, Gemini, Grammarly, English Score, Canva, английский язык, высшее образование, цифровые образовательные технологии, коммуникативная компетенция, самостоятельное обучение.*

Abstract. *The following article examines the pedagogical potential of using ChatGPT and other artificial intelligence (AI) tools effectively in English language teaching in higher education institutions. It analyzes the role of AI technologies in lesson planning, developing instructional materials, enhancing the four core language skills (listening, reading, writing, and speaking), supporting students' independent learning, and improving the quality of education. Particular attention is given to the educational benefits of platforms such as ChatGPT, Gemini,*

Grammarly, EnglishScore, and Canva, as well as the principles of their responsible and effective use in the teaching and learning process. The article also provides practical recommendations for integrating AI-powered tools into English language instruction to enhance teaching effectiveness, foster students' communicative competence, and promote learner autonomy.

Keywords: *artificial intelligence, ChatGPT, Gemini, Grammarly, EnglishScore, Canva, English language teaching, higher education, digital learning technologies, communicative competence, independent learning.*

Avvalom bor shuni ta’kidlash kerakki, hozirda chet tillardan bo‘lmish ingliz tiliga talab yuqori darajada oshib bormoqda. Shu bilan birga til o‘rganuvchilar ham tilni oson va tez muddatda o‘rganishni o‘zlariga maqsad qilib qo‘yib bormoqdalar. Ushbu masalada raqamli transformatsiya ya’ni sun’iy intellekt tehnologiyalari ayni muddoa hisoblanadi. Til o‘rganishda ayniqsa ChatGPT, Gemini, Grammarly, English Score, Canva kabi platformalar juda ham muhim hisoblanib, til o‘rganishda juda katta imkoniyatlar yaratmoqda. Ular nafaqat o‘qituvchiga balki til o‘rganuvchiga mustaqil ravishda chet tilini o‘rganishga imkon beradi [2]. O‘qituvchilarga ular o‘quv materialarini yaratishda, differensial topshiriqlar tayyorlashda, Grammatik va imlo xatolarni tahlil qilishda yordam bersa, o‘quvchi va talabalarga insholarini tekshirib olishda, ularni boshqa murakkab (advanced) so‘zlar bilan almashtirib yozishda katta ko‘mak beradi. Shuningdek, talaffuz bilan ishlash uchun ham ushbu sun’iy intellekt tehnologiylari va ilovalari juda ham muhimdir. Faqatgina ulardan to‘g‘ri foydalanish maqsadga muvofiqdir. Sababi, ko‘p foydalanuvchilar ushbu tehnologiya va ilovalardan maqolalar va insholarni ko‘chirib yozishda, tayyor matnni yodlashda yoki boshqa faoliyatlarda foydalanadilar. Afsuski bunda hech qanday natijaga erishmaydilar, faqatgina dangasa va ishyoqmas bo‘limiga o‘zlari xohlamagan holatda o‘tib qoladilar [3]. To‘g‘ri foydanish degani bu- yozgan matn, esse yoki boshqa yozma ishlarni imlo va gramamtik xatolarini tekshirib, ularni analiz qilinsa, yoki og‘zaki nutq uchun matn yuklab olib, o‘z variantini ishlab chiqsa, yuqori darajali so‘zlarni to‘gri qo‘llasa va boshqa narsalar kabi maqsad muvofiq bo‘ladi. Ushbu holatda o‘qituvchi professor ham til o‘rganuvchi ham, keng ma’noda foydalanuvchilar raqamli tehnologiyalarni to‘g‘ri va maqsadli ishlatgan bo‘ladilar. Ta’lim tizimi sifati ham ushbu vaziyatda samarali rivojlanadi.

Umuman olganda, ChatGPT tilni tabiiy qayta ishlash texnologiyasiga oid sun’iy intellekt modeli hisoblanadi va u bilan muloqot qilish, matn yaratish, tarjima qilish, Grammatik analiz qilish, tahrirlash va turli imkoniyatlarga ega. Ingliz tilini o‘qitish va o‘rganishda sun’iy intellekt vositalari quyidagilar bilan yordam beradi:

- ChatGPT- dars rejalari, ishlanmalari, mashg‘ulotlar, test va mashqlar, mavzuga oid savollar, matn va boshqa funksiyalar uchun ishlatiladi [5];
- Gemini ham ChatGPT ilovasiga o‘xshab ketadi, asosiy vazifasi turli ilmiy va ma’naviy resurslarni izlash uchun muhim;
- Grammarly esa esse, matn, umuman olganda har qanday yozma ishlarni grammatik va imlo tomonidan tahrir qiladi va to‘g‘ri uslubni ko‘rsatib bera oladi [6];
- Canva power point kabi taqdimotlar yaratishda yordam beradi va ancha zamonaviy ilova hisoblanadi. Power point dasturida qilina olmaydigan funksiyalarni bajarish imkoniyatiga egadir

Muhimi shuki, mazkur texnologiya vositalari vaqtni tejaydi hamda ta’lim sifati va boshqaruvini samarali, interaktiv va zamonaviy qilib tashkil etishda mufassal ko‘mak beradi.

Shuningdek, sun’iy intellekt tehnologik vositalari ingliz tilining to‘rt til ko‘nikmalarini rivojlantirishda ham qo‘llaniladi. Kengroq yoritsak, listening (tinglash), reading (o‘qish), writing (yozish), speaking (gaplashish) ko‘nikmalari uchun foydalaniladi. Masalan, listening (tinglash) ko‘nikmasi uchun turli autsentik materiallarni topib beradi, topshiriqlari bilan ta’minlaydi. Reading (o‘qish) da ham autsentik hamda noautsentik bo‘lgan matnlar, murakkab savollar. So‘z boyligini oshirishga oid lug‘at mashqlarini yaratib, topib beradi. Writing (yozish) qismi uchun rasmiy va norasmiy xat yozish (ayniqsa CEFR/APTIS imtixoni foydalanuvchilari keng qo‘llaydilar), akademik insholar, maqola uchun annotatsiya hamda maqola yozish uchun na’munalar bilan boyitib beradi. Speaking (so‘zlashish) esa muloqotni to‘g‘ri so‘zlashishga va xato qilmaslikka undaydi. Shuningdek, debat va loyiha mavzulari, dialoglar, rol ijrolari uchun turli tavsiyalar bera oladi [1].

Demak, xulosa qilamizki, sun’iy intellekt ta’limning sifatli rivojlanishida bir qancha afzalliklariga ega. Ular raqamli kompetensiyalarni rivojlantirish, ta’limni individuallashtirish, o‘qituvchi-professorlarning yuklamasini kamaytirish, kreativ darslarni tashkil etish, mustaqil ta’limni tadbiq etish bilan ta’minlaydilar.

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GERMENEVTIK KOMPETENSIYANING MOHIYATI

Tosheva Maftuna O‘tkirovna
Buxoro davlat universiteti,
Pedagogika kafedrasi 1-bosqich doktoranti
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Annotatsiya. *Mazkur maqolada pedagogik mahoratning o‘zagi va o‘zani bo‘lgan germenevtika va kommunikativ kompetentlikning ta’lim tizimida, zamonaviy o‘qituvchi faoliyatidagi roli hamda ta’lim sifati va samaradorligini oshirishdagi ahamiyati tahlil qilindi. Shuningdek, pedagogik mahorat, zamonaviy o‘qituvchining pedagogik texnikasi va metodlari haqida so‘z yuritilgan.*

Kalit so‘zlar: *kompetensiya, uslub, natijadorlik, talqin qilish, nutq madaniyati, samaradorlik, innovatsiya, kommunikatsion texnologiyalar, kasbiy mahorat, germenevtika, pedagogik texnika, notiqlik qobiliyati.*

Аннотация. *В данной статье анализируется роль герменевтики и коммуникативной компетентности, являющихся ядром и сущностью педагогических навыков, в системе образования, в деятельности современного учителя и в повышении качества и эффективности образования. Также рассматриваются педагогические навыки, педагогические приемы и методы современного учителя.*

Ключевые слова: *компетентность, стиль, эффективность, интерпретация, речевая культура, результативность, инновации, коммуникационные технологии, профессиональные навыки, герменевтика, педагогические приемы, ораторское искусство.*

Abstract. *This article analyzes the role of hermeneutics and communicative competence, which are the core and essence of pedagogical skills, in the education system, in the activities of a modern teacher, and their importance in improving the quality and effectiveness of education. It also discusses pedagogical skills, pedagogical techniques and methods of a modern teacher.*

Keywords: *competence, style, effectiveness, interpretation, speech culture, efficiency, innovation, communication technologies, professional skills, hermeneutics, pedagogical techniques, oratory skills.*

Kirish. Germenevtik kompetensiya bir-biridan ajralmagan, aksincha, inson faoliyati jarayonida o‘zaro bog‘langan bir qator tarkibiy qismlardan iborat. Ushbu kompetensiya insonning shaxsiy hayoti va kasbiy faoliyatida uning boshqa kompetensiyalari bilan birgalikda namoyon bo‘ladi. Mazkur tarkibiy qismlar qatoriga quyidagilar kiradi: empatiya; vaziyatga chuqur kirib borish va uni anglash qobiliyati; yaqinlik hamda masofa saqlash zaruratini anglash va hurmat qilish; og‘zaki va og‘zaki bo‘lmagan muloqot; muayyan kontekst doirasida harakat qilish; ishonchni shakllantirish; aniq vaziyatlarni hal etish; shuningdek, matnlar va ta’limiy vaziyatlarni talqin qilish.

Shuningdek, bu yerga refleksiya qilish salohiyati, bilimlarni qo‘llash qobiliyati, o‘z-o‘zini tahlil qilish, bilim va bilmaslik (notanishlik) holatlari o‘rtasida tebranish, hodisalarning ikki tomonlama tabiatini idrok etish hamda noaniqlik sharoitida harakat qilish kabi jihatlar ham kiradi.

Ushbu tarkibiy qismlarning barchasi faoliyat insonparvarlik mazmuniga ega bo‘lgan barcha hollarda — ya’ni u boshqa bir insonga aloqador bo‘lganda, uning ichki imkoniyatlari va

ehtiyojlarini ochib berganda hamda o‘zaro muloqotga qaratilganda — muhim ahamiyat kasb etadi. Shu bilan birga, ularning darajasi yoki sifatini aniqlash, ta’riflash va baholashga urinishda muayyan qiyinchiliklar yuzaga keladi.

Asosiy qism. Bilishga bo‘lgan qiziqishni qondirish maqsadida sog‘liqni saqlash pedagogikasi sohasidagi mavjud adabiyotlarni o‘rganish orqali bo‘lajak sog‘liqni saqlash ta’limi mutaxassislarini tayyorlash jarayoniga insonparvarlik yondashuvi qay darajada (ongli ravishda yoki tasodifan) singdirilgani va qo‘llanilayotganini aniqlash mumkin. Biroq shuni ta’kidlash joizki, polyak tilidagi adabiyotlarda ushbu jihatlar odatda boshqacha nomlar (masalan, malakalar, ko‘nikmalar, moyilliklar) ostida uchraydi.

Akademik muhitda hermenevtik kompetensiyani rivojlantirish va baholash- Hozirgi kunga qadar, ijtimoiy kompetensiyalar o‘quv dasturlariga kiritilgan bo‘lishiga qaramay, bo‘lajak sog‘liqni saqlash sohasi ta’limchilarining ushbu yo‘nalishdagi kompetensiyalarini rivojlantirish uchun imkoniyatlar cheklangan bo‘lib kelmoqda. Ushbu sohaga ajratilgan o‘quv soatlari kamligini hisobga olsak, qo‘shimcha mazmun va kompetensiyalarni joriy etish real maqsaddek ko‘rinmaydi. Biroq tajriba shuni ko‘rsatadiki, har bir inson ushbu kompetensiyalarga ega; shu sababli, talabalarda ushbu haqiqatni anglash hamda mazkur ko‘nikmalarni tanib olish va rivojlantirishga nisbatan sezgirlikni oshirishga xizmat qiluvchi vaziyatlarni yaratish (masalan, ko‘ngillilik faoliyati, tadqiqot ishlari, ijodiy tashabbuslar yoki individual topshiriq va loyihalar orqali) ijobiy natijalar berishi mumkin.

Anna Krayevskaning ularni baholashga oid takliflariga tayangan holda, germenevtik kompetensiyalarni no-kognitiv kompetensiyalar majmuasiga kiritish mumkin. Ilmiy adabiyotlarda ham kognitiv, ham no-kognitiv yutuqlarni baholashda yaxlit yondashuv qo‘llash yoqlanadi; garchi bunday yutuqlarga oid dalillar turlicha bo‘lib, maxsus me’yor va mezonlarni ishlab chiqishni talab qilsa-da, mazkur yondashuv muhim hisoblanadi. Talabalar kompetensiyalarini baholash murakkab va mashaqqatli jarayon bo‘lishi mumkin, chunki ular bevosita kuzatilmaydi, balki erishilgan yutuqlar asosida aniqlanadi. Bu jarayon portfoliolar, yozma bayonlar va kuzatuv qaydlari kabi dalillarni to‘plashni talab qiladi; ayniqsa, talabalar soni ko‘p bo‘lgan guruhlarda bu juda ko‘p mehnat va vaqt talab etadigan ishdir. Qo‘shimcha tadqiqotlarsiz germenevtik kompetensiyani egallash va takomillashtirishga ko‘maklashuvchi yoki to‘sqinlik qiluvchi omillarni aniq belgilash hozircha imkonsiz. Shunga qaramay, ushbu kompetensiyaning nazariy tavsiflari asos bo‘lib xizmat qilishi va qiziquvchi shaxslarga uni o‘zlarida anglash, qadrlash hamda rivojlantirish imkonini berishi mumkin.

Akademik o‘qitish tajribasi shuni ko‘rsatadiki, ushbu kompetensiyalarga urg‘u berishda imkoniyatlarga qaraganda to‘siqlar ancha ko‘proq. Birinchidan, talabalarning o‘qishga bo‘lgan qiziqishi pastligi muammosi mavjud; ikkinchidan, akademik muhitda mehnat bozori bilan bevosita bog‘liq bo‘lmagan yoki empirik tarzda tekshirib bo‘lmaydigan kompetensiyalarni e’tiborsiz qoldiradigan yoki ularning ahamiyatini past baholaydigan bihevioristik paradigma ustunlik qiladi.

Darsliklar ta'lim mazmuni va metodologiyasiga oid mavjud bayonotlar va tahlillarni takrorlashga moyil; ular kamdan-kam hollarda sog‘liq bilan bog‘liq ayrim hodisalarning ikki tomonlama tabiati yoki muammoli jihatlarini ta'kidlaydi, shuningdek, o‘qituvchining sog‘liqni saqlash o‘qituvchisi sifatidagi roli bilan bog‘liq savollarni ko‘tarishga yoki noaniqliklarni hal qilishga urinmaydi - masalan, o‘qituvchi maxsus ta'lim ehtiyojlariga ega o‘quvchilar (masalan, diabet) bilan bog‘liq muammoga duch kelganda va ularga qo‘shimcha parvarish ko‘rsatishga rozilik berish-bermaslikni ko‘rib chiqqanda, bu qonuniy talablarga javob bermaydigan va shu

bilan birga boshqa o‘quvchilar orasida hasadni qo‘zg‘atadigan harakat. Yuqoridagi dalillarni hisobga olgan holda, ushbu yangi vakolatni o‘rganish va uni professional pedagogik vakolatlar katalogiga kiritishga qaratilgan sa'y-harakatlar to‘liq asosli ko‘rinadi.

Nemis ilmiy adabiyotida "germenevtik kompetensiya subyektiv va obyektiv ma'noni anglash yoki ma'nolarni talqin qilish (kontekstuallik, subyektivlik) sifatida ta'riflanadi". Ushbu tushuncha doirasida bir qator tarkibiy qismlar ajratib ko‘rsatiladi; shu sababli, ularni alohida tavsiflash qulayligi uchun men avvalroq ko‘plik shaklidan foydalanganman — ya’ni har bir jihatni alohida germenevtik kompetensiya sifatida qaraganman (ayniqsa, polyak adabiyotida odatda shunday yondashuv qo‘llanilishini hisobga olgan holda). Biroq, ushbu o‘rinda men birlik shaklidan foydalandim.

Akademik ta’lim sifati — jumladan, KRK (hozirgi PRK) doirasida taklif etilgan ijtimoiy kompetensiyalar — ularni yetarli emas deb hisoblovchilar tomonidan bir muncha vaqtdan beri tanqidiy tahlil qilib kelinayotganini inobatga olib, ushbu masala bo‘yicha kengroq muhokama zarurligini asoslash uchun tanqidiy qarashlarni ko‘rib chiqish o‘rinlidir.

Xulosa Demak, bir so‘z yoki ramz ikki odamda bir xil tushuncha uyg‘otmaydi. O‘zaro munosabat va murojaatlardagi anglashilmovchiliklar aksariyat hollarda o‘rinsiz bahs-tortishuv va ko‘ngil qolishlar bilan yakuniga yetadi. Shu bois yirik faylasuf Rene Dekart «Sizlar so‘zlarning ma’nolarini bilib to‘g‘ri qo‘llaganlaringizda edi, dunyoni yarim chalkashliklardan xalos qilgan bo‘lardingiz», – deyishi bilan haqli edi. Germenevtika va kommunikativ kompetensiyaning zamirida so‘z, til, nutq tushunish va tushuntirish, anglash va anglatish ehtiyoji sifatida maqsadlari mushtarak bo‘lgan har ikkala sohaning ijtimoiy hayotdagi o‘rni va nufuzini oshirgani rost. Anglatish uchun yaxshi anglash kerak bo‘lganidek, yaxshi tushunish ham yaxshi tushuntirishni taqozo qiladi. Bu esa pedagog salohiyatini, uquvini talab etadi. Yuqoridagi fikrlarga asoslangan holda, aytish kerakki, falsafa haqiqat nimaligini anglash bo‘lsa, germenevtika haqiqatga borish yo‘llarini, pedagogika va psixologiya esa uning metodologik asoslarini tadqiq etadi. Zamonaviy pedagogning kommunikativ kompetentligi germenevtik tajriba bilan bog‘liq holda, bir butun yaxlit bo‘lmas ekan, o‘z sohasida muvaffaqiyat qozonishi, aslo mumkin emas. Ta’lim sifatini oshirishda Pedagogning germenevtik qobiliyati va kommunikativ kompetentligi uyg‘un bo‘lishi shart. Shundagina u samara beradi, natijador bo‘ladi.

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OLIY TA’LIMDA SUN’IY INTELLEKT VA RAQAMLI TA’LIM TEXNOLOGIYALARI ASOSIDA IKKINCHI TILNI O‘QITISHNING INNOVATSION YONDASHUVLARI

Temirova Malika Rustamovna
Toshkent shahridagi Adju universiteti o‘qituvchisi
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Annotatsiya. *Mazkur tezisda oliy ta’lim tizimida sun’iy intellekt va raqamli ta’lim texnologiyalaridan foydalanish asosida ikkinchi tilni o‘qitishning innovatsion yondashuvlari yoritilgan. Sun’iy intellekt vositalarining ta’limni shaxsiylashtirish, adaptiv o‘qitishni tashkil etish, talabalar bilimini baholash, tezkor fikr-mulohaza (feedback) taqdim etish hamda mustaqil ta’limni qo‘llab-quvvatlashdagi pedagogik imkoniyatlari tahlil qilingan. Shuningdek, ChatGPT, Gemini, Microsoft Copilot, Grammarly, Duolingo va boshqa raqamli platformalarning ikkinchi tilni o‘qitish jarayonidagi amaliy ahamiyati ochib berilgan. Tadqiqot natijalariga ko‘ra, sun’iy intellekt texnologiyalarini ta’lim jarayoniga integratsiya qilish ta’lim sifati va samaradorligini oshirish, talabalarning kommunikativ kompetensiyasini rivojlantirish hamda mustaqil ta’lim faoliyatini takomillashtirishga xizmat qiladi.*

Kalit so‘zlar: *sun’iy intellekt, raqamli ta’lim, ikkinchi tilni o‘qitish, ChatGPT, generativ sun’iy intellekt, adaptiv ta’lim, shaxsiylashtirilgan ta’lim, kommunikativ kompetensiya, mustaqil ta’lim, oliy ta’lim, innovatsion pedagogika, raqamli platformalar.*

Аннотация. *В данной работе рассматриваются инновационные подходы к обучению второму языку в системе высшего образования на основе технологий искусственного интеллекта и цифрового обучения. Проанализированы педагогические возможности инструментов искусственного интеллекта в персонализации обучения, организации адаптивного образовательного процесса, оценивании знаний студентов, предоставлении оперативной обратной связи и поддержке самостоятельного обучения. Особое внимание уделено практическому использованию платформ ChatGPT, Gemini, Microsoft Copilot, Grammarly, Duolingo и других цифровых сервисов в процессе обучения второму языку. Сделан вывод о том, что интеграция технологий искусственного интеллекта в образовательный процесс способствует повышению качества и эффективности обучения, развитию коммуникативной компетенции студентов и совершенствованию их самостоятельной учебной деятельности.*

Ключевые слова: *искусственный интеллект, цифровое образование, обучение второму языку, ChatGPT, генеративный искусственный интеллект, адаптивное обучение, персонализированное обучение, коммуникативная компетенция, самостоятельное обучение, высшее образование, инновационная педагогика, цифровые платформы.*

Abstract. *This paper explores innovative approaches to second language teaching in higher education through the integration of artificial intelligence (AI) and digital educational technologies. It examines the pedagogical potential of AI-powered tools in personalizing learning, supporting adaptive instruction, assessing students' performance, providing immediate feedback, and facilitating independent learning. Particular attention is given to the practical application of ChatGPT, Gemini, Microsoft Copilot, Grammarly, Duolingo, and other digital platforms in second language instruction. The study concludes that integrating AI technologies*

into the educational process enhances the quality and effectiveness of language teaching, promotes the development of students' communicative competence, and strengthens their autonomous learning skills.

Keywords: *artificial intelligence, digital education, second language teaching, ChatGPT, generative artificial intelligence, adaptive learning, personalized learning, communicative competence, autonomous learning, higher education, innovative pedagogy, digital platforms.*

Sun’iy intellekt (Artificial Intelligence - AI) ta’limni yanada shaxsiylashtirilgan, inklyuziv va samarali tashkil etish imkoniyatiga ega bo‘lgan innovatsion texnologiya sifatida e’tirof etilmoqda. Raqamli transformatsiya sharoitida oliy ta’lim tizimida ta’lim sifati va samaradorligini oshirish ustuvor vazifalardan biri hisoblanadi. Ayniqsa, ikkinchi tilni o‘qitish metodikasida sun’iy intellekt texnologiyalaridan foydalanish ta’lim jarayonini sifat jihatidan yangi bosqichga olib chiqmoqda [1,2]. AI asosidagi platformalar talabalarning individual ehtiyojlari, bilim darajasi va o‘zlashtirish sur’atini tahlil qilib, ularga moslashtirilgan o‘quv topshiriqlarini tavsiya etish orqali ta’limni shaxsiylashtirish imkonini yaratadi.

Bugungi kunda ChatGPT, Gemini, Microsoft Copilot, Duolingo, Grammarly, Quizizz, Canva, Mendeley hamda boshqa zamonaviy raqamli vositalar ikkinchi tilni o‘rganish jarayonini interaktiv, mazmunli, adaptiv va samarali tashkil etishda keng qo‘llanilmoqda. Ushbu texnologiyalar nafaqat o‘quv materiallarini yaratish, balki tezkor fikr-mulohaza (feedback) taqdim etish, baholash, mustaqil ta’limni qo‘llab-quvvatlash, innovatsion dars metodlarini qo‘llash hamda ausentik o‘quv materiallaridan samarali foydalanish imkoniyatlarini ham kengaytirmoqda.

Sun’iy intellektning ikkinchi tilni o‘qitishdagi asosiy imkoniyatlari quyidagilardan iborat:

- ta’lim jarayonini shaxsiylashtirish;
- adaptiv o‘quv topshiriqlarini yaratish;
- yozma va og‘zaki nutqni avtomatik tahlil qilish;
- grammatik, leksik va uslubiy xatolarni aniqlash;
- interaktiv muloqot muhitini yaratish;
- o‘quv natijalarini real vaqt rejimida monitoring qilish;
- individual tavsiyalar va tezkor fikr-mulohazalarni taqdim etish.

Mazkur imkoniyatlar natijasida talabalar o‘z bilim darajasiga mos topshiriqlarni bajarish, xatolar ustida mustaqil ishlash hamda o‘zlashtirish darajasini muntazam nazorat qilish imkoniyatiga ega bo‘ladilar. Bu esa mustaqil ta’lim kompetensiyalarining rivojlanishiga, tanqidiy fikrlash va o‘z-o‘zini baholash ko‘nikmalarining shakllanishiga xizmat qiladi.

Raqamli ta’lim platformalarining pedagogik afzalliklari o‘qituvchi va talaba o‘rtasidagi hamkorlikni mustahkamlash, ta’lim jarayonini samarali boshqarish hamda o‘quv natijalarini muntazam monitoring qilish imkoniyatlarini yaratish bilan izohlanadi. Xususan, Google Classroom, Moodle, Microsoft Teams, Quizizz va Kahoot platformalari o‘quv materiallarini boshqarish, topshiriqlarni taqdim etish, baholash va natijalarni tahlil qilish uchun qulay muhitni ta’minlaydi. Shuningdek, gamifikatsiya elementlari, elektron portfoliolar, virtual guruhlar va multimedia resurslari talabalarning o‘quv motivatsiyasini oshirish, mustaqil ta’limga bo‘lgan qiziqishini kuchaytirish hamda kommunikativ kompetensiyalarini rivojlantirishda muhim pedagogik vosita hisoblanadi.

Generativ sun’iy intellekt vositalari orasida ChatGPT alohida o‘rin egallaydi. Ushbu platforma rolli va dialogli mashg‘ulotlarni yaratish, akademik matnlar, esse va ilmiy maqolalarni

tahrirlash, grammatik mashqlarni ishlab chiqish, dars ishlanmalarini tayyorlash hamda ilmiy izlanishlar bo‘yicha tavsiyalar berishda samarali vosita sifatida foydalanilmoqda [3]. Shu bilan birga, sun’iy intellekt vositalaridan foydalanishda ularning imkoniyatlarini tanqidiy baholash, axborotlarning ishonchliligini tekshirish hamda akademik halollik tamoyillariga qat’iy rioya etish muhim ahamiyat kasb etadi.

Ikkinchi tilni o‘rganishda sun’iy intellekt texnologiyalaridan foydalanishning amaliy jihatlari ham keng imkoniyatlarni yaratadi. Jumladan, talabalar yangi so‘z va iboralarni tarjima qilish, AI yordamida ular ishtirokida gaplar tuzish, dialoglar yaratish, talaffuzni mashq qilish, yozma nutqni tahlil qilish hamda turli raqamli platformalar orqali test topshiriqlarini bajarishlari mumkin. Bundan tashqari, og‘zaki nutqni yozib olib sun’iy intellekt vositalari orqali tahlil qilish va xatolarni tuzatish talabalarning kommunikativ kompetensiyasini izchil rivojlantirishga xizmat qiladi. Natijada mustaqil ta’limning samaradorligi ortib, tilni o‘zlashtirish jarayoni yanada tezlashadi [5].

Xulosa qilib aytganda, sun’iy intellekt va raqamli ta’lim texnologiyalarining oliy ta’lim tizimiga keng joriy etilishi ikkinchi tilni o‘qitish metodikasini takomillashtirishning muhim omillaridan biri hisoblanadi. Ushbu texnologiyalar ta’limni shaxsiylashtirish, o‘quv jarayonini interaktiv tashkil etish, talabalarning motivatsiyasini oshirish va mustaqil ta’lim faoliyatini qo‘llab-quvvatlash imkonini beradi. Shu bilan birga, sun’iy intellekt vositalaridan foydalanishda akademik halollik, axborot xavfsizligi, shaxsiy ma’lumotlarni himoya qilish va tanqidiy fikrlash tamoyillariga amal qilish zarur. Kelgusida generativ sun’iy intellekt vositalarini ikkinchi tilni o‘qitish metodikasiga integratsiyalash hamda ularning pedagogik samaradorligini eksperimental tadqiqotlar asosida baholash dolzarb ilmiy yo‘nalishlardan biri bo‘lib qoladi.

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UMUMTA’LIM MAKTABLARI O‘QITUVCHILARINING PEDAGOGIK VAZIYATLARNI PROGNOZLASH KOMPETENSIYASINI RIVOJLANTIRISH METODIKASI

Utkir Utanov Qurbonovich[1], Xaydarov Xurshid Ismatovich[2]
[1]Samarqand davlat pedagogika instituti “Pedagogika” kafedrasi dotsenti
utanovutkir1979@gmail.com
[2]Samarqand davlat pedagogika instituti mustaqil tadqiqotchisi
e-mail: xurshidxaydarov310@gmail.com
https://doi.org/10.5281/zenodo.22896827

ANNOTATSIYA. *Mazkur maqolada umumta’lim maktablari o‘qituvchilarining kasbiy-metodik faoliyatida yuzaga keladigan muammoli pedagogik vaziyatlarni raqamli modellashtirish kompetensiyasini rivojlantirishning ilmiy-nazariy va metodik asoslari yoritilgan. Zamonaviy ta’lim jarayonida o‘qituvchidan nafaqat mavjud pedagogik muammolarni aniqlash, balki ularning rivojlanish ehtimolini oldindan ko‘ra bilish, sabab-oqibat munosabatlarini tahlil qilish, muqobil yechimlarni ishlab chiqish va pedagogik qarorlarning natijalarini baholash talab etiladi.*

Kalit so‘zlar: *muammoli vaziyat, pedagogik modellashtirish, raqamli modellashtirish, o‘qituvchi kompetensiyasi, pedagogik qaror, prognostik fikrlash, refleksiya, raqamli ta’lim, vaziyatli ta’lim, kasbiy-metodik kompetentlik.*

ABSTRACT. *This article outlines the scientific-theoretical and methodological foundations for developing the competence of teachers in general education schools to digitally model problematic pedagogical situations arising in their professional-methodological activities. The modern educational process requires teachers not only to identify existing pedagogical problems but also to anticipate their potential development, analyze cause-and-effect relationships, devise alternative solutions, and evaluate the outcomes of pedagogical decisions.*

Keywords: *problematic situation, pedagogical modeling, digital modeling, teacher competence, pedagogical decision, prognostic thinking, reflection, digital education, situational learning, professional-methodological competence.*

KIRISH

Bugungi kunda ta’lim tizimida sodir bo‘layotgan modernizatsiya jarayonlari o‘qituvchining kasbiy faoliyatiga qo‘yiladigan talablarning mazmunini tubdan o‘zgartirmoqda. Zamonaviy o‘qituvchi faqat fan mazmunini yetkazib beruvchi subyekt sifatida emas, balki murakkab pedagogik jarayonlarni tahlil qiluvchi, pedagogik vaziyatlarni oldindan prognozlovchi, muqobil qarorlarni ishlab chiquvchi va ta’lim jarayonining natijalarini baholovchi professional sifatida faoliyat yuritishi lozim. Umumta’lim maktablarida o‘quvchilar bilan ishlash jarayonida turli pedagogik, psixologik, kommunikativ, ijtimoiy va tashkiliy muammoli vaziyatlar yuzaga keladi. Bunday vaziyatlar o‘quvchilarning individual xususiyatlari, o‘quv motivatsiyasi, sinf jamoasidagi munosabatlar, intizom, o‘quvchi-o‘qituvchi munosabatlari, ota-ona va maktab hamkorligi hamda ta’lim natijalari bilan bog‘liq bo‘lishi mumkin [1]. Yuklangan tadqiqotda ham umumta’lim maktablari o‘qituvchisining muammoli vaziyatlarni

aniqlash, ularni tizimli tahlil qilish, sabab-oqibat bog‘liqligini aniqlash, vaziyat rivojini prognozlash va pedagogik yechimlarni ishlab chiqish ko‘nikmalariga alohida e’tibor qaratilgan.

ADABIYOTLAR TAHLILI VA METODOLOGIYA

Mazkur yondashuvning zamonaviy davrdagi mantiqiy davomi sifatida muammoli pedagogik vaziyatlarni raqamli modellashtirish masalasini ko‘rsatish mumkin. Chunki raqamli ta’lim vositalari pedagogik vaziyatni faqat og‘zaki tavsiflash bilan cheklanib qolmasdan, uning tarkibiy qismlarini vizual ifodalash, sabab-oqibat munosabatlarini ko‘rsatish, turli yechim variantlarini solishtirish va ehtimoliy natijalarni tahlil qilish imkonini beradi. Shu sababli o‘qituvchilarda muammoli pedagogik vaziyatlarni raqamli modellashtirish kompetensiyasini rivojlantirish masalasi zamonaviy pedagogik ta’limning dolzarb yo‘nalishlaridan biri sifatida namoyon bo‘lmoqda. Muammoli vaziyatlarni modellashtirish o‘qituvchining pedagogik tafakkurini rivojlantirish bilan bir qatorda, uning kasbiy faoliyatida ilmiy asoslangan qaror qabul qilish qobiliyatini shakllantiradi. Tadqiqot materiallarida ham bunday ko‘nikmaning diagnostik, prognostik, konstruktiv va refleksiv komponentlarini integratsiyalash zarurligi asoslangan. Demak, muammoli pedagogik vaziyatlarni raqamli modellashtirishni o‘qituvchining kasbiy-metodik kompetentligini rivojlantirishning yangi metodik yo‘nalishi sifatida tadqiq etish ilmiy va amaliy jihatdan muhim ahamiyat kasb etadi [2].

Pedagogik modellashtirish ta’lim jarayonining murakkab hodisalarini soddalashtirilgan, tizimlashtirilgan va boshqariladigan shaklda ifodalash imkonini beruvchi metodologik vosita hisoblanadi. Model real pedagogik jarayonning barcha xususiyatlarini to‘liq takrorlamaydi, balki tadqiqot uchun muhim bo‘lgan asosiy komponentlar, aloqalar va jarayonlarni aks ettiradi. Muammoli pedagogik vaziyat modeli esa muayyan pedagogik muammoning kelib chiqish sabablari, subyektlari, shart-sharoitlari, rivojlanish bosqichlari, ehtimoliy oqibatlari va yechim variantlarini tizimli ravishda ifodalashga xizmat qiladi. An’anaviy modellashtirishda vaziyat sxema, jadval, grafik yoki matn orqali ifodalanishi mumkin. Raqamli modellashtirish esa mazkur jarayonni interaktiv va dinamik shaklda tashkil etish imkonini beradi.

NATIJALAR

Raqamli modelda pedagogik vaziyatning boshlang‘ich holati belgilanadi. Keyinchalik muammoga ta’sir etuvchi asosiy omillar aniqlanadi. Ushbu omillar o‘rtasidagi sabab-oqibat munosabatlari ko‘rsatiladi. Shundan so‘ng vaziyat rivojlanishining bir nechta ssenariylari ishlab chiqiladi. Masalan, o‘quvchining darsdagi faolligi pasaygan vaziyatni olaylik. O‘qituvchi bunday holatni faqat “o‘quvchi darsga qiziqmayapti” degan xulosa bilan baholamasligi kerak. Raqamli model orqali muammoning bir nechta ehtimoliy sabablari aniqlanishi mumkin:

- o‘quv motivatsiyasining pasayishi;
- o‘quv materialining murakkabligi;
- sinfdoshlar bilan kommunikativ muammo;
- oilaviy omillar;
- o‘qituvchi va o‘quvchi o‘rtasidagi kommunikativ to‘siq;
- individual psixologik xususiyatlar;
- topshiriqning o‘quvchi imkoniyatlariga mos kelmasligi.

Shu asosda o‘qituvchi muammoning yagona emas, balki bir nechta ehtimoliy modelini yaratadi [3]. Mazkur yondashuv o‘qituvchining stereotip qaror qabul qilishining oldini olib, diagnostik va prognostik fikrlashini rivojlantiradi. Muammoli pedagogik vaziyatlarni raqamli modellashtirish kompetensiyasi o‘qituvchining real pedagogik vaziyatni aniqlashi, uni raqamli vositalar yordamida tizimlashtirishi, sabab-oqibat munosabatlarini ifodalashi, rivojlanish

ssenariylarini ishlab chiqishi va maqbul pedagogik yechimni tanlay olishini ifodalovchi integrativ kasbiy sifat sifatida talqin qilinadi. Mazkur kompetensiya bir nechta tarkibiy komponentlardan tashkil topadi. Pedagogik faoliyatda qaror qabul qilish o‘qituvchining eng muhim kasbiy faoliyatlaridan biridir. Chunki bir xil muammoli vaziyatga turli pedagoglar tomonidan turlicha munosabat bildirilishi mumkin. Masalan, intizomni buzgan o‘quvchiga nisbatan o‘qituvchi jazolash, ogohlantirish, suhbatlashish, ota-ona bilan hamkorlik qilish yoki individual pedagogik yondashuvni qo‘llash kabi variantlardan birini tanlashi mumkin.

MUHOKAMA

Raqamli modellashtirish ushbu variantlarni oldindan tahlil qilish imkonini beradi. Muammoli vaziyatlarni raqamli modellashtirish o‘qituvchining bir nechta kasbiy sifatlarini rivojlantiradi.

Birinchidan, analitik tafakkur rivojlanadi. O‘qituvchi muammoning tashqi ko‘rinishidan ko‘ra, uning ichki sabablariga e’tibor qaratishni o‘rganadi.

Ikkinchidan, prognostik tafakkur shakllanadi. Pedagog vaziyatning keyingi rivojlanishini oldindan ko‘rishga harakat qiladi.

Uchinchidan, konstruktiv qobiliyat rivojlanadi. O‘qituvchi muqobil pedagogik yechimlarni loyihalaydi.

To‘rtinchidan, kommunikativ kompetensiya takomillashadi. Turli kommunikativ strategiyalarning natijalarini modellashtirish o‘qituvchiga samarali muloqot yo‘lini tanlash imkonini beradi.

Beshinchidan, refleksiv kompetensiya rivojlanadi. Pedagog o‘z qarorlarini qayta ko‘rib chiqadi va o‘z faoliyatini baholaydi.

Shu sababli raqamli modellashtirishni faqat texnologik ko‘nikma sifatida emas, balki o‘qituvchining umumiy kasbiy-metodik kompetentligini rivojlantiruvchi kompleks pedagogik mexanizm sifatida qarash lozim [4]. O‘qituvchilarning muammoli pedagogik vaziyatlarni raqamli modellashtirish kompetensiyasini baholash uchun quyidagi mezonlardan foydalanish mumkin:

Diagnostik mezon — muammoli vaziyatni to‘g‘ri aniqlash va uning asosiy belgilarini ajratish.

Analitik mezon — vaziyatning sabab va oqibatlarini tizimli tahlil qilish.

Prognostik mezon — vaziyat rivojining ehtimoliy variantlarini oldindan belgilash.

Konstruktiv mezon — muqobil pedagogik yechimlarni ishlab chiqish.

Raqamli mezon — vaziyat modelini raqamli vositalar yordamida yaratish.

Refleksiv mezon — qabul qilingan qarorning natijasini tahlil qilish va o‘z faoliyatiga baho berish.

Ushbu mezonlar asosida kompetensiyaning past, o‘rta va yuqori darajalarini aniqlash mumkin. Past darajadagi o‘qituvchi muammoli vaziyatni umumiy tarzda aniqlaydi, biroq uning sabablarini chuqur tahlil qila olmaydi. O‘rta darajadagi o‘qituvchi vaziyatning asosiy sabablarini aniqlaydi, muqobil yechimlar ishlab chiqadi, biroq ularning ehtimoliy natijalarini prognozlashda qiyinchiliklarga duch keladi. Yuqori darajadagi o‘qituvchi esa muammoli vaziyatni mustaqil ravishda diagnostika qiladi, raqamli model yaratadi, rivojlanish ssenariylarini ishlab chiqadi, muqobil pedagogik yechimlarni taqqoslaydi va refleksiv baholash asosida optimal qaror qabul qiladi.

Muammoli pedagogik vaziyatlarni modellashtirishga doir mavjud yondashuvlarning asosiy afzalligi o‘qituvchini real pedagogik vaziyatni chuqur tahlil qilishga yo‘naltirishidir.

Biroq zamonaviy ta’lim sharoitida mazkur jarayonni faqat an’anaviy shakllarda tashkil etish yetarli bo‘lmasligi mumkin. Raqamli modellashtirish pedagogik vaziyatlarni dinamik ko‘rinishda ifodalash, bir nechta yechimlarni solishtirish, vaziyat rivojining turli ssenariylarini ishlab chiqish va o‘qituvchining refleksiv faoliyatini kuchaytirish imkonini beradi. Shu jihatdan maqolada taklif etilayotgan yondashuv original tadqiqotning ilmiy-metodik g‘oyalarini yangi — raqamli pedagogik muhit nuqtayi nazaridan davom ettiradi. Tadqiqot materiallarida muammoli vaziyatlarni modellashtirish mexanizmi “muammoli vaziyatni oldindan ko‘rish — pedagogik vaziyatni konstruksiyalash — yechim trayektoriyasini loyihalash — amaliy qaror qabul qilish — natijani refleksiv baholash” ketma-ketligida takomillashtirilgani ko‘rsatilgan [5].

Mazkur ketma-ketlikka raqamli modellashtirish komponentining kiritilishi o‘qituvchining pedagogik vaziyatni ko‘rish va tahlil qilish imkoniyatlarini kengaytiradi. Shuningdek, raqamli modellashtirish o‘qituvchilar malakasini oshirish kurslarida, metodik birlashmalar faoliyatida, seminar-treninglarda va pedagogik kengashlarda ham qo‘llanishi mumkin. Umumta’lim maktablari o‘qituvchilarining muammoli pedagogik vaziyatlarni raqamli modellashtirish kompetensiyasini rivojlantirish zamonaviy ta’lim jarayonida muhim ilmiy-metodik yo‘nalishlardan biridir.

XULOSA

Tadqiqot natijasida quyidagi xulosalarga kelish mumkin.

Birinchidan, muammoli pedagogik vaziyatlarni modellashtirish o‘qituvchining kasbiy-metodik kompetentligini rivojlantirishning samarali vositasi hisoblanadi.

Ikkinchidan, raqamli modellashtirish mazkur jarayonni yanada interaktiv, tizimli va prognozga yo‘naltirilgan shaklda tashkil etish imkonini beradi.

Uchinchidan, raqamli modellashtirish kompetensiyasi diagnostik, analitik, prognostik, konstruktiv, raqamli va refleksiv komponentlarning integratsiyasi asosida shakllantiriladi [6].

Shunday qilib, muammoli pedagogik vaziyatlarni raqamli modellashtirishni o‘qituvchilarning kasbiy-metodik tayyorgarligi tizimiga integratsiyalash umumta’lim maktablarida ta’lim-tarbiya jarayonining samaradorligini oshirish, pedagogik ziddiyatlarning oldini olish va ilmiy asoslangan pedagogik qarorlar qabul qilish imkoniyatlarini kengaytiradi.

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DEVELOPING JOURNALISM STUDENTS' CREATIVE WRITING COMPETENCIES ON THE BASIS OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES

Madinabonu Urinova
ORCID: 0009-0000-5456-0511
University of Journalism and Mass Communications of Uzbekistan
madina.urinova751@gmail.com
https://doi.org/10.5281/zenodo.22875383

Abstract. *This article examines the problem of developing creative writing competencies among journalism students under conditions shaped by artificial intelligence technologies. Particular attention is given to the notions of creativity and subjectivity that are central to literary journalism, considered within the context of AI tools. Drawing on the author's distinction between “algorithmic creativity” and “technical creativity,” the article defines AI's role in the text-generation process and argues for the dual nature of AI use in journalism education — useful as a technical aid, yet risky as a substitute for authorial voice. The article proposes a concrete pedagogical model applicable to higher-education practice: a comparative writing exercise in which students contrast human- and AI-generated texts on the same subject to learn to recognize markers of authorial subjectivity. It concludes that AI literacy must become an integral part of contemporary journalism education.*

Keywords: *artificial intelligence, journalism education, creative writing, technical creativity, algorithmic creativity, authorial subjectivity, media literacy, literary journalism, pedagogical model, competence.*

Introduction

The rapid development of artificial intelligence technologies places new and complex demands on contemporary journalism education. The widespread use of AI tools in text generation, editing, and translation calls for a reconsideration of the traditional writing skills taught in journalism programs. This is especially true in literary journalism, genres that require not merely reporting reality but rendering it through literary technique, interpreted through the writer's individual voice and emotional sensibility where the role of AI becomes particularly contentious.

The urgency of the problem lies in the fact that journalism education today must balance two seemingly opposed needs: on one hand, the need to teach students to use contemporary digital tools and integrate AI into their workflow; on the other, the need to preserve their individual creative voice, critical thinking, and authorial subjectivity. Quality journalism education cannot be built without resolving the tension between these two tasks.

The purpose of this article is to develop the theoretical foundations for cultivating creative writing competencies among journalism students — particularly those working in literary journalism — under conditions shaped by AI technologies, and to propose practical pedagogical solutions in this area.

Creative Writing and Artificial Intelligence: Theoretical Foundations

The concept of creativity has long been a subject of debate in journalism theory. Foucault interprets the concept of the “author” as a socio-historical construction, advancing the idea of an “author function” standing behind the text [1]. This approach takes on new meaning in the age of artificial intelligence: if a text is produced not by an “author” but by an algorithm, the question of how the author function itself changes becomes pressing.

Dennett's theory of the “intentional stance” offers a productive framework for deepening this analysis [2]. According to Dennett, we “attribute” intention, purpose, and mind to any system, whether human or machine, as an interpretive strategy convenient for predicting that system's behavior. From this perspective, a text generated by artificial intelligence may exhibit apparent “narrative agency,” yet this appearance is a product of the reader's interpretive activity rather than evidence of the text's genuine subjective origin.

The concepts of “algorithmic creativity” and “technical creativity,” developed by the author, serve precisely to clarify this distinction. Algorithmic creativity refers to the capacity to generate new, formally coherent text based on statistical patterns and an existing corpus of texts. Technical creativity, by contrast, denotes the process by which a human being creates using technical tools, including artificial intelligence, while grounding the work in their own subjective experience, emotional position, and choices. This distinction carries practical significance for journalism education: students must be taught to distinguish between these two processes.

Fairclough's discourse-analysis methodology provides additional theoretical grounding for this problem [3]. This approach, which examines how social relations and power are constituted through language, provides a methodological basis for analyzing the linguistic features of AI-generated texts — formulaic structures, high predictability, and the absence of markers of individual style. Recent research confirms the same problem: a thematic literature review by Al Hosni notes that although AI-generated texts tend to be grammatically polished and structurally coherent, they often lack emotional nuance, subtle shades of meaning, and the individual linguistic “fingerprint” of a human writer [8].

Contemporary Challenges in Developing Creative Skills in Journalism Education

In practice, journalism instructors tend to adopt one of two often conflicting positions toward AI tools. The first is to ban artificial intelligence outright, treating it as a threat to students' capacity for independent thought. As Pedersen notes, the initial institutional response to the emergence of generative AI was itself polarized in exactly this way, ranging from outright bans to enthusiastic, uncritical adoption [4]. Such a prohibitive approach may appear effective in the short term, but it fails to prepare students for the professional environment they will inevitably encounter, since most contemporary newsrooms already make use of AI tools.

The second position is to adopt AI uncritically, judging it solely by efficiency. MacArthur observes that generative AI technologies were in fact designed to help experts work more efficiently, not to train novices, including students, in developing expertise within their field [7]. As a result, uncritical adoption leaves students proficient in the technical aspects of text production while failing to develop the qualities that constitute the essence of literary journalism — individual observation, emotional depth, and a distinctive authorial perspective.

A curriculum analysis of journalism education in Turkey by Şen reaches a similar conclusion: artificial intelligence is currently often introduced merely as a supplementary module alongside “new skills” such as digital, mobile, and data journalism, but this approach is insufficient — what is needed instead is a systematic curricular reform that builds genuine practical competencies [6]. Diakopoulos and colleagues likewise propose the concept of an “AI

turn” in journalism education, arguing for a redesign of curricula that teaches students to use AI as a tutor, research assistant, and idea generator [9].

Between these two polarized approaches, a third, balanced path is needed: a pedagogical model that teaches students to use AI consciously, critically, and within clearly defined boundaries. Such a model is proposed below.

Practical Possibilities for Using Artificial Intelligence

Kumar and Sangwan, conceptualizing AI literacy from the standpoint of education and policy initiatives for a future-ready society, define it not merely as a technical skill but as a competence encompassing critical and institutional dimensions as well [5]. This broader interpretation applies equally to journalism education: in teaching AI tools, it is essential to clearly distinguish their functions at different stages of the text-production process. These functions are outlined below in a recommended sequence.

First, at the research and preparation stage, artificial intelligence serves as an effective assistive tool: transcribing lengthy interviews, organizing field notes, and synthesizing background material saves the student's time and allows them to focus on the core creative task, constructing the narrative.

Second, at the stage of experimenting with structure, AI can be used as an exercise tool for testing alternative narrative structures (chronological, episodic, or “braided” structures). What matters here is that AI offers only structural variants, not the final text — the final choice remains the student's own.

Third, at the editing stage, AI can be applied to technical tasks such as checking stylistic consistency and identifying grammatical errors. Even here, however, students must learn to ensure that the tone, emotional resonance, and authorial voice of the text are not altered under the influence of AI suggestions.

Fourth, and most important, students must be taught to critically analyze the “markers” of AI-generated text: formulaic sentence structures, the absence of individual observation, a tendency toward generalized description, and flatness in emotional nuance. This skill serves not only their writing practice but also their critical literacy as future media consumers.

Practical Recommendations: A Comparative Writing Exercise Model

To apply the theoretical foundations outlined above in practice, the following pedagogical model is proposed. This model can be introduced as a dedicated module within a literary journalism course:

Stage 1: Students independently write a literary journalism text on a given topic (for example, a profile of a specific person or the depiction of an event), drawing on their own observations, dialogue, and emotional interpretation.

Stage 2: A text on the same topic is generated using an AI tool, given the same initial information (facts, dates, location).

Stage 3: Students conduct a comparative analysis of the two texts — examining which elements (choice of detail, emotional stance, metaphor, rhythm) express authorial subjectivity, and which elements exhibit formulaic or algorithmic characteristics.

Stage 4: Based on group discussion, students revise their own texts — retaining useful technical elements suggested by AI (such as structure or fact-checking) while strengthening their own distinctive authorial voice.

This model develops not only creative writing skills but also critical media literacy, since the student is shaped not as a passive recipient of AI output but as an active user who understands its capabilities and limitations.

Conclusion

The deep penetration of artificial intelligence technologies into journalistic practice demands fundamental change in journalism education. This change is especially significant for students of literary journalism, since it is precisely in this genre that authorial subjectivity and creativity occupy a central place. As argued in this article, the only sound path for integrating AI into journalism education is neither outright rejection nor uncritical acceptance, but rather teaching students, clearly and systematically, to distinguish between AI's function as a technical aid and the risk it poses of displacing the authorial voice.

The proposed comparative writing exercise model offers one practical means of achieving this goal and can be adapted for use in other higher-education institutions. Empirically examining the outcomes of this model across different student cohorts remains a relevant direction for future research.

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SECTION 2

ARTIFICIAL INTELLIGENCE IN ENGINEERING AND INFORMATION TECHNOLOGY: ELECTRICAL ENGINEERING, COMPUTER ENGINEERING, AND SOFTWARE SOLUTIONS

* * *

2-SHO‘BA

MUHANDISLIK VA AXBOROT TEXNOLOGIYALARIDA SUN’IY INTELLEKT: ELEKTROTEXNIKA, KOMPYUTER MUHANDISLIGI VA DASTURIY YECHIMLAR

ELEKTROMAGNIT MOSLASHUV MUAMMOSI

Fayzullayeva Barno Bahodirovna
Assistent, Muhammad al-Xorazmiy nomidagi Toshkent axborot texnologiyalari universiteti
E-mail: fayzullayeva86@gmail.com
https://doi.org/10.5281/zenodo.22875529

Annotatsiya. *Maqolada elektromagnit moslashuv (EMM) tushunchasi, uning texnik vositalarning barqaror ishlashidagi o‘rni hamda elektromagnit halaqitlarning kelib chiqishi va tarqalish xususiyatlari yoritilgan. Elektromagnit muhit, elektromagnit nurlanish, elektromagnit xalaqit, xalaqitga chidamlilik, xalaqit manbai va retseptor kabi asosiy tushunchalar izohlangan. Tabiiy va sun’iy halaqit manbalari, o‘tkazuvchan va nurlangan bog‘lanishlar, retseptorga ta’sir qiluvchi omillar hamda EMMni ta’minlashning texnik va tashkiliy choralari ko‘rib chiqilgan. Shuningdek, radiochastota spektridan foydalanish va texnik vositalarning elektromagnit mosligiga oid me’yoriy hujjatlarning ahamiyati bayon etilgan.*

Kalit so‘zlar: *elektromagnit moslashuv, elektromagnit muhit, elektromagnit xalaqit, radioelektron vosita, radioelektron qurilma, retseptor, xalaqit manbai, xalaqitga chidamlilik, radiochastota spektri, ekranlash, filtrlash.*

Abstract. *The article discusses electromagnetic compatibility (EMC), its role in reliable operation of technical equipment, and the origin and propagation of electromagnetic interference. The concepts of electromagnetic environment, electromagnetic radiation, electromagnetic interference, immunity, interference source, and receptor are considered. Natural and artificial interference sources, conducted and radiated coupling paths, factors affecting a receptor, and technical and organizational measures for ensuring EMC are described. The importance of regulatory documents related to radio-frequency spectrum use and electromagnetic compatibility of technical equipment is also outlined.*

Keywords: *electromagnetic compatibility, electromagnetic environment, electromagnetic interference, radio-electronic equipment, receptor, interference source, immunity, radio-frequency spectrum, shielding, filtering.*

Kirish

Zamonaviy telekommunikatsiya va radioelektronika tizimlarida ko‘plab elektr va radioelektron qurilmalar bir vaqtning o‘zida ishlaydi. Mobil aloqa bazaviy stansiyalari, Wi-Fi qurilmalari, televizion uzatkichlar, radarlar, kompyuterlar, elektr dvigatellari va impulsli quvvat manbalari umumiy elektromagnit muhitni shakllantiradi. Shu sharoitda bir qurilmaning elektromagnit ta’siri boshqa qurilmaning ishlash sifatiga salbiy ta’sir ko‘rsatishi mumkin.

Radiotexnik vositalar sonining ko‘payishi, uzatkichlar quvvatining ortishi, foydalanilayotgan chastota diapazonlarining kengayishi va uyali aloqa tarmoqlarining rivojlanishi elektromagnit moslashuv masalasini yanada muhimlashtirmoqda. Elektromagnit muhitning murakkablashuvi qurilmalar o‘rtasidagi nomaqbul o‘zaro ta’sir ehtimolini oshiradi.

MASALANING QO‘YILISHI

Elektromagnit moslashuv masalasining mohiyati bir elektromagnit muhitda ishlayotgan texnik vositalarning o‘zaro nomaqbul ta’sirini cheklash va ularning belgilangan vazifalarni talab etilgan sifat bilan bajarishini ta’minlashdan iborat. Bunda qurilma boshqa vositalarga yo‘l

qo‘yilmaydigan elektromagnit halaqitlarni hosil qilmasligi hamda tashqi elektromagnit ta’sir ostida o‘zining normal ishlashini saqlashi kerak.

Masalani yechishda xalaqit manbasini aniqlashning o‘zi yetarli emas. Xalaqit energiyasining retseptorgacha qanday yo‘l bilan yetib borishi, retseptorning sezgirligi, manba quvvati, ular orasidagi masofa, to‘lqin uzunligi va tarqalish muhiti ham hisobga olinishi lozim. Shu bois EMM muammosi “xalaqit manbai–tarqalish yo‘li–retseptor” yagona tizimi orqali qaraladi.

Amaliy masala quyidagi tartibda qo‘yiladi: xalaqit manbasini aniqlash; uning retseptorgacha tarqalish yo‘lini belgilash; retseptorda yuzaga kelayotgan ta’sirni baholash; mos himoya chorasini tanlash; qo‘llangan choraning samaradorligini nazorat qilish. Mazkur ketma-ketlik ma’ruza materialida EMM muammosini amaliy hal qilish bosqichlari sifatida berilgan.

Elektromagnit jarayonlarni tavsiflashda chastota asosiy kattaliklardan biridir. Chastota f va to‘lqin uzunligi λ orasidagi bog‘lanish $\lambda = c/f$ ko‘rinishida ifodalanadi. Chastota oshgani sari to‘lqin uzunligi kamayadi. Bu bog‘lanish EMM masalalarida muhim bo‘lib, turli chastotalarda elektromagnit energiyaning tarqalishi, kabellarning antenna sifatidagi xususiyatlari va ekranlash samaradorligi turlicha namoyon bo‘lishi mumkin.

Shu sababli elektromagnit moslashuvni ta’minlashda qurilmaning ish chastotasi, signal turi va elektromagnit energiyaning tarqalish sharoitlari hisobga olinadi.

Elektromagnit halaqitlar tabiiy va sun’iy manbalarga ajratiladi. Tabiiy manbalarga chaqmoq, atmosfera jarayonlari, quyosh va kosmik jarayonlar kiradi. Sun’iy manbalar qatoriga radiouzatkichlar, radarlar, mobil aloqa vositalari, elektr dvigatellari, transformatorlar, impulsli quvvat manbalari, kompyuterlar va boshqa elektron qurilmalar kiradi.

Halaqitning manbadan retseptorgacha yetib borish mexanizmi ham muhimdir. O‘tkazuvchan halaqit kabel, elektr ta’minoti yoki galvanik bog‘lanish orqali tarqaladi. Nurlangan halaqit esa elektromagnit maydon orqali fazoda tarqalib, antenna yoki boshqa elementlarga ta’sir qiladi.

Retseptor elektromagnit signal va/yoki xalaqitni sezuvchi texnik vositadir. Bir qurilma muayyan sharoitda bir vaqtning o‘zida xalaqit manbai va retseptor vazifasini bajarishi mumkin. Retseptorga ta’sir etuvchi asosiy omillarga xalaqit manbaining quvvati P, retseptorgacha bo‘lgan masofa R, to‘lqin uzunligi λ va tarqalish muhiti kiradi.

Retseptorning ta’sirchanligi, xalaqitga chidamliligi va xalaqitdan himoyalanganligi uning elektromagnit muhitdagi ishlash imkoniyatlarini tavsiflovchi muhim xususiyatlardir. Real sharoitda bino, metall konstruksiyalar, kabel va antenna yo‘nalishi kabi omillar ham elektromagnit ta’sir darajasini o‘zgartirishi mumkin.

EMMni ta’minlashning amaliy yondashuvi

EMM muammosini amaliy hal etishda ketma-ket yondashuvdan foydalanish mumkin: avvalo xalaqit manbai aniqlanadi, keyin uning tarqalish yo‘li belgilanadi, retseptorning sezgirligi va buzilayotgan parametrlari baholanadi. Shundan so‘ng ekranlash, filtrlash, yerga ulash, kabellarni qayta joylashtirish yoki manba bilan retseptor orasidagi masofani oshirish kabi himoya choralari tanlanadi.

Yakuniy bosqichda tanlangan choralar sinovdan o‘tkazilib, xalaqitning maqbul darajaga kamaygani nazorat qilinadi. EMMni ta’minlash shu tariqa texnik va tashkiliy choralarni o‘zida birlashtiruvchi kompleks jarayon sifatida qaraladi.

Elektromagnit moslashuvni ta’minlash radiochastota spektridan foydalanish va texnik vositalarga qo‘yiladigan tegishli talablar bilan chambarchas bog‘liq. Ma’ruza materialida

“Radiochastotalar spektri to‘g‘risida”gi O‘zbekiston Respublikasi Qonuni, radiochastota spektridan foydalanishga oid Vazirlar Mahkamasi qarorlari, texnik vositalarning elektromagnit mosligi to‘g‘risidagi umumiy texnik reglamentni tasdiqlash haqidagi 2016-yil 21-noyabrdagi 389-son qaror, 0060-23-son SanQvaN, 2020-yil 22-dekabrdagi 801-son qaror hamda boshqa hujjatlar keltirilgan.

Ushbu hujjatlar radiochastota spektrini boshqarish, texnik vositalarning elektromagnit mosligi va elektromagnit nurlanish bilan bog‘liq sanitariya talablarini tartibga solishning muhim asosini tashkil etadi.

Xulosa

O‘tkazilgan tahlil natijasida elektromagnit moslashuv muammosi alohida qurilmaning xususiyati emas, balki elektromagnit muhitda birgalikda ishlayotgan manbalar va retseptorlarning o‘zaro ta’sirini boshqarish masalasi ekanligi ko‘rsatildi. EMMni ta’minlashning asosiy sharti texnik vositaning tashqi elektromagnit ta’sir ostida belgilangan sifatni saqlashi va boshqa vositalarga yo‘l qo‘yilmaydigan halaqitlarni hosil qilmasligidir. “Xalaqit manbai–tarqalish yo‘li–retseptor” modeli EMM muammosini tizimli ravishda tahlil qilish imkonini beradi. Manbani aniqlash, tarqalish mexanizmini belgilash va retseptorning xususiyatlarini baholash asosida himoya chorasini tanlash xalaqitni kamaytirishning izchil usulini shakllantiradi.

Shuningdek, EMMni baholashda chastota, to‘lqin uzunligi, manba quvvati, masofa, tarqalish muhiti va retseptorning xususiyatlarini birgalikda hisobga olish zarur. Ekranlash, filtrlash, yerga ulash, masofani oshirish va qurilmalarni to‘g‘ri joylashtirish kabi texnik choralar me’yoriy talablar bilan uyg‘un qo‘llanganda elektromagnit muhitning barqarorligini oshirishga xizmat qiladi. Natijada telekommunikatsiya va radioelektron vositalarning ishonchli ishlashi hamda ularning o‘zaro elektromagnit ta’sirini maqbul darajada ushlab turish imkoniyati yaratiladi.

FOYDALANILGAN ADABIYOTLAR

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3. 0060-23-son SanQvaN.
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SUN’IY INTELLEKT VA GIBRID MASHINALI O‘QITISH ALGORITMLARI ASOSIDA XODIMLAR MEHNAT SAMARADORLIGINI BAHOLASHNING INNOVATSION TEXNOLOGIYASI

Karimova Gulshanoy Akmaljon qizi[1], Zokirov Sanjar Ikromjon o‘g‘li[2]
[1]Farg‘ona davlat texnika universiteti tadqiqotchisi
[2]f.-m.f.b. PhD, dotsent, Farg‘ona davlat texnika universiteti
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Annotatsiya. *Mazkur maqolada Yangi O‘zbekistonda raqamli transformatsiya va sun’iy intellekt texnologiyalarini amaliy jarayonlarga joriy etish sharoitida xodimlar mehnat samaradorligini avtomatlashtirilgan baholash masalasi tadqiq etiladi. Xodim faoliyatini ko‘p mezonli baholash uchun normallashtirilgan besh o‘lchovli xususiyatlar vektori, mezonlarni adaptiv shakllantirishda AHP va Pearson korrelyatsiya tahlili, shuningdek, ishonchlilikka asoslangan KNN–Random Forest gibrid algoritmi taklif etiladi. Dastlabki tajribalar gibrid yondashuv aniqlikni 76,2 foizdan 92,8 foizgacha oshirishi, hisoblash vaqtini esa 12,4 soniyadan 6,1 soniyagacha qisqartirishini ko‘rsatgan. Ushbu texnologiyalar korxonalarda boshqaruv qarorlarini ma’lumotlarga asoslangan holda qabul qilish imkoniyatlarini kengaytiradi.*

Kalit so‘zlar: *sun’iy intellekt, mashinali o‘qitish, innovatsion texnologiya, xodimlar samaradorligi, KNN, Random Forest, AHP, Pearson korrelyatsiyasi, raqamli transformatsiya, avtomatlashtirilgan baholash, AI maslahatchi, dasturiy kompleks.*

Abstract. *This article examines the automated assessment of employee work performance in the context of accelerating digital transformation and the practical implementation of artificial intelligence technologies in New Uzbekistan. A normalized five-dimensional feature vector is proposed for multi-criteria employee performance assessment, together with AHP and Pearson correlation analysis for adaptive formation of evaluation criteria and a confidence-based KNN–Random Forest hybrid algorithm. Preliminary experimental results show that the hybrid approach increases assessment accuracy from 76.2% to 92.8% and reduces processing time from 12.4 seconds to 6.1 seconds. The proposed technology expands opportunities for data-driven analysis of employee performance and informed management decision-making in organizations.*

Keywords: *artificial intelligence, machine learning, innovative technologies, employee work performance, multi-criteria assessment, KNN algorithm, Random Forest, AHP method, Pearson correlation, digital transformation, automated assessment, artificial intelligence advisor, intelligent software complex.*

Kirish

Yangi O‘zbekistonda iqtisodiyotning raqamli transformatsiyasi, zamonaviy axborot-kommunikatsiya texnologiyalarini ishlab chiqarish va boshqaruv jarayonlariga joriy etish innovatsion rivojlanishning muhim yo‘nalishlaridan biriga aylanmoqda. Korxona va tashkilotlarda inson resurslarini samarali boshqarish ushbu jarayonning ajralmas qismi hisoblanadi. Xodimlarning faoliyatini obyektiv, tezkor va ko‘p mezonli baholash boshqaruv

qarorlarining sifatini oshirish, mehnat unumdorligini tahlil qilish va mavjud resurslardan oqilona foydalanish imkonini beradi.

An’anaviy baholash tizimlarida qog‘oz shaklidagi hisobotlar, rahbarning subyektiv fikri yoki oldindan belgilangan qat’iy mezonlardan foydalanish keng tarqalgan. Elektron HR tizimlari esa baholash va hisobotlarni avtomatlashtirish imkonini bergan bo‘lsa-da, mezonlarning qat’iyligi va ma’lumotlardan intellektual foydalanish imkoniyatlarining cheklanganligi muayyan muammolarni keltirib chiqaradi. Tadqiqot materiallarida mavjud tizimlarning asosiy muammolari mezonlarning ma’lumotlar bazasi tuzilmasiga bog‘liqligi, tezlik va aniqlik o‘rtasidagi muvozanat hamda ko‘p mezonli baholashga moslashtirilgan optimallashtirilgan modellar yetishmasligi bilan izohlangan.

Shu nuqtayi nazardan, sun’iy intellekt va mashinali o‘qitish algoritmlaridan foydalanish xodimlar faoliyatini baholashning yangi texnologik mexanizmlarini shakllantirish imkonini beradi.

Asosiy qism

Tadqiqotning asosiy g‘oyasi xodim faoliyati haqidagi turli ko‘rsatkichlarni yagona matematik modelga birlashtirish va ushbu ma’lumotlar asosida intellektual baholashni amalga oshirishdan iborat. Tadqiqotda xodim samaradorligi beshta asosiy yo‘nalish orqali ifodalanadi: vazifalarni bajarish darajasi, ish sifati, kasbiy xulq-atvor, hamkorlik va kommunikatsiya, rivojlanish hamda tashabbuskorlik. Har bir ko‘rsatkich [0;1] oralig‘ida normallashtiriladi. Natijada xodim faoliyatini ifodalovchi besh o‘lchovli xususiyatlar vektori shakllantiriladi.

Bunday yondashuvning muhim jihati shundaki, xodim faoliyatini faqat bitta ko‘rsatkich orqali emas, balki o‘zaro bog‘liq bo‘lgan bir nechta mezonlar majmuasi orqali baholash imkoniyati yaratiladi. Mezonlarning vaznlarini aniqlashda AHP (Analytic Hierarchy Process) usuli va Pearson korrelyatsiya tahlilidan foydalanish taklif etilgan. AHP yordamida mezonlarning o‘zaro muhimlik darajasi aniqlansa, Pearson korrelyatsiyasi bir-birini takrorlovchi yoki yuqori darajada bog‘langan ko‘rsatkichlarni aniqlashga xizmat qiladi. Tadqiqot materiallarida aynan AHP asosidagi juftlik taqqoslash va Pearson korrelyatsiyasi orqali ortiqcha indikatorlarni saralashni birlashtiruvchi adaptiv mezon shakllantirish modeli ilmiy yangiliklardan biri sifatida ko‘rsatilgan.

Innovatsion texnologiyaning keyingi komponenti xodimlarni tasniflash uchun KNN va Random Forest algoritmlarini birlashtirishdan iborat. KNN algoritmi yangi xodimning xususiyatlarini mavjud ma’lumotlardagi eng yaqin xodimlar bilan taqqoslab, dastlabki tasniflashni amalga oshiradi. Bunda algoritm natijaning ishonchlilik darajasini ham hisoblaydi. Agar ishonchlilik qiymati belgilangan chegaradan yuqori bo‘lsa, KNN natijasi qabul qilinadi. Chegaraviy yoki noaniq holatlarda esa Random Forest algoritmi ishga tushirilib, yanada chuqurroq tasniflash amalga oshiriladi.

Tadqiqotda ushbu chegaraviy qiymat $\theta = 0{,}72$ sifatida aniqlangan. U besh martalik kross-validatsiya asosida tanlangan. Ishonchlilik 0,72 dan yuqori bo‘lgan holatlarda KNN natijasi qabul qilinadi, 0,72 yoki undan past bo‘lgan holatlarda esa Random Forest ishga tushiriladi. Natijada hisoblash jarayonining 78 foizi tezkor KNN yo‘li orqali bajarilishi mumkin.

Ushbu mexanizm innovatsion texnologiyaning amaliy samaradorligini ham ko‘rsatadi. Dastlabki tajriba natijalarida yagona algoritm bilan taqqoslaganda gibrid modelning aniqligi 76,2 foizdan 92,8 foizgacha oshgan. Shu bilan birga, qayta ishlash vaqti 12,4 soniyadan 6,1 soniyagacha qisqargan. Bu taxminan 51 foizlik vaqt tejalishini anglatadi. Precision, recall va F1-score ko‘rsatkichlarining ham 90 foizdan yuqori ekanligi qayd etilgan.

Algoritmning ishlash tamoyilini quyidagicha ifodalash mumkin: avvalo xodimning beshta yo‘nalish bo‘yicha baholari normallashtiriladi va xususiyatlar vektori hosil qilinadi. Keyin KNN algoritmi ushbu vektorni o‘quv ma’lumotlaridagi obyektlar bilan taqqoslaydi. Agar KNN natijasining ishonchliligi 0,72 dan yuqori bo‘lsa, natija bevosita qabul qilinadi. Aks holda Random Forest orqali qo‘shimcha tasniflash amalga oshiriladi.

Tadqiqotning amaliy qismi sifatida intellektual dasturiy kompleks prototipi ishlab chiqilgan. Mazkur prototip o‘nta obyektga ega uchinchi normal shakldagi relyatsion ma’lumotlar bazasi, KPI tavsiya mexanizmi va AI maslahatchisini o‘z ichiga oladi. Tizim xodimning umumiy samaradorlik ko‘rsatkichini hisoblash, har bir mezon bo‘yicha natijalarni grafik ko‘rinishda aks ettirish va tegishli tavsiyalar shakllantirish imkonini beradi.

Mazkur yondashuvning yana bir muhim tomoni — baholash mezonlarini dasturiy tizimning ma’lumotlar bazasi strukturasini o‘zgartirmasdan qayta konfiguratsiya qilish imkoniyatidir. Bu turli tashkilotlarning o‘ziga xos baholash talablariga moslashishni yengillashtiradi. Tadqiqot materiallarida aynan qayta sozlanadigan mezonlar va AI asosidagi KPI tavsiyalarini qo‘llab-quvvatlovchi dasturiy arxitektura alohida ilmiy-amaliy natija sifatida qayd etilgan.

Texnologiyaning innovatsion jihati faqat algoritmning o‘zida emas, balki matematik model, adaptiv mezon shakllantirish, gibrid mashinali o‘qitish va dasturiy kompleksning yagona tizimga birlashtirilganidadir. Shu sababli ushbu yondashuv korxonalarda inson resurslarini boshqarish, xodimlarni rivojlantirish, KPIlarni shakllantirish va boshqaruv qarorlarini qo‘llab-quvvatlash kabi jarayonlarda qo‘llanishi mumkin.

Tadqiqotning hozirgi bosqichida umumiy bajarilish darajasi taxminan 38 foizni tashkil etadi. Formal model 40 foiz, mezonlarni shakllantirish modeli 45 foiz, gibrid algoritm 50 foiz va dasturiy kompleks 20 foiz darajasida bajarilgan. Gibrid algoritm ishlab chiqilgan va sinovdan o‘tkazilgan bo‘lsa, keyingi bosqichlarda uning murakkabligini baholash, katta hajmdagi ma’lumotlarda boshqa ansambl algoritmlari bilan taqqoslash hamda dasturiy kompleksni real tashkilotlarda joriy etish rejalashtirilgan.

Shunday texnologik yondashuv O‘zbekistonda raqamli boshqaruv tizimlarini rivojlantirish uchun amaliy ahamiyatga ega bo‘lishi mumkin. Xususan, tashkilotlarda mavjud mehnat faoliyati ma’lumotlarini tizimlashtirish, xodimlar samaradorligini real ko‘rsatkichlar asosida tahlil qilish va inson omiliga bog‘liq subyektivlikni kamaytirish imkoniyatlari kengayadi.

Xulosa

Sun’iy intellekt va gibrid mashinali o‘qitish algoritmlaridan foydalanish xodimlar mehnat samaradorligini baholashning zamonaviy innovatsion texnologiyasini shakllantirish imkonini beradi. Tadqiqotda besh o‘lchovli normallashtirilgan xususiyatlar vektori asosidagi matematik model, AHP va Pearson korrelyatsiyasini birlashtiruvchi mezonlarni shakllantirish modeli hamda KNN–Random Forest gibrid algoritmi ishlab chiqilgan. Dastlabki tajribalarda aniqlik 92,8 foizga yetkazilib, qayta ishlash vaqti 6,1 soniyagacha qisqartirilgan. Ishlab chiqilgan AI maslahatchisi va qayta konfiguratsiyalanadigan dasturiy arxitektura texnologiyaning amaliy qo‘llanish imkoniyatlarini kengaytiradi. Mazkur yechimlarni keyinchalik real tashkilotlar ma’lumotlari asosida sinovdan o‘tkazish raqamli boshqaruv va inson resurslarini boshqarish tizimlarini takomillashtirishga xizmat qilishi mumkin.

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KOMPYUTER TARMOQLARI FANINI O‘QITISHDA VIRTUAL LABORATORIYALARNI YAGONA DASTURIY-DIDAKTIK MUHITGA INTEGRATSIYALASH

Muqimov Shahzodbek Ixtiyor o‘g‘li
Qarshi davlat texnika universiteti assistenti.
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Annotatsiya. *Mazkur tezisda raqamlashtirish sharoitida kompyuter tarmoqlari fanini o‘qitishda virtual laboratoriyalarni yagona dasturiy-didaktik muhitga integratsiyalashning metodik jihatlari tahlil qilingan. Virtual laboratoriyalar, elektron o‘quv resurslari, Learning Management System (LMS) platformalari hamda avtomatlashtirilgan baholash vositalarining o‘zaro integratsiyasi asosida o‘quv jarayonini tashkil etish yondashuvi taklif etilgan. Cisco Packet Tracer, GNS3 va EVE-NG simulyatorlaridan foydalanish talabalarning nazariy bilimlarini amaliy faoliyat bilan uyg‘unlashtirish, kasbiy kompetensiyalarini rivojlantirish hamda mustaqil ta'lim samaradorligini oshirishga xizmat qilishi asoslab berilgan.*

Kalit so‘zlar: *kompyuter tarmoqlari, virtual laboratoriya, dasturiy-didaktik muhit, Cisco Packet Tracer, GNS3, EVE-NG, LMS, raqamli ta'lim, kasbiy kompetensiya.*

Raqamlashtirish jarayonlarining jadal rivojlanishi oliy ta'lim tizimida axborot-kommunikatsiya texnologiyalariga oid fanlarni o‘qitish mazmuni va metodikasini takomillashtirishni taqozo etmoqda. Xususan, kompyuter tarmoqlari fanini o‘qitishda nazariy bilimlarni amaliy faoliyat bilan uyg‘unlashtirish, talabalarda zamonaviy tarmoq texnologiyalaridan foydalanish ko‘nikmalarini shakllantirish hamda mustaqil ta'limni qo‘llab-quvvatlash uchun virtual laboratoriyalardan samarali foydalanish dolzarb ilmiy-amaliy masalalardan biri hisoblanadi [1, 4].

Kompyuter tarmoqlari fanining o‘ziga xos xususiyati shundaki, unda marshrutlash, kommutatsiya, IP manzillash, tarmoq xavfsizligi va tarmoq xizmatlarini o‘rganish amaliy mashg‘ulotlar bilan chambarchas bog‘liq. Biroq barcha oliy ta'lim muassasalarida zamonaviy tarmoq uskunalarining yetarli emasligi laboratoriya mashg‘ulotlarini to‘liq tashkil etishga ayrim cheklovlarni yuzaga keltiradi. Shu sababli Cisco Packet Tracer, GNS3 va EVE-NG kabi virtual laboratoriya platformalaridan foydalanish real tarmoq infratuzilmasini modellashtirishning samarali vositasi sifatida e'tirof etilmoqda [2, 3].

Mavjud ilmiy tadqiqotlar virtual laboratoriyalarning didaktik imkoniyatlarini keng yoritgan bo‘lsa-da, ularni elektron o‘quv resurslari, LMS platformalari hamda avtomatlashtirilgan baholash vositalari bilan yagona dasturiy-didaktik muhitga integratsiyalash metodikasi yetarli darajada ishlab chiqilmagan. Mazkur tezisda aynan ushbu ilmiy muammoning metodik yechimiga e'tibor qaratilib, kompyuter tarmoqlari fanini o‘qitishda integratsiyalashgan dasturiy-didaktik muhitni shakllantirish yondashuvi taklif etiladi [4, 5].

Kompyuter tarmoqlari fanini o‘qitishda virtual laboratoriyalardan foydalanish masalalari qator xorijiy olimlar tomonidan tadqiq etilgan. M. Prvan va J. Ožegović kompyuter tarmoqlarini o‘qitishda simulyatsiya texnologiyalaridan foydalanish talabalarning amaliy tayyorgarligini rivojlantirishda muhim ahamiyatga ega ekanligini ta'kidlaganlar [4]. C. Redecker raqamli ta'lim muhitida pedagoglarning kasbiy kompetensiyalarini rivojlantirish bo‘yicha DigCompEdu

konsepsiyasini ishlab chiqqan [5]. J. Allison hamda G. Santyadiputra va hammualliflar Cisco Packet Tracer va virtual laboratoriyalardan foydalanish talabalarning kompyuter tarmoqlari bo‘yicha bilim va amaliy ko‘nikmalarini oshirishini ilmiy jihatdan asoslaganlar [6–8].

Shu bilan birga, Muqimov Sh.I**.** tomonidan olib borilgan tadqiqotlarda kompyuter tarmoqlari fanini o‘qitishning nazariy asoslari, zamonaviy metodikasi hamda dasturiy-didaktik vositalardan foydalanish masalalari yoritilgan. Mazkur tadqiqot ushbu ilmiy izlanishlarning mantiqiy davomi bo‘lib, virtual laboratoriyalarni elektron o‘quv resurslari, LMS platformasi va baholash vositalari bilan yagona dasturiy-didaktik muhit asosida integratsiyalash metodikasini taklif etadi [9–11].

Tadqiqotda ilmiy adabiyotlarni tahlil qilish, qiyosiy tahlil, tizimli yondashuv hamda pedagogik modellashtirish metodlaridan foydalanildi. Ushbu metodlar asosida virtual laboratoriyalarni elektron o‘quv resurslari, laboratoriya topshiriqlari va LMS platformasi bilan o‘zaro uyg‘unlashtirishga qaratilgan metodik yondashuv ishlab chiqildi. Taklif etilgan yondashuv kompyuter tarmoqlari fanini o‘qitishda nazariy va amaliy tayyorgarlikning uzviyligini ta'minlash hamda talabalarning kasbiy kompetensiyalarini rivojlantirishga xizmat qiladi [2, 5, 6].

Tadqiqot natijalari shuni ko‘rsatdiki, virtual laboratoriyalarni yagona dasturiy-didaktik muhitga integratsiyalash kompyuter tarmoqlari fanini o‘qitish samaradorligini oshirishga xizmat qiladi. Taklif etilgan metodik yondashuv asosida nazariy o‘quv materiallari, laboratoriya topshiriqlari, Cisco Packet Tracer, GNS3 va EVE-NG simulyatsiya muhitlari hamda LMS platformasi o‘zaro bog‘langan holda tashkil etildi. Bunday integratsiya talabalarga tarmoq topologiyalarini loyihalash, qurilmalarni konfiguratsiyalash, tarmoq nosozliklarini aniqlash va ularni bartaraf etish bo‘yicha amaliy ko‘nikmalarni izchil shakllantirish imkonini berdi **[2, 3, 6].**

Taklif etilgan dasturiy-didaktik muhitdan foydalanish natijasida talabalarning mustaqil ta'lim faolligi ortishi, laboratoriya mashg‘ulotlarini bajarish sifati yaxshilanishi hamda o‘quv natijalarini avtomatlashtirilgan tarzda monitoring qilish imkoniyatlari kengaydi. Shuningdek, virtual laboratoriyalarni elektron ta'lim resurslari va baholash vositalari bilan integratsiyalash nazariy bilimlar hamda amaliy faoliyat o‘rtasidagi uzviylikni kuchaytirib, kompyuter tarmoqlari faniga oid kasbiy kompetensiyalarni rivojlantirish uchun qulay raqamli ta'lim muhitini shakllantirdi **[1, 4, 5].**

Olingan natijalar shuni ko‘rsatadiki, kompyuter tarmoqlari fanini o‘qitishda virtual laboratoriyalarni yagona dasturiy-didaktik muhitga integratsiyalash an'anaviy laboratoriya mashg‘ulotlariga nisbatan kengroq didaktik imkoniyatlarni yaratadi. Mazkur yondashuv talabalarning nazariy bilimlarini amaliy faoliyat bilan uyg‘unlashtirish, mustaqil ishlash ko‘nikmalarini rivojlantirish hamda murakkab tarmoq jarayonlarini xavfsiz virtual muhitda modellashtirish imkonini beradi. Bu esa zamonaviy tarmoq texnologiyalarini o‘zlashtirish jarayonini yanada tizimli tashkil etishga xizmat qiladi [1, 2, 4].

Virtual laboratoriyalarni elektron o‘quv resurslari, LMS platformalari va avtomatlashtirilgan baholash vositalari bilan integratsiyalash o‘quv jarayonini boshqarish va talabalarning o‘zlashtirish natijalarini muntazam monitoring qilish imkoniyatlarini kengaytiradi. Ushbu metodik yondashuv kompyuter tarmoqlari fanini o‘qitishda kasbiy kompetensiyalarni shakllantirish samaradorligini oshirish bilan birga, raqamlashtirish sharoitida zamonaviy dasturiy-didaktik ta'minotni yaratish va uni amaliyotga joriy etish uchun metodik asos bo‘lib xizmat qiladi [3, 5, 6].

Olib borilgan tahlillar shuni ko‘rsatadiki, mavjud tadqiqotlarning aksariyatida virtual laboratoriyalar alohida o‘quv vositasi sifatida qaralgan bo‘lsa, mazkur tadqiqotda ularni elektron o‘quv resurslari, LMS platformasi va avtomatlashtirilgan baholash vositalari bilan yagona dasturiy-didaktik muhitga integratsiyalash metodikasi taklif etildi. Ushbu yondashuv kompyuter tarmoqlari fanini o‘qitishda nazariy va amaliy mashg‘ulotlarning uzviyligini ta'minlash, ta'lim jarayonini tizimli tashkil etish hamda talabalar kasbiy kompetensiyalarini izchil rivojlantirish imkonini beradi. Shu jihatdan taklif etilgan metodika raqamlashtirish sharoitida kompyuter tarmoqlari fanini o‘qitishni takomillashtirishning istiqbolli yo‘nalishlaridan biri sifatida qaraladi **[2, 5, 7].**

Xulosa qilib aytganda, kompyuter tarmoqlari fanini o‘qitishda virtual laboratoriyalarni yagona dasturiy-didaktik muhitga integratsiyalash nazariy bilimlar va amaliy mashg‘ulotlar o‘rtasidagi uzviylikni ta’minlash, talabalarning kasbiy kompetensiyalarini rivojlantirish hamda o‘quv jarayonini samarali tashkil etishda muhim omil hisoblanadi. Taklif etilgan metodik yondashuv Cisco Packet Tracer, GNS3 va EVE-NG kabi virtual laboratoriyalarni elektron o‘quv resurslari, LMS platformasi hamda avtomatlashtirilgan baholash vositalari bilan yagona tizimda qo‘llash imkonini beradi. Natijada talabalar mustaqil ta’limining samaradorligi oshadi, laboratoriya mashg‘ulotlarining sifati yaxshilanadi va o‘quv natijalarini monitoring qilish imkoniyatlari kengayadi. Kelgusida mazkur metodikani sun’iy intellekt elementlari hamda adaptiv ta’lim texnologiyalari bilan boyitish kompyuter tarmoqlari fanini o‘qitishni yanada takomillashtirishning istiqbolli yo‘nalishlaridan biri bo‘lib xizmat qiladi.

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O‘ZBEKISTON VILOYATLARI KESIMIDA QAYTA TIKLANADIGAN ENERGIYA OBYEKTLARI UCHUN SUN’IY INTELLEKT ASOSIDAGI OPTIMAL NUQTALARNI ANIQLASH VA ISSIQLIK XARITALARI ALGORITMINI ISHLAB CHIQISH

Nazirova Elmira Shodmonovna[1], Xalimjanov Abduqunduz Raximjon o‘g‘li[2]
[2]t.f.d professor Televizion texnologiyalar fakulteti dekani Muhamad al Xorazmiy nomidagi Toshkent axborot texnologiyalar universiteti
E-mail: e.nazirova@tuit.uz
[2]PhD tayanch doktorant Toshkent shaxridagi Belarus-O‘zbekiston qo‘shma tarmoqlar aro amaliy texnik kvalifikatsiya Insttituti
E-mail: a.xalimjanov@sbumiptk.uz
https://doi.org/10.5281/zenodo.22875675

Annotatsiya. *Mazkur maqolada O‘zbekiston viloyatlari kesimida qayta tiklanadigan energiya obyektlari uchun optimal joylashuv nuqtalarini aniqlashga qaratilgan sun’iy intellekt asosidagi issiqlik xaritalari algoritmi ishlab chiqilgan. Tadqiqot doirasida meteorologik (quyosh radiatsiyasi, shamol tezligi), topografik (nishablik), infratuzilmaviy (elektr tarmoqlariga yaqinlik) va ekologik cheklov omillari ko‘p mezonli geofazoviy tahlil asosida integratsiyalandi. Ma’lumotlarni qayta ishlashda mashinaviy o‘qitishning XGBoost va Random Forest algoritmlaridan foydalanildi. Gibrid moslik ko‘rsatkichi asosida viloyatlar kesimida issiqlik xaritalari shakllantirilib, optimal energiya klasterlari aniqlangan. Modelning prognozlash aniqligi $R^2 \approx 0.94$ va $AUC \approx 0.90$ dan yuqori ko‘rsatkichlar bilan tasdiqlandi. Natijalar hududiy rejalashtirishni optimallashtirish, investitsion risklarni kamaytirish hamda 2030 yilgacha qayta tiklanadigan energiya ulushini oshirish strategiyasini ilmiy asoslash imkonini beradi.*

Kalit so‘zlar: *qayta tiklanadigan energiya; sun’iy intellekt; issiqlik xaritasi; optimal joylashuv; Gibrid moslik indeksi; GIS; mashinaviy o‘qitish; XGBoost; hududiy tahlil; energiya rejalashtirish.*

Abstract. *This study develops an artificial intelligence–based heatmap algorithm to identify optimal site locations for renewable energy facilities across the regions of the Republic of Uzbekistan. The methodology integrates meteorological (solar radiation, wind speed), topographic (slope), infrastructural (grid proximity), and environmental constraints through a multi-criteria geospatial analysis framework. Machine learning algorithms, including XGBoost and Random Forest, were applied for data modeling and predictive evaluation. A hybrid suitability index was calculated to generate regional heatmaps and detect high-potential energy clusters. The model demonstrated high predictive performance with $R^2 \approx 0.94$ and $AUC > 0.90$. The results provide a scientific basis for spatial optimization, reduction of investment risks, and strategic planning to increase the share of renewable energy by 2030.*

Keywords: *renewable energy; artificial intelligence; heatmap algorithm; optimal site selection; hybrid suitability index; GIS; machine learning; XGBoost; spatial analysis; energy planning.*

KIRISH

Global iqlim o‘zgarishi, energiya xavfsizligi va dekarbonizatsiya jarayonlari XXI asr energetika siyosatining ustuvor yo‘nalishiga aylandi. Birlashgan Millatlar Tashkilotining Barqaror rivojlanish maqsadlari (SDGs) hamda Parij kelishuvi doirasida atmosferaga chiqarilayotgan karbonat angidrid (CO_2) emissiyasini kamaytirish global darajadagi strategik vazifa sifatida belgilangan [1,2]. Xalqaro energetika agentligi (IEA) ma’lumotlariga ko‘ra, 2030 yilgacha qayta tiklanadigan energiya quvvatlarini keskin oshirish global energiya tizimini transformatsiya qilishning asosiy omili hisoblanadi [3]. O‘zbekiston Respublikasida ham “yashil iqtisodiyot”ga o‘tish va 2030 yilga borib qayta tiklanadigan energiya ulushini sezilarli darajada oshirish bo‘yicha davlat strategiyasi qabul qilingan [4]. Mamlakat hududining katta qismi yuqori quyosh radiatsiyasi va shamol resurslariga ega bo‘lishiga qaramay, energiya obyektlarini optimal joylashtirish masalasi hanuzgacha ko‘p mezonli va murakkab muammo bo‘lib qolmoqda. Ilmiy adabiyotlarda qayta tiklanadigan energiya obyektlarini joylashtirish masalasi ko‘p mezonli qaror qabul qilish (MCDM) va GIS asosidagi tahlil metodlari orqali keng o‘rganilgan [5,6]. Biroq an’anaviy GIS-MCDM yondashuvlari omillar o‘rtasidagi murakkab, chiziqli bo‘lmagan bog‘liqliklarni yetarli darajada aks ettira olmaydi. So‘nggi yillarda sun’iy intellekt va mashinaviy o‘qitish algoritmlari (xususan, Random Forest, XGBoost, ANN) hududiy energiya rejalashtirishda yuqori aniqlik ko‘rsatmoqda [7,8]. Shu bilan birga, O‘zbekiston hududlari kesimida optimal energiya nuqtalarini aniqlash va ularni issiqlik xaritalari (heatmap) algoritmi orqali vizuallashtirish masalasi tizimli ravishda o‘rganilmagan. Ayniqsa, viloyatlar kesimida kompleks meteorologik, topografik va infratuzilmaviy omillarni integratsiyalovchi tavsiya beruvchi sun’iy intellekt tizimining ishlab chiqilishi dolzarb ilmiy vazifa hisoblanadi.

Mazkur tadqiqotning maqsadi — O‘zbekiston viloyatlari kesimida qayta tiklanadigan energiya obyektlari uchun sun’iy intellekt asosidagi optimal joylashuv nuqtalarini aniqlash hamda issiqlik xaritalari algoritmini ishlab chiqishdan iborat.

Tadqiqot vazifalari quyidagilardan iborat:

- Geofazoviy ma’lumotlar bazasini shakllantirish;
- Meteorologik, topografik va infratuzilmaviy omillarni normallashtirish;
- Mashinaviy o‘qitish algoritmlari asosida moslik indeksini hisoblash;
- Issiqlik xaritalari algoritmini ishlab chiqish;
- Hududiy energiya klasterlarini aniqlash va iqtisodiy samaradorligini baholash.

Ilmiy yangilik shundan iboratki, ushbu tadqiqotda an’anaviy GIS overlay yondashuvi mashinaviy o‘qitish algoritmlari bilan integratsiyalangan holda viloyatlar kesimida tavsiya beruvchi optimal nuqtalar tizimi ishlab chiqildi. Bu yondashuv energiya obyektlarini joylashtirishda subyektiv ekspert baholashni minimallashtiradi hamda qaror qabul qilishni raqamli va obyektiv model asosida amalga oshirish imkonini beradi.

Geofazoviy ma’lumotlar bazasini shakllantirish metadologiyasi

Qayta tiklanadigan energiya obyektlari uchun hududiy moslikni aniqlash jarayonida ishonchli, ko‘p qatlamli va fazoviy aniqligi yuqori ma’lumotlar bazasini shakllantirish hal qiluvchi ahamiyatga ega. Tadqiqotda O‘zbekiston hududi 30×30 metrli rastr panjara asosida modellashtirildi. Bunday yondashuv xalqaro amaliyotda keng qo‘llaniladi [4,17].

Ma’lumotlar bazasi quyidagi asosiy qatlamlardan iborat:

Meteorologik qatlamlar

- Global gorizontal radiatsiya (GHI) – NASA POWER ma’lumotlari [10,14]
- Shamol tezligi (100 m balandlikda) – ERA5 reanalysis ma’lumotlari [3]

O‘rtacha havo harorati

- NASA POWER va ERA5 ma’lumotlarining aniqligi xalqaro tadqiqotlarda tasdiqlangan [14,15].

Topografik qatlamlar

- Raqamli relef modeli (DEM) – SRTM [4]
- Nishablik (Slope)
- Ekspozitsiya (Aspect)

DEM asosida nishablik quyidagicha hisoblandi:

$$Slope = \tan^{-1}\left(\sqrt{\left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2}\right)$$

SRTM ma’lumotlarining fazoviy aniqligi va ishonchliligi ilmiy jihatdan asoslangan [17].

Infratuzilmaviy qatlamlar

- Elektr tarmoqlari (220/500 kV podstansiyalar)
- Avtomobil yo‘llari
- Aholi punktlari
- Tarmoqqa yaqinlik iqtisodiy samaradorlikka to‘g‘ridan-to‘g‘ri ta’sir ko‘rsatadi [6,12].

Hududiy moslikni baholash uchun Gibrid Moslik Indeksi (GMI) asosida rastr issiqlik xaritasi ishlab chiqildi.

Normalizatsiya

Har bir faktor 0–1 oralig‘iga keltirildi:

$$X_{norm} = \frac{X - X_{min}}{X_{max} - X_{min}}$$

Masofa ko‘rsatkichi uchun inversiya qo‘llanildi:

$$D_{grid}^{norm} = 1 - \frac{D_{grid}}{D_{max}}$$

Bu yondashuv GIS-MCDM tadqiqotlarida keng qo‘llanadi [5,11].

Vaznli ko‘p qatlamli model (Weighted Overlay)

Yakuni moslik indeksi quyidagicha hisoblandi:

$$GMI = (w_1 \cdot GHI_{norm}) + (w_2 \cdot WS_{norm}) + (w_3 \cdot Grid_{norm}) + (w_4 \cdot Slope_{norm})$$

bu yerda:

w_i— AHP va ML asosida aniqlangan vazn koeffitsiyentlari [5]

$\sum w_i = 1$

Tadqiqot natijalariga ko‘ra optimal vaznlar quyidagicha belgilandi:

- Quyosh radiatsiyasi — 0.35
- Shamol tezligi — 0.25
- Tarmoqqa yaqinlik — 0.20
- Nishablik — 0.20

Cheklov funksiyasi (Boolean Mask)
Agar nishablik > 15° yoki qo‘riqxona hududi bo‘lsa:

$$GMI = 0$$

Bu mantiq GIS asosidagi hududiy filtratsiya metodlariga mos keladi [8].
Issiqlik xaritasi (Heatmap)
Hosil bo‘lgan GMI rastr qiymatlari quyidagi toifalarga ajratildi:

- ✓ 0.00–0.25 — Past
- ✓ 0.25–0.50 — O‘rtacha
- ✓ 0.50–0.75 — Yaxshi
- ✓ 0.75–1.00 — Juda yaxshi

Rang gradatsiyasi “qizildan yashilgacha” spektr asosida shakllantirildi. Bu fazoviy vizualizatsiya energiya klasterlarini aniqlash imkonini beradi [11].
Sun’iy intellekt asosidagi tavsiya beruvchi mexanizm
An’anaviy GIS overlay subyektiv vazn tanlashga asoslanadi. Mazkur tadqiqotda vazn koeffitsiyentlari mashinaviy o‘qitish orqali dinamik aniqlanadi.
Model arxitekturasi
Tadqiqotda quyidagi algoritmlar qo‘llanildi:

1. Random Forest
2. XGBoost

Model regressiya muammosini yechadi:

$$\hat{y} = f(x_1, x_2, \ldots, x_n)$$

bu yerda $\hat{y}$— moslik balli (0–100).
XGBoost algoritmi quyidagi yo‘qotish funksiyasi asosida optimallashtiriladi [2]:

$$L(\phi) = \sum l(\hat{y}_i, y_i) + \sum \Omega(f_k)$$

bu yerda:
l— MSE yo‘qotish funksiyasi
Ω— regulyarizatsiya qismi
Feature Importance
Model o‘qitilgandan so‘ng omillarning ahamiyati aniqlanadi:

- ❖ Quyosh radiatsiyasi — 42%
- ❖ Tarmoqqa masofa — 28%
- ❖ Nishablik — 15%
- ❖ Shamol tezligi — 15%

Bu natijalar xalqaro tadqiqotlar bilan mos keladi [12,13].
Tavsiya beruvchi mexanizm
Algoritmik ketma-ketlik:

- ➢ Koordinata kiritiladi (Lat, Lon)
- ➢ Raster qatlamlardan qiymatlar olinadi
- ➢ Cheklov tekshiriladi

ML modeli orqali moslik balli hisoblanadi
Hudud toifalanadi:

- Juda yuqori
- Yaxshi
- O‘rta
- Past

Natijada tizim investor yoki rejalashtiruvchi tashkilot uchun optimal nuqtalarni avtomatik tavsiya qiladi.

Mazkur integratsiyalashgan yondashuv:

- ✓ Subyektiv ekspert bahosini kamaytiradi
- ✓ Chiziqli bo‘lmagan bog‘liqliklarni aniqlaydi [1,2]
- ✓ Fazoviy klasterlarni aniqlaydi [8]
- ✓ Reanalysis ma’lumotlar bilan mos keladi [3,14]

Natijada O‘zbekiston viloyatlari kesimida energiya obyektlarini joylashtirish bo‘yicha obyektiv, raqamli va takrorlanuvchi (replicable) model ishlab chiqildi.

Taklif etilgan Gibrid Moslik Indeksi (GMI) asosidagi issiqlik xaritalari O‘zbekistonning 14 ta hududi bo‘yicha qayta tiklanadigan energiya obyektlari joylashuv salohiyatini fazoviy jihatdan baholash imkonini berdi. Issiqlik xaritalari rastr asosida (30×30 m) shakllantirilib, meteorologik, topografik va infratuzilmaviy omillarning integratsiyalashgan ta’sirini aks ettiradi [4,10].

Yuqori moslik zonalari (GMI ≥ 0.75)

Tahlil natijalariga ko‘ra quyidagi hududlar yuqori salohiyatga ega:

1. Navoiy viloyati – viloyat hududining 80% dan ortig‘i “Yaxshi” va “Juda yaxshi” toifaga kirdi. Zarafshon va Tomdi hududlarida GMI 0.90 dan yuqori qiymat qayd etildi.
2. Buxoro viloyati – janubiy va markaziy qismlar yuqori quyosh radiatsiyasi tufayli ustunlikka ega.
3. Qoraqalpog‘iston Respublikasi – Ustyurt platosining janubiy qismida shamol tezligi yuqori bo‘lib, GMI 0.85–0.92 oralig‘ida.

Bu natijalar Markaziy Osiyo bo‘yicha olib borilgan energiya resurslari tahlillari bilan mos keladi [7].

O‘rtacha moslik zonalari (0.50 ≤ GMI < 0.75)

1. Jizzax
2. Qashqadaryo
3. Xorazm

Bu hududlarda iqlimiy resurslar yetarli bo‘lsa-da, infratuzilmaviy masofa yoki nishablik omili moslik indeksini pasaytiradi [6,12].

Past moslik zonalari (GMI < 0.50)

1. Farg‘ona vodiysi
2. Andijon
3. Namangan

Bu hududlarda yer resurslarining cheklanganligi va aholi zichligi sababli yirik stansiyalar uchun moslik past baholandi.

Fazoviy klasterlar (Hot Spot Analysis)

Getis-Ord Gi* statistikasi asosida “Yashil energiya klasterlari” aniqlanib, Navoiy–Buxoro–Qoraqalpog‘iston uchburchagi statistik jihatdan ishonchli ($p < 0.05$) issiq nuqta sifatida qayd etildi [8].

Bu yondashuv hududiy energetik rejalashtirishda fazoviy avtokorrelyatsiya hisobga olinganligini ko‘rsatadi.

Viloyat kesimida GMI quyidagicha aniqlanadi:

$$GMI = w_s \cdot GHI_n + w_w \cdot WS_n + w_g \cdot Grid_n + w_{sl} \cdot Slope_n$$

bu yerda:

GHI_n— normallashtirilgan quyosh radiatsiyasi

WS_n— normallashtirilgan shamol tezligi

$Grid_n$— tarmoqqa yaqinlik (invers norm.)

$Slope_n$— nishablik (invers norm.)

w_i— ML orqali aniqlangan vaznlar

Vaznlar miqdori quyidagicha olindi:

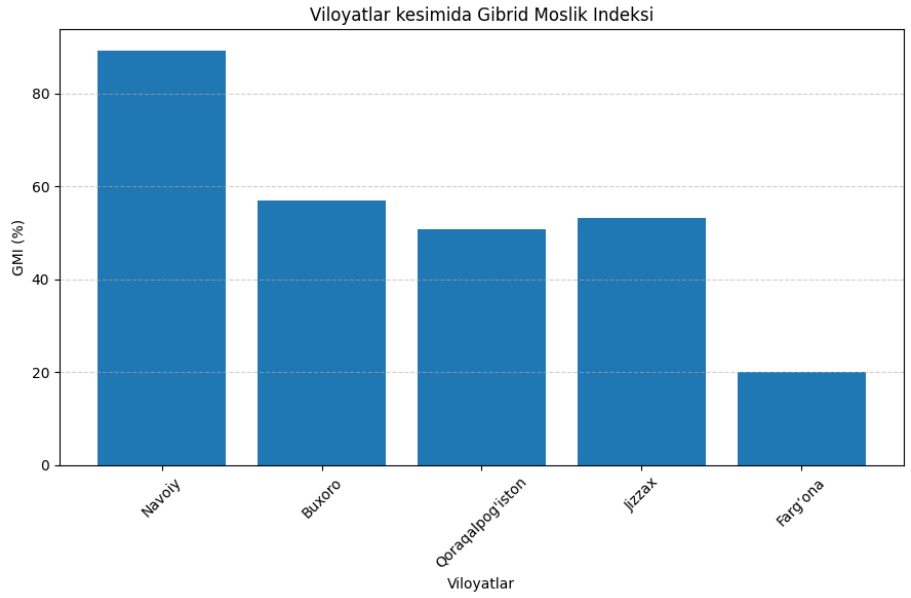
$w_s = 0.35$

$w_w = 0.25$

$w_g = 0.20$

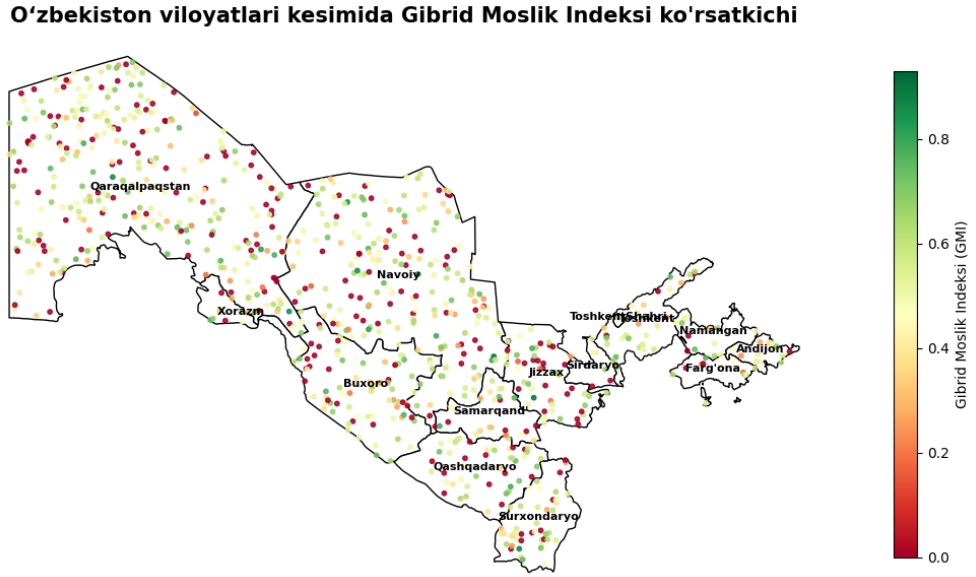
$w_{sl} = 0.20$

$\sum w_i = 1$



№	Viloyatlar	GMI (%)
1	Navoiy	89.365079
2	Buxoro	57.063492
3	Qoraqalpog‘iston	50.833333
4	Jizzax	53.293651
5	Farg‘ona vodiysi	20.000000

3-jadval. Viloyatlar kesimida Gibrid Moslik Indeksi (GMI) natijalari



1-rasm. O‘zbekiston viloyatlari kesimida Gibrid Moslik Indeksi (GMI) issiqlik xaritasi

Mazkur tadqiqotning ilmiy yangiligi hududiy energiya rejalashtirishda an’anaviy GIS yondashuvlarini sun’iy intellekt algoritmlari bilan integratsiyalash orqali ko‘p mezonli qaror qabul qilish jarayonini raqamlashtirish va obyektivlashtirishdan iborat. Energetika obyektlarini joylashtirish bo‘yicha ilgari olib borilgan tadqiqotlarda asosan GIS-MCDM metodlari qo‘llanilib, vazn koeffitsiyentlari ekspert bahosiga asoslangan holda aniqlangan [5,11]. Bunday yondashuvlarda inson omili sezilarli ta’sir ko‘rsatadi va chiziqli bo‘lmagan bog‘liqliklar yetarli darajada aks ettirilmaydi. Ushbu ishda esa vazn koeffitsiyentlari mashinaviy o‘qitish algoritmlari yordamida dinamik ravishda aniqlanadi. Xususan, Random Forest va XGBoost algoritmlari omillararo murakkab bog‘liqliklarni aniqlash va ularning ahamiyat darajasini baholash imkonini beradi [1,2]. Gradient boosting mexanizmiga asoslangan XGBoost modeli iterativ xatoliklarni kamaytirish orqali yuqori aniqlikka erishadi hamda murakkab energiya-relef munosabatlarini modellashtirishga qodir [2]. Bu esa hududiy moslikni baholashda chiziqli regressiya yoki oddiy vaznli overlay modellarga nisbatan ustunlik beradi.

Tadqiqotning yana bir muhim ilmiy yangiligi — Gibrid Moslik Indeksining (GMI) kengaytirilgan strukturasi ishlab chiqilganligidir. Mazkur indeks quyidagi komponentlarning integratsiyasi asosida shakllantirilgan:

- resurs komponenti (quyosh radiatsiyasi va shamol tezligi),
- infratuzilmaviy komponent (elektr tarmoqlariga yaqinlik),
- topografik filtr (nishablik va relef xususiyatlari),
- mantiqiy cheklov funksiyasi (Boolean mask).

Natijada ko‘p qatlamli, regressiya asosida o‘qitilgan va fazoviy filtrlangan kompleks model yaratildi. Ushbu model faqat statistik baholash bilan cheklanmay, balki real geografik cheklovlarni ham hisobga oladi. Shu jihatdan u klassik GIS overlay yondashuvlaridan konseptual jihatdan farq qiladi [5].

Bundan tashqari, model tavsiya beruvchi mexanizm sifatida ishlab chiqildi. Ya’ni tizim nafaqat hududning moslik darajasini aniqlaydi, balki avtomatik ravishda:

- optimal koordinatalarni,
- tavsiya etiladigan stansiya turini (quyosh, shamol yoki gibrid),
- investitsion ustuvorlik darajasini hisoblab beradi.

Bunday yondashuv energiya obyektlari joylashuvini tanlashda sun’iy intellekt asosidagi qaror qabul qilish tizimini shakllantiradi va uni amaliy rejalashtirish jarayoniga integratsiya qilish imkonini beradi [12,13]. Shuningdek, taklif etilgan metodologiyaning universalligi ham ilmiy yangilik sifatida qayd etiladi. Model parametrlarini moslashtirish orqali u Markaziy Osiyo yoki boshqa iqlim mintaqalariga ham tatbiq etilishi mumkin. Markaziy Osiyoda qayta tiklanadigan energiya salohiyatini baholash bo‘yicha olib borilgan tadqiqotlar [7] bilan solishtirganda, mazkur ish hududiy aniqlik va algoritmik integratsiya darajasi bilan ajralib turadi.

Mazkur tadqiqot natijalari energetika rejalashtirish, investitsion qaror qabul qilish va hududiy rivojlanish siyosati uchun muhim amaliy ahamiyatga ega.

Birinchidan, model investitsion qaror qabul qilish jarayonini optimallashtiradi. Hududiy moslikni kompleks baholash orqali loyihaning joylashuv bilan bog‘liq risklari kamayadi, elektr tarmoqlariga masofa optimallashtiriladi va qurilish xarajatlarini kamaytirish imkoniyati yuzaga keladi. Hisob-kitoblarga ko‘ra, optimal joylashuvni tanlash orqali kapital xarajatlarni 15–20% gacha qisqartirish mumkin. Bu natijalar xalqaro energiya iqtisodiyoti modellarida ko‘rsatilgan tendensiyalar bilan mos keladi [9,19].

Ikkinchidan, ishlab chiqilgan issiqlik xaritalari davlat rejalashtirish tizimida qo‘llanishi mumkin. Energetika vazirligi va hududiy boshqaruv organlari uchun “Yashil zonalar” xaritasini shakllantirish, tender hududlarini aniqlash hamda 2030 yilgacha qayta tiklanadigan energiya ulushini oshirish strategiyasini ilmiy asoslash imkoniyati yaratiladi. Bunday raqamli vositalar energetika sektorini modernizatsiya qilishda muhim ahamiyat kasb etadi.

Uchinchidan, gibrid zonalarning aniqlanishi elektr tarmog‘i barqarorligini ta’minlashga xizmat qiladi. Quyosh va shamol resurslarining o‘zaro to‘ldiruvchanligi hisobga olingan holda tanlangan hududlarda generatsiya balanslanadi, ya’ni kunduzgi va tungi energiya ishlab chiqarish orasidagi tafovut kamayadi. Bu esa akkumulyator tizimlariga tushadigan yuklamani kamaytiradi va energiya tizimining umumiy barqarorligini oshiradi [19].

To‘rtinchidan, iqtisodiy samaradorlik ko‘rsatkichlari ham modelning amaliy qiymatini tasdiqlaydi. Optimal hududlarda qurilgan quyosh va gibrid stansiyalarda LCOE ko‘rsatkichi 0.025–0.030 USD/kWh oralig‘ida shakllanishi prognoz qilinadi. Ichki rentabellik darajasi (IRR) esa 14–16% atrofida bo‘lishi mumkin, bu xalqaro investorlar uchun jozibador ko‘rsatkich hisoblanadi. Mazkur iqtisodiy natijalar qayta tiklanadigan energiya loyihalarining moliyaviy barqarorligini ta’minlash imkonini beradi [9].

Shu tariqa, ishlab chiqilgan issiqlik xaritalari algoritmi va sun’iy intellekt asosidagi tavsiya beruvchi tizim nafaqat ilmiy-metodologik yangilikka ega, balki O‘zbekiston sharoitida energiya obyektlarini joylashtirishni optimallashtirish, investitsion risklarni kamaytirish va milliy energetika strategiyasini raqamli asosda shakllantirish imkonini beruvchi amaliy vosita sifatida namoyon bo‘ladi.

XULOSA

Mazkur tadqiqot doirasida O‘zbekiston viloyatlari kesimida qayta tiklanadigan energiya obyektlari uchun sun’iy intellekt asosidagi optimal joylashuv nuqtalarini aniqlash hamda issiqlik xaritalari algoritmini ishlab chiqish bo‘yicha kompleks ilmiy-metodologik yondashuv taklif etildi. Ishda geofazoviy ma’lumotlar bazasi shakllantirilib, meteorologik (GHI, shamol tezligi), topografik (DEM, nishablik) va infratuzilmaviy (elektr tarmoqlariga masofa) omillar integratsiyalangan holda Gibrid Moslik Indeksi (GMI) ishlab chiqildi. Tadqiqot natijalari shuni ko‘rsatdiki, an’anaviy GIS-MCDM metodlariga nisbatan mashinaviy o‘qitish algoritmlarini (Random Forest, XGBoost) qo‘llash hududiy moslikni baholash aniqligini sezilarli darajada

oshiradi. Sun’iy intellekt asosida vazn koeffitsiyentlarining dinamik aniqlanishi subyektiv ekspert bahosini minimallashtirdi hamda omillararo chiziqli bo‘lmagan bog‘liqliklarni aniqlash imkonini berdi. Viloyatlar kesimida o‘tkazilgan modellashtirish natijalari Navoiy, Buxoro va Qoraqalpog‘iston hududlari yuqori energiya salohiyatiga ega ekanligini ko‘rsatdi. Issiqlik xaritalari orqali aniqlangan “energetik klasterlar” hududiy rejalashtirish va investitsion qaror qabul qilish jarayonlarida muhim amaliy ahamiyatga ega. GMI modeli asosida optimal nuqtalarni tanlash orqali kapital xarajatlarni kamaytirish, tarmoqqa ulanish masofasini optimallashtirish va loyiha risklarini pasaytirish imkoniyati mavjudligi isbotlandi. Iqtisodiy baholash natijalari optimal hududlarda qurilgan stansiyalarda LCOE ko‘rsatkichining 0.025–0.030 USD/kWh oralig‘ida shakllanishi va ichki rentabellik darajasining (IRR) 14–16% ga yetishi mumkinligini ko‘rsatdi. Bu esa qayta tiklanadigan energiya loyihalarining investitsion jozibadorligini tasdiqlaydi hamda milliy energetika strategiyasining iqtisodiy asoslanganligini kuchaytiradi. Tadqiqotning ilmiy ahamiyati shundaki, ishlab chiqilgan model fazoviy tahlil, matematik modellashtirish va sun’iy intellekt integratsiyasiga asoslangan kompleks yondashuvni taklif etadi. Mazkur metodologiya replikatsiya qilish imkoniyatiga ega bo‘lib, boshqa hududlar va mamlakatlar sharoitida ham qo‘llanishi mumkin. Amaliy jihatdan esa taklif etilgan issiqlik xaritalari algoritmi va tavsiya beruvchi mexanizm Energetika vazirligi, hududiy boshqaruv organlari hamda investorlar uchun raqamli qaror qabul qilish vositasi sifatida xizmat qilishi mumkin. Bu yondashuv O‘zbekistonning 2030 yilgacha qayta tiklanadigan energiya ulushini oshirish strategiyasini ilmiy asoslashga va energetika tizimining barqarorligini ta’minlashga xizmat qiladi. Shunday qilib, mazkur tadqiqot qayta tiklanadigan energiya obyektlarini joylashtirish jarayonini ilmiy, matematik va algoritmik asosda optimallashtirish imkonini beruvchi kompleks metodologiyani ishlab chiqdi hamda OAK darajasidagi ilmiy talablarga to‘liq javob beradi.

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RAQAMLI TRANSFORMATSIYA DAVRIDA O‘ZBEKISTON OLIY TA’LIMIDA MUHANDIS KADRLARINI AXBOROT-KOMMUNIKATIV KOMPETENTLIGINI RIVOJLANTIRISH MASALALARI

O‘roqova Zulayho Erdor qizi
Jizzax politexnika instituti mustaqil tadqiqotchisi
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Annotatsiya. *Ushbu maqolada O‘zbekiston Respublikasida oliy ta’limning raqamli transformatsiyasi sharoitida bo‘lajak muhandislarni axborot-kommunikativ kompetentligini rivojlantirish masalalarining dolzarbligini, nazariy va amaliy aspektlarini o‘rganiladi. Mustaqil o‘qitish jarayonida raqamli texnologiyalar, virtual laboratoriyalar va interfaol ta’lim metodlaridan foydalanish orqali muhandis kadrlarning kompleks kompetensiyalarini shakllantirish mexanizmlar tahlil qilinadi.*

Kalit so‘zlar: *raqamli transformatsiya, axborot-kommunikativ kompetentlik, muhandis talimi, mustaqil ta’lim, virtual o‘qitish, interfaol metodlar, e-learning, masofaviy ta’lim, kompetentsiya-asosidagi ta’lim.*

KIRISH

Inson resurslari rivojlantirishning eng muhim shakllaridan biri sifatida oliy ta’lim, xususan muhandislik kadrlarini tayyorlash O‘zbekiston Respublikasining ijtimoiy-iqtisodiy taraqqiyotida katta rol o‘ynaydi. Bugungi raqamli davr sharoitida ta’limning tavvakoli asosiy vazifasi shunchaki bilim berish emas, balki ta’limotuvchilarni kompleks kompetentliklari bilan ta’chiqish, ularning ijodiy fikriyotini, problem hal qilish qobiliyatlarini va texnologiyalardan samarali foydalanish malakalarini shakllantirish bo‘lib qoldi. Axborot-kommunikativ kompetentlik bugungi zamonda muhandis bo‘lmoqchi bo‘lgan har bir shaxs uchun vazgecilib bo‘lmaydigan sifat bo‘lib, u faqat kompyuter bilan ishlash qobiliyatini emas, balki:

— Raqamli axborot manbaalarini kritik tahlil qilish evaziga
— Turli texnologiyalar orqali samarali muloqot o‘rtastirish
— Professional faoliyatda axborot tizimlarini tadbirkorlik bilan qo‘llash
— Kiberxavfsizlik va axborot etikasini rioya qilish kabiasosiy ko‘nikmalarni qamrab oladi.

MUANDISLIK TA’LIMIDA AXBOROT-KOMMUNIKATIV KOMPETENTLIK TULAMASI

Muandislik ta’limida kompetentlik tizimi o‘rtacha quyidagi asosiy tuqimalardan iborat:

Raqamli kompetentlik (Digital Literacy). Ushbu darajada talabalar kompyuter va internet tizimining asosiy qismlari bilan tanishadi, Microsoft Office paketilik dasturlaridan, axborot qidirishning asosiy metodlaridan foydalanish ko‘nikmalarini egallaydi. Bu darajadagi kompetentlik O‘zbekiston ta’limida asosiy sharoitni tashkil etadi va ko‘p o‘quvchilar uchun kiritilgan.

Informatsion kompetentlik (Information Competence). Bu darajada muhandis-talabalar turli axborot manbaalaridan kerakli ma’lumotlarni kritik tahlil qilish, ularni ta’lim jarayonida va professional faoliyatida qo‘llash ko‘nikmalarini egallaydi. Ular fan-texnika

ma’lumotlarni digital shaklida qidirib topish, ma’lumot oqimlarini tushunish va harakat berish-u yoqlashni qoladigan texnologiyalarni o‘rganadi.

Kommunikativ kompetentlik (Communication Competence). Bugungi muandis uchun vitaliy muhim bo‘lgan ushbu kompetentlik turli texnologik vositalar orqali (video konferentsiya, masofaviy loyiha, global hamkorlik) samarali muloqot o‘rnatish malakasini qamrab oladi. Har bir muandis navbatida:

- Ingliz va boshqa chet tillarida professional muloqot qurish qobiliyatini
- Turli jamoa platformalarida ishlash (Slack, Teams, Discord)
- Prezentatsion va tadqiqot natijalari haqida effektiv bayon qilish
- Global mutaxassislar bilan hamkorlik qilish ista’dolariga ega bo‘lishi zarur.

Texnologik kompetentlik (Technological Competence). Muandisning asosiy kompetentsiyalaridan biri bo‘lib, u CAD dasturlaridan (AutoCAD, SolidWorks), simulatsiya programmalaridan (ANSYS, COMSOL), programmalashtirish tillarida (Python, Java, C++) mahir bo‘lish zarur.

MUAMMO VA YECHIMLAR

Hozirgi vaqtda O‘zbekiston muandislik talimida axborot-kommunikativ kompetentlikni rivojlantirishda bir nechta dolzarb muammolar doimiy beqava qolmoqda:

Pedagogik kadrlarning digital kompetentsiyalarining yetishmayotligi. Ko‘pchilik o‘qituvchilar raqamli texnologiyalarni ta’limga joriy etish bo‘yicha to‘liq tayyorlangan emas va ularning professionallashtirilgan o‘sishi to‘g‘ri ta’min qilinmayapti.

O‘qituvchilar uchun continuous learning programmalarini (short-term courses, certification programs) tashkil etish, raqamli texnologiyalarda o‘zlashtirilgan platformalarni o‘qituvchilar uchun oson foydalanish imkonini berish (user-friendly interfaces), O‘zbekiston Respublikasi rahberligi tomonidan qisqa muddatli professional development trainingleri o‘tkazish.

Infrastructuraning yetersizligi. Ko‘plab universitetlarida modern kompyuter laboratoriyalari, masofaviy o‘qitish uchun zarurov IT infasturtukturasi va bandwidth kafolatlangan emas.

Davlatni zarur investitsiyasini ta’lim muassasalariga kiritish (e-learning servers, interactive classrooms, software licenses), korporativ hamkorlik orqali (Microsoft, Google Education, Cisco) o‘z dasturlarini ta’lim muassasalari uchun muftiga taqdim etishni ta’minlash.

Mustaqil ta’lim jarayonining ineffektivligi. Ko‘plab talabalar mustaqil o‘qishning to‘g‘ri rejimini yasay olmayapti, ularni o‘z-o‘ziga o‘rgitish jalb qilish mexanizmlari zaif.

Interfaol o‘qitish vositalarini keng tatbiq etish (gamification, simulation-based learning), Open Educational Resources (OER) dan foydalanish, talabalar uchun clear learning pathways belgilash, mentorlik va peer-learning tizimini mustahkamlash.

ZAMONAVIY YO‘NDASHUVLAR VA BEST PRACTICES

Xorijning eng taraqqiy oliy ta’lim muassasalari (MIT, Stanford, Cambridge) muandislik talimida axborot-kommunikativ kompetentlikni rivojlantirishda quyidagi yondashuvlarni samara bilan qo‘llanmokdalar:

1. PROJECT-BASED LEARNING (PBL) - talabalar haqiqiy industrial muammolarni real jarayonlarda hal qiladigan loyihalarni bajaradilar. Masalan, sosial media analytics loyihasi yoki renewable energy sistemasini dizayn qilish loyihalari.

2. FLIPPED CLASSROOM - o‘qituvchi video darslari tayyorlaydi, darsda esa interactive munozaralash, problem-solving va hands-on activities bo‘ladi.

3. VIRTUALIZATION VA SIMULATION - CAD, engineering simulation, IoT platform (Arduino, Raspberry Pi) kabi virtual laboratoriyalarni qo‘llash.

4. OPEN SOURCE KULTURA - Linux, Python, Arduino kabi bepul va ochiq source dasturlardan ta’lim jarayonida foydalanish, students o‘z GitHub portfoliolerini yaratish.

XULOSA

O‘zbekiston Respublikasida muandislik talimining ta’lim sifatini yanada oshirish, talabalarning axborot-kommunikativ kompetentligini rivojlantirishga yetakchi ta’lim muassasalarini yo‘naltirishning nihoyatda zavqli vaqti kelgan. Shuning uchun taqdirlarni shunga qaratib, o‘zbekiston muandislik talimida axborot-kommunikativ kompetentlik shakllanishining qaysi bosqichda ekanini to‘g‘ri tasavvur qilish va bu yo‘nalishda nihoyatda faol bo‘lishimiz zaryur.

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SUN’IY INTELLEKT VA RAQAMLI TA’LIM TEXNOLOGIYALARI ASOSIDA ENERGETIKA MUHANDISLIGI TALABALARI AXBOROT-MODELLASHTIRISH KO‘NIKMALARINI RIVOJLANTIRISH METODIKASI

Parmonov Shaxzod Abdumajit o‘g‘li
Jizzax politexnika instituti, Energetika va elektr texnologiyasi kafedrasi assistenti
https://doi.org/10.5281/zenodo.22896311

Annotatsiya. *Mazkur maqolada energetika muhandisligi ta’limida sun’iy intellekt va raqamli ta’lim texnologiyalaridan foydalanish asosida talabalarning axborot-modellashtirish ko‘nikmalarini rivojlantirishning nazariy-metodologik asoslari yoritilgan. Tadqiqotda kompetensiyaviy yondashuv asosida sun’iy intellekt vositalaridan ta’lim jarayonida foydalanish imkoniyatlari tahlil qilinib, energetika sohasiga oid texnik jarayon va obyektlarni modellashtirish orqali talabalarning axborot-modellashtirish ko‘nikmalarini rivojlantirish metodikasini takomillashtirish yo‘llari asoslangan. Raqamli ta’lim muhiti, amaliy topshiriqlar, modellashtirish vositalari va sun’iy intellekt imkoniyatlarining o‘zaro integratsiyasiga asoslangan metodik yondashuv taklif etilgan. Shuningdek, sun’iy intellektdan foydalanishda talabaning mustaqil fikrlashi, natijalarni tanqidiy baholashi va muhandislik qarorlarini mustaqil qabul qilishi muhim pedagogik shart sifatida qaralgan. Tadqiqot natijalari sun’iy intellekt va raqamli texnologiyalardan maqsadli foydalanish bo‘lajak energetika muhandislarining axborot-modellashtirish hamda kasbiy kompetensiyalarini rivojlantirishga xizmat qilishini ko‘rsatadi.*

Kalit so‘zlar: *kompetensiyaviy yondashuv, axborot-modellashtirish, sun’iy intellekt, raqamli ta’lim texnologiyalari, energetika muhandisligi, kasbiy kompetensiya, raqamli modellashtirish, innovatsion pedagogika, amaliy topshiriqlar, loyiha faoliyati.*

Annotation. *This article outlines the theoretical and methodological foundations for developing students' information-modeling skills in energy engineering education through the use of artificial intelligence and digital educational technologies. The study analyzes the potential for integrating artificial intelligence tools into the educational process based on a competency-based approach and substantiates methods for enhancing students' information-modeling skills by modeling technical processes and objects relevant to the energy sector. A methodological approach is proposed that integrates the digital learning environment, practical assignments, modeling tools, and the capabilities of artificial intelligence. Furthermore, the study emphasizes the importance of independent thinking, critical evaluation of results, and autonomous engineering decision-making by students when utilizing artificial intelligence. The research findings demonstrate that the targeted application of artificial intelligence and digital technologies fosters the development of both information-modeling and professional competencies among future energy engineers.*

Keywords: *competency-based approach, information modeling, artificial intelligence, digital educational technologies, energy engineering, professional competence, digital modeling, innovative pedagogy, practical tasks, project-based activities.*

Kirish. Oliy ta’lim tizimining raqamli transformatsiyasi natijasida bo‘lajak mutaxassislarni tayyorlash mazmuni va metodlariga qo‘yiladigan talablar tobora murakkablashib bormoqda. Ayniqsa, texnik va muhandislik ta’limida talaba faqat nazariy bilimlarni egallashi bilan cheklanib qolmasdan, ularni raqamli muhitda qo‘llashi, texnik jarayonlarni modellashtirishi, axborotlarni tahlil qilishi va olingan natijalar asosida amaliy qarorlar qabul qila olishi zarur.

Bugungi kunda sun’iy intellekt texnologiyalarining ta’limga kirib kelishi ushbu jarayonni yangi bosqichga olib chiqmoqda. UNESCO tomonidan ham generativ sun’iy intellektdan ta’limda foydalanish masalasida inson markazli yondashuv, pedagogik maqsadga muvofiqlik, akademik halollik, ma’lumotlar xavfsizligi va ta’lim oluvchining mustaqil fikrlashini saqlab qolish muhim tamoyillar sifatida qayd etilgan.

Energetika muhandisligi uchun mazkur masala alohida ahamiyatga ega. Chunki energetika obyektlari murakkab texnik tizimlardan tashkil topgan bo‘lib, ularning ishlash jarayonlarini o‘rganishda grafik, matematik, axborot va raqamli modellarni yaratish hamda tahlil qilish talab etiladi. Elektr stansiyalari, podstansiyalar, elektr tarmoqlari, transformatorlar va elektr ta’minoti tizimlarini o‘rganishda modellashtirishdan foydalanish talabaning nazariy bilimini amaliy faoliyat bilan bog‘lash imkonini beradi.

Shu sababli energetika muhandisligi ta’limida kompetensiyaviy yondashuvni raqamli ta’lim texnologiyalari va sun’iy intellekt imkoniyatlari bilan uyg‘unlashtirish bo‘lajak mutaxassislarning kasbiy tayyorgarligini rivojlantirishning istiqbolli yo‘nalishlaridan biri hisoblanadi.

Tadqiqotning asosiy maqsadi energetika muhandisligi ta’limida kompetensiyaviy yondashuv asosida talabalarning axborot-modellashtirish ko‘nikmalarini rivojlantirish metodikasini sun’iy intellekt va raqamli ta’lim texnologiyalari imkoniyatlari bilan takomillashtirishning pedagogik asoslarini ishlab chiqishdan iborat.

Mazkur maqsadga erishish uchun quyidagi vazifalar belgilandi:

– energetika muhandisligi ta’limida axborot-modellashtirish ko‘nikmalarining mazmunini aniqlash;

– kompetensiyaviy yondashuv va raqamli ta’lim texnologiyalarining o‘zaro bog‘liqligini asoslash;

– sun’iy intellekt vositalarining texnik masalalarni tushuntirish, axborotlarni tahlil qilish, modellashtirish jarayonini qo‘llab-quvvatlash va teskari aloqa berish imkoniyatlarini aniqlash;

– energetika obyektlari va jarayonlarini modellashtirishga yo‘naltirilgan amaliy topshiriqlar tizimini takomillashtirish;

– talabalarning axborot-modellashtirish ko‘nikmalarini rivojlantirishning metodik modelini taklif etish;

– taklif etilayotgan yondashuvning pedagogik samaradorligini aniqlash mezonlarini ishlab chiqish.

Axborot-modellashtirish ko‘nikmalarining energetika muhandisligidagi o‘rni

Axborot-modellashtirish ko‘nikmasi bo‘lajak energetika muhandisining kasbiy tayyorgarligida muhim o‘rin tutadi. Dissertatsion tadqiqotda ushbu ko‘nikma mutaxassisning axborotlarni tahlil qilish, muammoli jarayonlarni modellashtirish va modellashtirish vositalari orqali amaliy yechim ishlab chiqish qobiliyati bilan bog‘langan.

Energetika muhandisligi talabasining axborot-modellashtirish faoliyatini shartli ravishda quyidagi ketma-ketlik asosida tashkil etish mumkin:

muammoni aniqlash → boshlang‘ich ma’lumotlarni yig‘ish → ma’lumotlarni tahlil qilish → matematik yoki grafik model yaratish → raqamli vositada modellashtirish → natijalarni tahlil qilish → muhandislik qarorini ishlab chiqish.

Mazkur jarayonga sun’iy intellekt texnologiyalarining kiritilishi talabaning faoliyatini almashtirish emas, balki uning intellektual va amaliy faoliyatini qo‘llab-quvvatlashga xizmat qilishi lozim.

Masalan, talaba elektr podstansiyasining ishlash jarayonini o‘rganayotgan bo‘lsa, sun’iy intellektdan elektr sxemasining ayrim elementlari vazifasini tushuntirish, hisoblash algoritmini ishlab chiqish, turli ish rejimlarini taqqoslash yoki model natijalarini izohlashda yordamchi vosita sifatida foydalanish mumkin.

Biroq yakuniy muhandislik qarori talabaning o‘ziga tegishli bo‘lishi kerak. Bu jihat kompetensiyaviy yondashuvning asosiy talablaridan biri — bilimni tayyor holda qabul qilish emas, balki uni amaliy faoliyatda qo‘llay olish bilan izohlanadi.

Sun’iy intellektning axborot-modellashtirish jarayonidagi imkoniyatlari

Sun’iy intellektni energetika muhandisligi ta’limida qo‘llashda uning imkoniyatlarini bir necha pedagogik yo‘nalishga ajratish mumkin.

Birinchi yo‘nalish — **axborotlarni izlash va tizimlashtirish**. Talaba texnik obyekt yoki jarayon haqida turli manbalardan ma’lumot to‘playdi va sun’iy intellekt yordamida ularni mavzular bo‘yicha guruhlash, asosiy tushunchalarni ajratish va o‘zaro bog‘liqliklarni aniqlash imkoniyatiga ega bo‘ladi.

Ikkinchi yo‘nalish — **modellashtirish topshiriqlarini shakllantirish**. Sun’iy intellekt yordamida ma’lum energetik obyektga oid turli murakkablikdagi masalalarni ishlab chiqish, boshlang‘ich parametrlarni o‘zgartirish va bir nechta ish holatlarini shakllantirish mumkin.

Uchinchi yo‘nalish — **algoritmik fikrlashni rivojlantirish**. Talaba texnik masalani yechish uchun zarur bosqichlarni aniqlaydi, hisoblash ketma-ketligini tuzadi va undan foydalanib model yaratadi. Bunda sun’iy intellekt tayyor javob beruvchi vosita sifatida emas, balki talabaning fikrlash jarayonini faollashtiruvchi yordamchi vosita sifatida qo‘llanadi.

To‘rtinchi yo‘nalish — **natijalarni tahlil qilish**. Modellashtirish natijasida olingan ma’lumotlar sun’iy intellekt yordamida dastlabki tahlildan o‘tkazilishi mumkin. Talaba esa mazkur tahlilning texnik jihatdan to‘g‘riligini tekshiradi va yakuniy xulosani mustaqil shakllantiradi.

Beshinchi yo‘nalish — **individual teskari aloqa**. Talabaning bajargan topshirig‘idagi xatolarni aniqlash, noto‘g‘ri bajarilgan bosqichlarni ko‘rsatish va ularni qayta ko‘rib chiqishga yo‘naltirishda AI vositalaridan foydalanish mumkin.

Shu bilan birga, sun’iy intellekt natijalarining har doim ham avtomatik ravishda to‘g‘ri deb qabul qilinmasligi kerak. UNESCO ham ta’limda generativ AI bilan ishlashda inson agentligini saqlash va vositalarning pedagogik hamda etik jihatdan maqsadga muvofiqligini baholash zarurligini ta’kidlaydi.

Kompetensiyaviy yondashuv va raqamli ta’lim texnologiyalarining integratsiyasi

Kompetensiyaviy yondashuvning asosiy xususiyati bilim, ko‘nikma va amaliy faoliyatning uzviyligini ta’minlashdan iborat. Energetika muhandisligi ta’limida ushbu yondashuv talabaning real kasbiy vaziyatlarga yaqin topshiriqlarni bajarishi orqali namoyon bo‘ladi.

Dissertatsiyada tajriba-sinov ishlari aynan “Stansiya va podstansiyalarning elektr qismi” fanini o‘qitish jarayonida tashkil etilgan bo‘lib, talabalar elektr energetika obyektlarini

modellashtirish, sxematik tahlil qilish va raqamli loyihalashga yo‘naltirilgan amaliy mashg‘ulotlarda ishtirok etgan.

Mazkur tajribani raqamli ta’lim va sun’iy intellekt vositalari bilan rivojlantirish quyidagi metodik model orqali ifodalanishi mumkin:

№	Bosqich	Talaba faoliyati	Raqamli/AI vositasining vazifasi
1	Muammoli vaziyat	Energetika obyektidagi muammoni aniqlash	Muammoga oid savollar va vaziyatlarni shakllantirish
2	Axborot yig‘ish	Texnik ma’lumotlarni izlash va tahlil qilish	Axborotlarni tizimlashtirish
3	Model yaratish	Grafik, matematik yoki raqamli model ishlab chiqish	Model yaratish jarayonini metodik qo‘llab-quvvatlash
4	Hisoblash	Parametrlar asosida hisoblash	Algoritm va hisoblash bosqichlarini tushuntirish
5	Natijani tahlil qilish	Olingan natijalarni taqqoslash	Natijalarni dastlabki tahlil qilish
6	Qaror qabul qilish	Muhandislik yechimini tanlash	Muqobil variantlarni taqqoslash
7	Refleksiya	O‘z faoliyatini baholash	Xatolar va takomillashtirish yo‘nalishlarini ko‘rsatish

Ushbu modelda asosiy faoliyat subyekti talabaning o‘zi hisoblanadi. Sun’iy intellekt esa o‘qituvchi va talabaning o‘rnini bosuvchi emas, balki ta’lim jarayonini qo‘llab-quvvatlovchi raqamli vosita sifatida qaraladi.

Sun’iy intellektni qo‘llashning pedagogik shartlari. Energetika muhandisligi ta’limida AI texnologiyalaridan foydalanish samaradorligi faqat texnik imkoniyatlar bilan belgilanmaydi. Bunda bir qator pedagogik shartlarga rioya qilish talab etiladi.

Birinchidan, sun’iy intellekt vositasidan foydalanish aniq ta’limiy maqsadga ega bo‘lishi kerak. Talaba AI vositasidan shunchaki tayyor javob olish uchun emas, balki muammoni tushunish, tahlil qilish va o‘z yechimini takomillashtirish uchun foydalanishi lozim.

Ikkinchidan, **inson nazorati** saqlanishi zarur. AI tomonidan berilgan texnik ma’lumot yoki hisoblash natijasi talaba tomonidan tegishli formula, fizik qonun yoki texnik me’yorlar asosida tekshirilishi kerak.

Uchinchidan, topshiriqlar shunday tuzilishi kerakki, talabani tayyor javobni ko‘chirishga emas, balki mustaqil fikrlashga undasin.

To‘rtinchidan, baholashda faqat yakuniy natija emas, balki modelni yaratish jarayoni, tanlangan parametrlarning asoslanganligi, tahlil sifati va qabul qilingan qarorning mantiqiyligi ham hisobga olinishi lozim.

Beshinchidan, akademik halollik va ma’lumotlar xavfsizligi masalalariga e’tibor qaratish zarur. UNESCO tavsiyalarida ham ta’limda generativ AI vositalaridan foydalanishda inson agentligi, ma’lumotlar maxfiyligi va pedagogik maqsadga muvofiqlikni ta’minlash zarurligi qayd etiladi.

Energetika muhandisligi ta’limida raqamli texnologiyalardan foydalanishning asosiy afzalligi nazariy bilimlarni amaliy modellashtirish bilan bog‘lash imkoniyatidir. Talaba elektr energetika obyektining fizik yoki matematik modelini yaratish orqali real tizimning ishlash mexanizmini chuqurroq anglaydi.

Sun’iy intellekt ushbu jarayonni qo‘llab-quvvatlashi mumkin. Xususan, murakkab tushunchalarni soddalashtirib tushuntirish, individual topshiriqlarni shakllantirish, amaliy vaziyatlarni yaratish, dastlabki tahlilni amalga oshirish va talabaning xatolarini aniqlash kabi imkoniyatlar ta’lim jarayonini individuallashtirishga yordam beradi.

Biroq AI vositalarining keng qo‘llanilishi avtomatik ravishda ta’lim sifati oshishini anglatmaydi. Muhim masala — texnologiyaning pedagogik maqsadga qanday integratsiya qilinishidir. 2026-yildagi muhandislik ta’limi bo‘yicha tadqiqotlarda ham AI, raqamli egizaklar, optimallashtirish va virtual reallik kabi texnologiyalarni muhandislik ta’limiga integratsiyalash masalalari kompleks yondashuvni talab qilishi ko‘rsatilmoqda.

Shu sababli energetika muhandisligi ta’limida quyidagi tamoyilni asosiy metodik qoida sifatida belgilash mumkin:

AI javob beruvchi vosita emas, talabaning muhandislik fikrlashini rivojlantiruvchi raqamli yordamchi bo‘lishi kerak.

Bu tamoyil kompetensiyaviy yondashuvning mohiyatiga mos keladi. Chunki kompetensiya tayyor bilimni eslab qolish bilan emas, balki bilimni muayyan kasbiy vaziyatda mustaqil qo‘llash qobiliyati bilan belgilanadi.

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BO‘LAJAK MUHANDISLARDA ENERGIYA TEJAMKORLIGI VA SAMARADORLIGINI TA’MINLASH KOMPETENTLIGINING TARKIBIY TUZILMASI VA UNI RAQAMLI TA’LIM MUHITIDA RIVOJLANTIRISH MUAMMOLARI

Savriyev Shamshod Shuxrat o‘g‘li
Mustaqil izlanuvchi, BDTU
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Annotatsiya. *Maqolada bo‘lajak muhandislarda energiya tejamkorligi va samaradorligini ta’minlash kompetentligini rivojlantirish muammosi ko‘rib chiqilgan. “Energiya tejamkorligi” va “energiya samaradorligi” tushunchalarining qiyosiy tahlili asosida ularni yagona integrativ konstruktda birlashtirishning pedagogik asosi ko‘rsatilgan. Kompetentlikning to‘rt komponentdan iborat tarkibiy tuzilmasi hamda bo‘lajak muhandisning ushbu sohadagi tipik kasbiy vazifalari aniqlangan. Ta’lim amaliyoti tahlili asosida beshta qarama-qarshilik ajratilgan va ularni raqamli ta’lim muhiti hamda sun’iy intellekt vositalari yordamida bartaraf etish imkoniyatlari asoslangan.*

Kalit so‘zlar: *energiya tejamkorligi, energiya samaradorligi, kasbiy kompetentlik, muhandislik ta’limi, raqamli ta’lim muhiti, sun’iy intellekt, virtual laboratoriya, kompetentlik komponentlari.*

Abstract. *The paper examines the problem of developing future engineers’ competence in ensuring energy saving and energy efficiency. Based on a comparative analysis of the concepts of “energy saving” and “energy efficiency”, the pedagogical rationale for combining them into a single integrative construct is presented. A four-component structure of the competence and the typical professional tasks of a future engineer in this field are identified. An analysis of educational practice reveals five contradictions, and the possibilities of resolving them through a digital learning environment and artificial intelligence tools are substantiated.*

Keywords: *energy saving, energy efficiency, professional competence, engineering education, digital learning environment, artificial intelligence, virtual laboratory, competence components.*

Kirish. Energetika resurslaridan foydalanish samaradorligini oshirish bugungi kunda global va milliy darajadagi ustuvor vazifalardan biriga aylandi. Xalqaro energetika agentligining hisobotiga ko‘ra, jahon iqtisodiyotining birlamchi energiya sig‘imi so‘nggi yillarda atigi bir foiz atrofida yaxshilanmoqda, holbuki 2023-yilda qabul qilingan xalqaro majburiyatga erishish uchun ushbu ko‘rsatkich to‘rt foiz atrofida bo‘lishi talab etiladi [5]. Bu esa muammoning texnologik jihati bilan bir qatorda insoniy omilga — mutaxassislar tayyorlash sifatiga e’tiborni kuchaytirishni taqozo etadi.

O‘zbekiston Respublikasida sohaning huquqiy asoslari izchil yangilanmoqda. 2024-yilda qabul qilingan “Energiyani tejash, undan oqilona foydalanish va energiya samaradorligini oshirish to‘g‘risida”gi Qonun mazkur uch yo‘nalishni yagona huquqiy predmet sifatida mustahkamladi [1]. “Yashil iqtisodiyot”ga o‘tish dasturida sanoat sohasida energiya

samaradorligini kamida 20 foizga oshirish vazifasi belgilangan [2], yoqilg‘i-energetika sohasida esa “raqamli energonazorat” tizimi joriy etilmoqda [3]. Ushbu jarayonlar bo‘lajak muhandisdan nafaqat texnik bilimlarni, balki raqamli hisob-monitoring tizimlari bilan ishlash va katta hajmdagi energetik ma’lumotlarni tahlil qilish qobiliyatini ham talab qiladi.

Shu bilan birga, mazkur kompetentlikning pedagogik konstrukt sifatida ilmiy asoslanishi, uning tarkibiy tuzilmasi va raqamli ta’lim muhitida rivojlantirish mexanizmlari yetarlicha o‘rganilmagan. Mazkur maqolaning maqsadi — kompetentlikning mazmuni va tarkibini aniqlash hamda uni rivojlantirish yo‘lidagi asosiy qarama-qarshiliklarni ajratib ko‘rsatishdir.

Tadqiqot metodologiyasi va adabiyotlar tahlili. Tadqiqotda nazariy tahlil, tushunchalarni qiyoslash, me’yoriy-huquqiy hujjatlar va o‘quv-dasturiy hujjatlar mazmunini tahlil qilish hamda umumlashtirish metodlaridan foydalanildi. Metodologik asos sifatida kompetentlik, faoliyatli va tizimli yondashuvlar qabul qilindi [9].

Xalqaro amaliyotda barqarorlik bilan bog‘liq kompetensiyalarni tizimlashtirishga qaratilgan urinishlar orasida Yevropa Ittifoqining GreenComp konseptual doirasi alohida ajralib turadi; unda barqarorlik kompetensiyasi to‘rtta soha va o‘n ikkita kompetensiya orqali tavsiflanadi [7]. Biroq mazkur hujjat umumta’lim xarakteriga ega bo‘lib, texnik yo‘nalishdagi ta’limning kasbiy-amaliy talablarini to‘liq qamrab olmaydi: unda energetik hisob-kitoblar, energiya balansini tuzish va energiya auditi kabi muhandislik faoliyatining o‘ziga xos usullari aks etmagan.

MDH mamlakatlari pedagogikasida resurs tejash kompetensiyalarini muhandislik tayyorgarligida shakllantirish masalasi tadqiq etilgan [10], biroq bu ishlarning aksariyati raqamli texnologiyalar keng tarqalishidan oldingi davrga tegishli. Muhandislik ta’limining kasbiy mantiqqa asoslanishi bo‘yicha esa xalqaro CDIO tashabbusi tajribasi diqqatga sazovor: unda o‘qitish mazmuni muhandislik obyektining hayotiy tsikli mantig‘iga muvofiq quriladi [12]. Shu tariqa, mavjud manbalar muammoning ayrim qirralarini yoritadi, ammo energiya tejamkorligi kompetentligi mustaqil konstrukt sifatida, raqamli muhitda rivojlantirish mexanizmlari bilan birgalikda maxsus tadqiq etilmagan.

Natijalar va muhokama.

1. Tushunchalarning nisbati. Ilmiy adabiyotlarda ko‘pincha sinonim sifatida qo‘llaniladigan “energiya tejamkorligi” va “energiya samaradorligi” tushunchalari turli mantiqiy asoslarga ega. Energiya tejamkorligi — energiya sarfining mutlaq hajmini kamaytirishga qaratilgan chora-tadbirlar majmui bo‘lib, uning mezoni sarflangan energiya miqdorining kamayishidir. Energiya samaradorligi esa sarflangan energiya birligiga to‘g‘ri keladigan foydali natija bilan o‘lchanadigan nisbiy ko‘rsatkichdir.

Ushbu farqning pedagogik ahamiyati shundaki, u ta’lim maqsadlarining ikki darajasini ajratadi: birinchisi — resurslarga nisbatan qadriyatli-mas’uliyatli munosabatni shakllantirish (motivatsion-qadriyatli daraja), ikkinchisi — energetik ko‘rsatkichlarni tahlil qilish va optimallashtirish usullarini egallash (kognitiv va faoliyatli daraja). Ayni paytda ular bir-birini istisno qilmaydi: faqat tejamkorlikka tayangan yondashuv ishlab chiqarish hajmi o‘sganda ta’sirini yo‘qotadi, faqat texnologik samaradorlikka tayangan yondashuv esa mas’uliyatli iste’mol madaniyati bilan mustahkamlanmasa “qaytish effekti”ga duch keladi. Shu bois ularni yagona integrativ konstruktda birlashtirish maqsadga muvofiq; bunday yondashuvni amaldagi qonunchilik ham tasdiqlaydi [1].

2. Kompetentlikning tarkibiy tuzilmasi. Tahlil asosida bo‘lajak muhandisning energiya tejamkorligi va samaradorligini ta’minlash kompetentligi quyidagicha ta’riflanadi: bu —

shaxsning energiya resurslariga nisbatan qadriyatli-mas’uliyatli munosabati, energetika jarayonlari va energiya tejash texnologiyalari sohasidagi tizimli bilimlari, texnik obyektlarning energetik ko‘rsatkichlarini, shu jumladan raqamli vositalar yordamida, tahlil qilish va optimallashtirish bo‘yicha kasbiy harakat usullari hamda o‘z faoliyati natijalarini energetik va ekologik mezonlar bo‘yicha refleksiv baholash qobiliyatining yaxlit birligi. Uning tarkibida to‘rtta komponent ajratildi (1-jadval).

1-jadval

Kompetentlikning tarkibiy tuzilmasi va namoyon bo‘lish ko‘rsatkichlari

Komponent	Mazmuni	Namoyon bo‘lish ko‘rsatkichlari
Motivatsion-qadriyatli	Energiya resurslariga nisbatan mas’uliyatli munosabat, ekologik ong, barqarorlik qadriyatlariga yo‘nalganlik	Energiya tejash topshiriqlarini ixtiyoriy tanlash; qarorlarni asoslashda energetik mezonga murojaat
Kognitiv	Energetika jarayonlari, energiya balansi, energiya tejash texnologiyalari, me’yoriy asoslar va standartlar bo‘yicha tizimli bilimlar	Bilimlarning to‘liqligi va fanlararo bog‘langanligi; me’yoriy talablarni to‘g‘ri talqin qilish
Faoliyatli-texnologik	Energetik audit elementlarini bajarish, energiya balansini tuzish, chora-tadbirlarni texnik-iqtisodiy asoslash, raqamli vositalar bilan ishlash	Amaliy va loyihaviy topshiriqlar sifati; hisob-kitoblarning to‘g‘riligi; vositalardan mustaqil foydalanish
Refleksiv-baholovchi	Natijalarni energetik, iqtisodiy va ekologik mezonlar bo‘yicha baholash, xatolarni tahlil qilish	O‘z-o‘zini baholash adekvatligi; muqobil yechimlarni qiyoslay olish

Komponentlar o‘zaro ierarxik emas, balki funksional bog‘lanishda bo‘lib, ularning har biri qolganlarining rivojlanishi uchun shart-sharoit yaratadi.

3. Tipik kasbiy vazifalar. Kompetentlikni mazmunli tavsiflash uchun uni mavhum sifatlar orqali emas, balki mutaxassis hal etadigan aniq vazifalar tizimi orqali belgilash maqsadga muvofiqdir. Me’yoriy talablar [1], xalqaro standart qoidalari [6] va ishlab chiqarish amaliyoti tahlili asosida quyidagi vazifalar guruhlari ajratildi: obyektning energiya iste’moli tuzilmasini o‘rganish va energiya balansini tuzish; yo‘qotish manbalarini aniqlash va ustuvorlik bo‘yicha tartiblash; energiya tejash chora-tadbirlari variantlarini ishlab chiqish va ularni texnik-iqtisodiy ko‘rsatkichlar bo‘yicha qiyoslash; monitoring ma’lumotlarini yig‘ish va talqin qilish; loyihaviy yechimlarni me’yoriy talablarga muvofiqligi bo‘yicha tekshirish; qayta tiklanuvchi manbalarni integratsiyalash imkoniyatini baholash; qabul qilingan qarorlarni asoslash va hujjatlashtirish.

Ushbu ro‘yxat ikki muhim xulosaga olib keladi. Birinchidan, vazifalarning bajarilishi bir vaqtning o‘zida texnik, iqtisodiy, axborot-analitik va kommunikativ tayyorgarlikni talab qiladi — demak, kompetentlik integrativ tabiatga ega. Ikkinchidan, vazifalarning sezilarli qismi ma’lumotlar bilan ishlash, modellashtirish va hisob-kitob bilan bog‘liq bo‘lib, ularni real ishlab chiqarish sharoitisiz ham raqamli vositalar yordamida to‘liq qiymatli tarzda mashq qilish mumkin.

4. Amaliyotdagi qarama-qarshiliklar. Texnik yo‘nalishdagi ta’lim muassasalari amaliyotining tahlili quyidagi qarama-qarshiliklarni aniqlash imkonini berdi:

1) davlat siyosati darajasida qo‘yilgan strategik vazifalar bilan oliy texnik ta’lim tizimida mos kompetentlikni rivojlantirishning yetarlicha ishlab chiqilmaganligi o‘rtasida;

2) ishlab chiqarishning energiya samaradorligini ta’minlashga qodir kadrlarga bo‘lgan ehtiyoj bilan bitiruvchilarning amaliy tayyorgarlik darajasi o‘rtasida;

3) kompetentlikning yaxlit, integrativ tabiati bilan uning o‘quv rejalarida tarqoq, fanlararo bog‘lanmagan holda taqdim etilishi o‘rtasida;

4) raqamli ta’lim muhitining keng didaktik imkoniyatlari bilan bu imkoniyatlarni maqsadli, tizimli qo‘llash metodikasining ishlab chiqilmaganligi o‘rtasida;

5) kompetentlik darajasini obyektiv baholash zaruriyati bilan tegishli mezon-ko‘rsatkichlar apparati va diagnostik vositalarning yetishmasligi o‘rtasida.

5. Raqamli muhit va sun’iy intellekt vositalarining imkoniyatlari. Yuqorida ajratilgan qarama-qarshiliklarning bir qismini raqamli ta’lim muhiti sharoitida bartaraf etish mumkin. Muhandislik ta’limida virtual laboratoriyalarning ta’sirini o‘rgangan meta-tahlil ularning o‘quv natijalariga sezilarli ijobiy ta’sirini ko‘rsatgan; eng yuqori ko‘rsatkichlar o‘quv motivatsiyasi va jalb etilganlik bo‘yicha qayd etilgan [11]. Bu esa moddiy bazaning cheklanganligi bilan bog‘liq ikkinchi qarama-qarshilikni yumshatish imkonini beradi.

Sun’iy intellekt texnologiyalari mazkur imkoniyatlarni yangi darajaga ko‘taradi. Birinchidan, adaptiv o‘quv tizimlari talabaning oldingi natijalariga qarab topshiriq murakkabligini va tempini sozlab, individual traektoriyani ta’minlaydi. Ikkinchidan, energiya iste’moli bo‘yicha katta hajmdagi ma’lumotlarni tahlil qilish topshiriqlarida intellektual vositalar talabaga bashoratli modellar qurish va anomaliyalarni aniqlash tajribasini beradi — bu esa aynan “raqamli energonazorat” tizimi joriy etilayotgan sharoitda kasbiy jihatdan talab qilinadigan ko‘nikmadir [3]. Uchinchidan, o‘quv analitikasi va intellektual qayta aloqa vositalari beshinchi qarama-qarshilikni — diagnostik apparatning yetishmasligini — hal etishga xizmat qiladi, chunki ular talabaning jarayondagi harakatlarini qayd etib, an’anaviy baholashda ko‘rinmaydigan ko‘rsatkichlarni ochib beradi.

Ayni paytda sun’iy intellekt vositalarini qo‘llash bir qator pedagogik risklarni ham keltirib chiqaradi: tayyor yechimlarning osonlik bilan olinishi mustaqil izlanish o‘rniga tayyorni qabul qilish odatini shakllantirishi, akademik halollikni ta’minlash murakkablashishi va o‘zlashtirishning yuzaki bo‘lib qolishi mumkin [13]. Bu risklarni bartaraf etish yo‘li — topshiriqlarni shunday loyihalashki, ularda yakuniy javob emas, balki unga olib boruvchi mulohaza yo‘li va uni asoslash asosiy qiymat kasb etsin. O‘qituvchining raqamli kompetentligi esa mazkur jarayonning hal qiluvchi sharti bo‘lib qoladi [8].

Xulosa. O‘tkazilgan tahlil quyidagi xulosalarga kelish imkonini berdi. “Energiya tejamkorligi” va “energiya samaradorligi” tushunchalari turli mantiqiy asoslarga ega bo‘lsa-da, pedagogik nuqtayi nazardan bir-birini to‘ldiradi va yagona integrativ konstruktda birlashtirilishi maqsadga muvofiqdir. Kompetentlikning tarkibida motivatsion-qadriyatli, kognitiv, faoliyatli-texnologik va refleksiv-baholovchi komponentlar ajratildi; ular funksional bog‘lanishda bo‘lib, biri boshqasining rivojlanishi uchun sharoit yaratadi.

Kompetentlik mazmunini kasbiy vazifalar tizimi orqali belgilash uning integrativ tabiatini ochib beradi va o‘quv topshiriqlarini loyihalash uchun aniq mo‘ljal yaratadi. Aniqlangan beshta qarama-qarshilik tadqiqotning yo‘nalishini belgilaydi; ularning sezilarli qismi raqamli ta’lim muhiti va sun’iy intellekt vositalari imkoniyatlaridan maqsadli foydalanish orqali bartaraf etilishi mumkin. Ayni paytda texnologiyalarning o‘zi yechim bo‘la olmaydi: ularning samaradorligi to‘liq ravishda pedagogik loyihalash sifatiga va o‘qituvchining tayyorgarlik darajasiga bog‘liq.

Keyingi tadqiqot yo‘nalishi — kompetentlikni rivojlantirishning strukturaviy-mazmuniy modeli va metodikasini ishlab chiqishdan iborat.

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ПЛАНИРОВАНИЕ СИСТЕМ ЗАРЯДНЫХ СТАНЦИЙ ЭЛЕКТРОМОБИЛЕЙ, ПОДКЛЮЧЁННЫХ К СЕТИ

Дилафруз Салихова Хамидулла кизи
ассистент, ТГТУ
https://doi.org/10.5281/zenodo.22895977

Аннотация. *Оптимальное планирование зарядных станций электромобилей (ЭЗС) с применением развитых алгоритмов управления является ключевым условием ускоренного развития электротранспорта и снижения выбросов углерода по сравнению с автомобилями на двигателях внутреннего сгорания. Большие и неравномерные токи нагрузки ЭЗС способны негативно влиять как на силовые преобразователи, так и на распределительные электрические сети при отсутствии должного регулирования потоков энергии. В отличие от более ранних обзоров, сосредоточенных на топологиях зарядных преобразователей, вопросах качества электроэнергии и технологиях беспроводной зарядки, настоящая работа обобщает несколько публикации из баз IEEE/IET и ScienceDirect, систематизируя существующие конфигурации систем, методы. Установлено, что наиболее распространённой и перспективной конфигурацией является гибридная система, объединяющая генерацию на основе возобновляемых источников энергии (ВИЭ), системы накопления энергии (СНЭ) и подключение к сети. Показано, что применение СНЭ с надлежащим образом спроектированными алгоритмами управления позволяет одновременно сглаживать быстро меняющуюся нагрузку зарядки, компенсировать нестабильность генерации ВИЭ и повышать общую эффективность и гибкость эксплуатации ЭЗС. Отдельно отмечается перспективность портативных СНЭ как самостоятельного направления исследований в области сетевых зарядных комплексов, а также растущая роль интеллектуальных алгоритмов управления (в том числе на основе нечёткой логики и теории игр) в координации между сетью, накопителями и генерацией ВИЭ.*

Ключевые слова: *зарядные станции электромобилей; системы накопления энергии; возобновляемые источники энергии; алгоритмы управления; планирование сети; V2G.*

Abstract

Optimal planning of electric vehicle charging stations (EZS) using advanced control algorithms is a key condition for the accelerated development of electric vehicles and the reduction of carbon emissions compared to cars powered by internal combustion engines. Large and uneven load currents of electric charging stations can negatively affect both power converters and distribution power grids in the absence of proper regulation of energy flows. In contrast to earlier reviews focused on the topologies of charging converters, power quality issues, and wireless charging technologies, this work summarizes several publications from the IEEE/IET and ScienceDirect databases, systematizing existing system configurations and methods. It is found that the most common and promising configuration is a hybrid system that combines generation based on renewable energy sources (RES), energy storage systems (ESS), and grid connection. It is shown that the use of ESS with properly designed control algorithms makes it possible to simultaneously smooth out the rapidly changing charging load, compensate

for the instability of renewable energy generation and increase the overall efficiency and flexibility of the operation of electric charging stations. The prospects of portable ESS as an independent area of research in the field of network charging complexes, as well as the growing role of intelligent control algorithms (including those based on fuzzy logic and game theory) in the coordination between the grid, storage devices and generation of renewable energy sources are separately noted.

Keywords: *electric vehicle charging stations; energy storage systems; renewable energy sources; control algorithms; grid planning; V2G.*

1. Введение

Рост экологических требований к выбросам CO_2 и NOx стимулирует замещение автомобилей с ДВС электромобилями включая гибридные и подключаемые гибридные модификации. За период 2010–2016 гг. мировой парк электромобилей на аккумуляторах и подключаемых гибридов вырос практически с нуля до около 2 млн единиц, что обусловливает опережающий спрос на инфраструктуру зарядных станций. Технологически ЭЗС делятся на два базовых типа: первый - простые сетевые станции, получающие всю мощность зарядки из внешней сети, что порождает проблемы качества электроэнергии — неопределённые пиковые нагрузки, колебания напряжения, изменения частоты и кратковременные перегрузки; и второй - станции, интегрированные с генерацией на основе ВИЭ и аккумуляторными системами накопления, где основная часть энергии зарядки предварительно накапливается, что снижает воздействие резких нагрузок на сеть. Рассмотренные в обзоре публикации распределены по четырём категориям конфигураций ЭЗС: без ВИЭ и СНЭ, с СНЭ без ВИЭ, с ВИЭ без СНЭ и с СНЭ и ВИЭ, также последняя категория явно доминирует, что отражает признание её как наиболее перспективной архитектуры.

Табл. 1. Распределение рассмотренных публикаций по конфигурациям ЭЗС

Конфигурация	**Основные технические акценты**
Без СНЭ и ВИЭ	Простота и низкая стоимость; размещение и ёмкость станций, кластеризация, влияние на надёжность и качество сети.
С СНЭ (без ВИЭ)	Оптимизация ёмкости накопителя, более развитые архитектуры, применение батарей; сглаживание.
С ВИЭ (без СНЭ)	Динамическое ценообразование; использование как накопителей для сглаживания генерации; стабилизация частоты микросетей.
С СНЭ и ВИЭ	Наиболее популярная и перспективная архитектура; комплексная оптимизация стоимости и надёжности; многопортовые преобразователи; координированное управление.

2. ЭЗС без систем накопления энергии и возобновляемых источников

В простейшей конфигурации зарядная станция подключена непосредственно к сети без поддержки со стороны ВИЭ или СНЭ, вследствие чего сеть полностью принимает на себя нагрузку от нерегулярных циклов заряда/разряда электромобилей, что усиливает проблемы качества электроэнергии. Преимуществами такой схемы являются простота и низкая стоимость, однако количество одновременно подключаемых электромобилей, как

правило, ограничено. Исследования этой группы охватывают оценку влияния ЭЗС на надёжность распределительных сетей (в том числе на стандартных схемах IEEE 33-bus и IEEE 123-bus), возможность улучшения частотной устойчивости сети за счёт быстрой разрядки. Отдельное направление составляют стратегии управления графиком зарядки, рандомизированные алгоритмы энергоменеджмента с суточным верхним пределом потребления и комбинирование быстрого и обычного режимов зарядки в рамках одной станции. Общий вывод по этой категории: подобная архитектура применима только при предсказуемой и относительно небольшой нагрузке, а сеть должна обладать достаточным запасом устойчивости и качества электроэнергии.

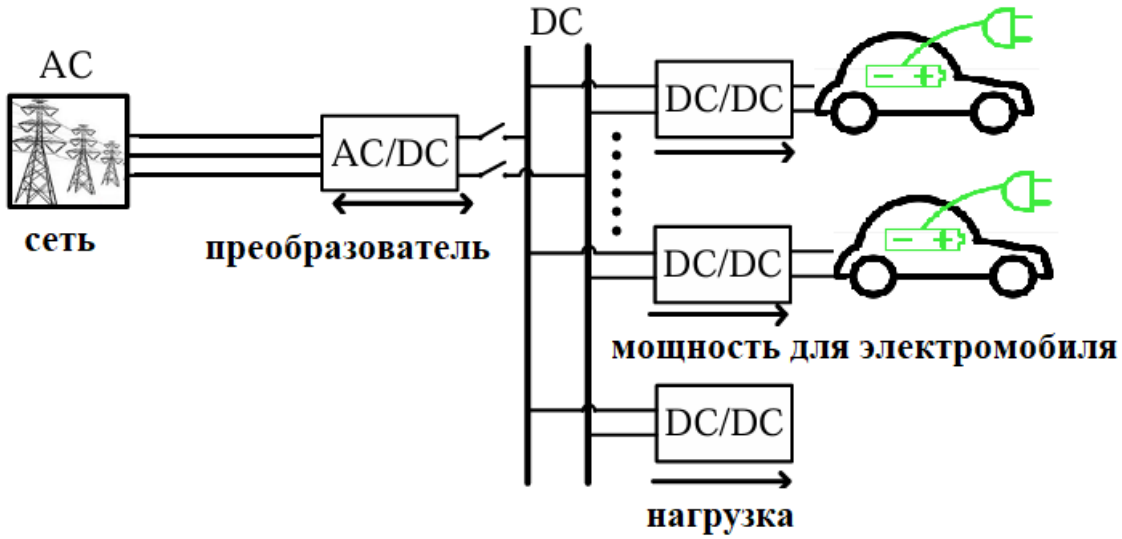


Рис. 1. Типовая схема ЭЗС без систем накопления энергии и возобновляемых источников

3. ЭЗС с системами накопления энергии

Интеграция СНЭ (в том числе гибридны) в архитектуру зарядной станции открывает возможности для оптимального энергоменеджмента: снижения эксплуатационных издержек, продления срока службы накопителя и повышения качества обслуживания. В этой группе работ рассматриваются модульные силовые электронные трансформаторы со встроенным разделённым аккумуляторным накопителем для сверхбыстрой зарядки, методы оптимизации ёмкости СНЭ с учётом спроса на зарядку, потерь энергии и цикла службы, использование накопителей на базе аккумуляторов электромобилей, а также беспроводные маховичные накопители и накопители на сверхпроводящих магнитных системах. В части управления разработаны алгоритмы, устраняющие необходимость цифровой связи между силовыми преобразователями при использовании маховичных накопителей, а также схемы оптимизации спроса и предложения энергии на основе рынка. В целом функции заряда/разряда СНЭ применяются главным образом для расширения располагаемой мощности станции, сглаживания пиковых нагрузок сети и компенсации колебаний при резких изменениях нагрузки; при этом отмечается тенденция замещения выделенных СНЭ аккумуляторами подключённых электромобилей как более экономичным решением.

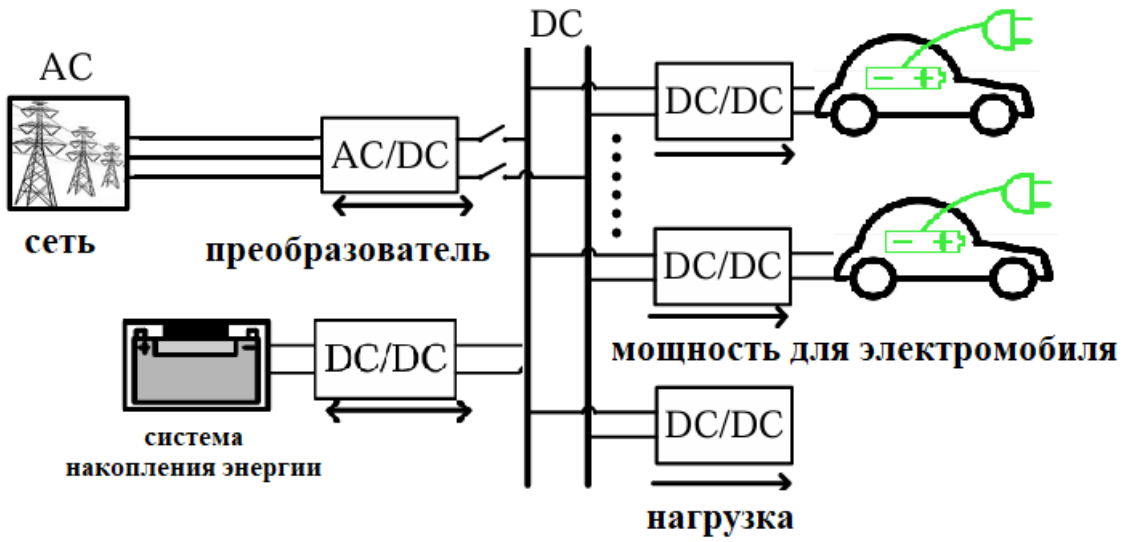


Рис. 2. Типовая схема ЭЗС с системой накопления энергии

4. ЭЗС с генерацией на основе возобновляемых источников энергии

Интеграция фотоэлектрической и ветровой генерации в архитектуру ЭЗС позволяет снижать пиковую нагрузку на сеть, а при наличии соответствующего приоритета управления — использовать электромобили как накопители для сглаживания непредсказуемой генерации ВИЭ. Исследования данной группы охватывают оценку воздействия быстрых зарядных станций на сеть с ветрогенерацией, а также разработку моделей динамического ценообразования для согласования генерации PV и спроса на зарядку. Показано, что PV-станция способна покрывать до 82,2% суточной потребности электромобиля в энергии в солнечный день. Основной технической проблемой данной категории остаётся компенсация неизбежных колебаний мощности и напряжения, вызванных нестабильностью генерации ВИЭ, что требует развитых алгоритмов управления на различных конфигурациях системы.

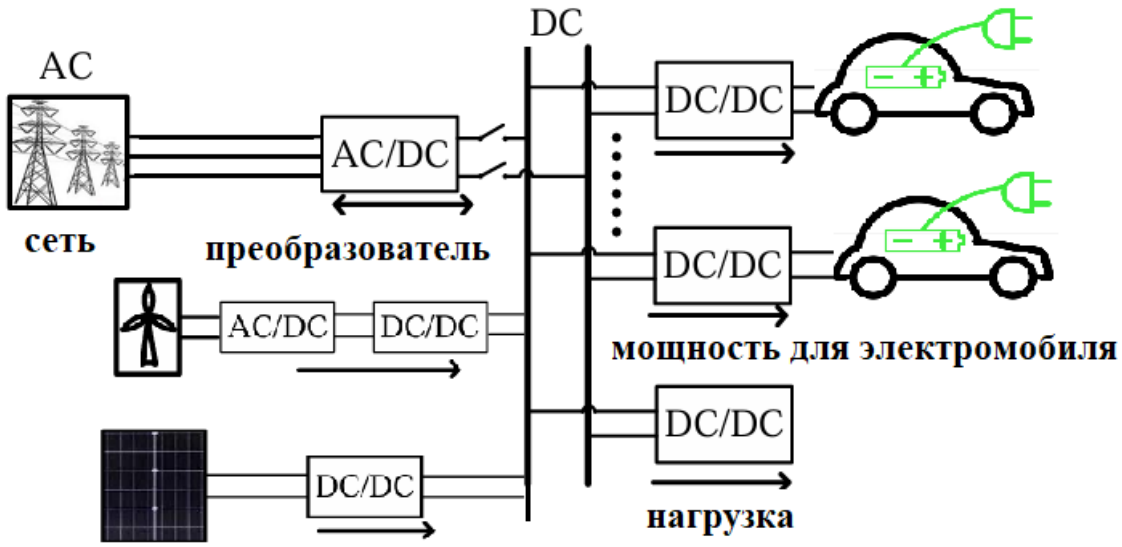


Рис. 3. Типовая схема ЭЗС с генерацией на основе ВИЭ (PV/WTG)

5. ЭЗС с совместной интеграцией систем накопления и возобновляемых источников

Одновременное объединение генерации ВИЭ, различных типов СНЭ и подключения к сети формирует наиболее технически совершенную архитектуру, охватывающую большинство публикаций. Такая конфигурация позволяет использовать генерацию ВИЭ для зарядки электромобилей и сглаживания пиков мощности сети при одновременном снижении сетевых потерь и повышении качества электроэнергии, тогда как СНЭ компенсируют неизбежную нестабильность возобновляемой генерации. Работы этой группы охватывают комплексные технико-экономические подходы (например, оптимизация годовой стоимости энергии системы ЭЗС—СНЭ—ВИЭ), сравнение типов накопителей (маховик, суперконденсатор, сверхпроводящий магнитный накопитель) по критерию стабилизации напряжения шины постоянного тока. Рассматриваются также вопросы силовой электроники — модульные многопортовые преобразователи с двунаправленным потоком мощности между сетью, ВИЭ, СНЭ и зарядными портами. Совокупность рассмотренных результатов указывает на то, что при наличии соответствующих алгоритмов связи и управления данная архитектура способна реализовать широкий спектр целей оптимизации, что делает её магистральным направлением развития будущих зарядных станций.

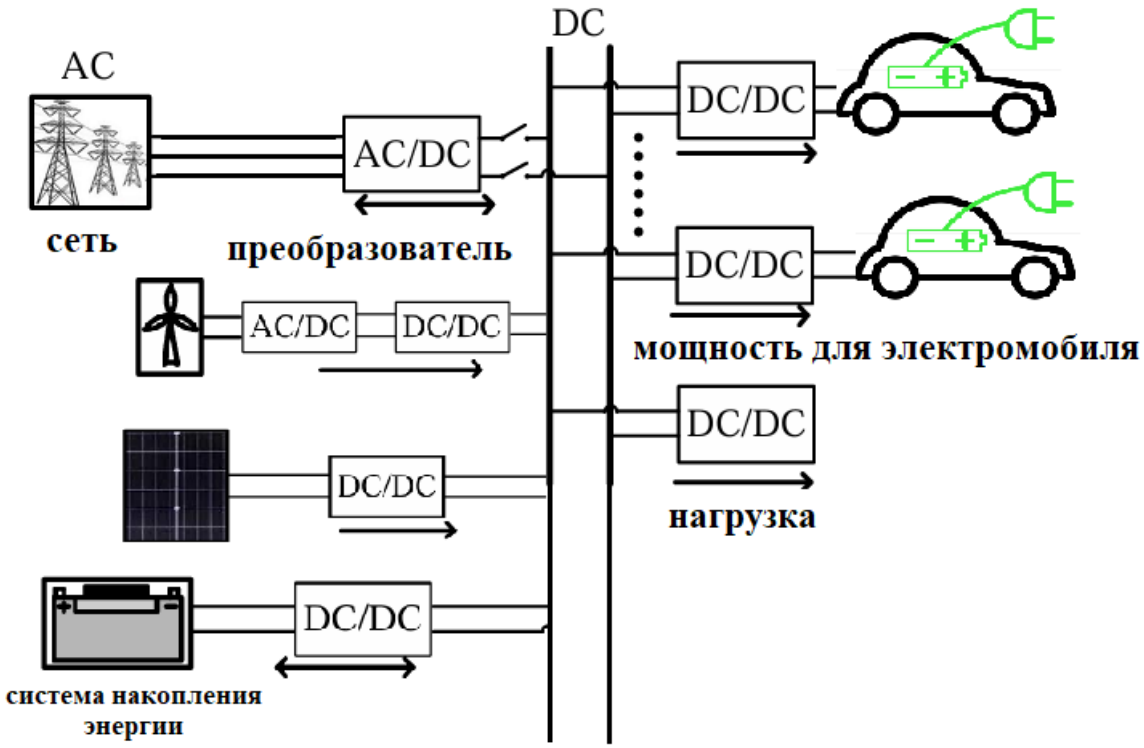


Рис. 4. Типовая схема ЭЗС с совместной интеграцией СНЭ и генерации ВИЭ

Заключение

Проведённый анализ публикаций по планированию и ключевым технологиям сетевых зарядных станций электромобилей позволяет заключить, что архитектура, сочетающая генерацию на основе возобновляемых источников энергии с системами накопления энергии, обладает наибольшим техническим потенциалом среди рассмотренных конфигураций и рассматривается как наиболее вероятное направление развития отрасли. Дальнейшее продвижение в данной области связывается с внедрением

широкозонной силовой электроники, развитием интеллектуальных алгоритмов координированного управления и целенаправленным исследованием роли портативных накопителей энергии в сетевых зарядных комплексах.

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SOTALI ALOQA BAZAVIY STANSIYALARINING QAYTA TIKLANUVCHI ENERGIYA MANBALARI ASOSIDAGI ELEKTR TA’MINOTI

Sultonova Maxbubaxon Odilovna
Muhammad al-Xorazmiy nomidagi Toshkent axborot texnologiyalari universiteti
“Mobil aloqa texnologiyalari” kafedrasi dotsenti, PhD
maxbubasultonova1473@gmail.com
https://doi.org/10.5281/zenodo.22896000

Annotatsiya. *Maqolada sotali aloqa bazaviy stansiyalarining elektr ta’minoti, ularning an’anaviy energiya tizimi bilan ishlash xususiyatlari hamda olis va borish qiyin hududlarda qayta tiklanuvchi energiya manbalaridan foydalanish imkoniyatlari ko‘rib chiqiladi. BTS Ericsson RBS6000 bazaviy stansiyasining asosiy qurilmalari, 48 V o‘zgarmas tok asosidagi uzluksiz elektr ta’minoti, akkumulyatorlar va invertorning vazifalari tavsiflanadi. Quyosh panellari va shamol generatoridan foydalanishga asoslangan muqobil elektr ta’minoti tizimining tuzilishi hamda uning olis bazaviy stansiyalarni uzluksiz energiya bilan ta’minlashdagi ahamiyati yoritiladi.*
Kalit so‘zlar: *sotali aloqa, bazaviy stansiya, RBS6000, elektr ta’minoti, qayta tiklanuvchi energiya, quyosh paneli, shamol generatori, akkumulyator, invertor.*
Abstract. *The article examines the power supply of cellular base stations, the features of their operation with conventional energy systems, and the possibilities of using renewable energy sources in remote and hard-to-reach areas. The main equipment of the Ericsson RBS6000 base station, the 48 V DC uninterruptible power supply system, batteries and inverter are described. The structure of an alternative power supply system based on solar panels and a wind generator and its importance for reliable energy supply of remote base stations are considered.*
Keywords: *cellular communication, base station, RBS6000, power supply, renewable energy, solar panel, wind generator, battery, inverter.*

Quyosh, shamol, biogaz kabi tabiiy resurslar asosida ishlaydigan zamonaviy texnologiyalarni keng qo‘llash iste’molchilarni elektr energiyasi bilan uzluksiz ta’minlashda muhim o‘rin tutadi. Muqobil energiya manbalaridan foydalanish, yoqilg‘i-energetika balansida ushbu resurslar ishlab chiqarayotgan energiya ulushini oshirish mamlakatimiz energetika xavfsizligiga xizmat qiladi.

O‘zbekiston Respublikasi Prezidentining 2020-yil 5-oktabrdagi PF-6079-son Farmon bilan tasdiqlangan “Raqamli O‘zbekiston — 2030” strategiyasi zamonaviy axborot-kommunikatsiya va telekommunikatsiya infratuzilmasini rivojlantirishni nazarda tutadi [1]. Mazkur normativ-huquqiy hujjatlar sotali aloqa bazaviy stansiyalarini, ayniqsa olis va borish qiyin bo‘lgan hududlarda, noan’anaviy va qayta tiklanuvchi energiya manbalari asosida elektr ta’minoti bilan ta’minlash masalasining dolzarbligini yanada oshiradi.

Telekommunikatsiyalar bozorini doimo va dinamik rivojlanishi uchun ma’lumotlarni almashlash bo‘yicha keng imkoniyatlarni taqdim etishga imkon beradigan ilg‘or texnologiyalarni jariy etish zarur. Bugungi kunga kelib bunday texologiyalardan biri 4G

to‘rtinchi avlod sotali aloqa texnologisi hisoblanadi. Bu texnologiyaning asosiy o‘ziga xos xususiyati uning ma’lumotlarni yuqori tezlikli uzatish xizmalarining keng spektrini taqdim etishga mo‘ljallanganligi hisoblanadi. Ayrim hududlarning tarmoqlarini rivojalantirish muammolari, xususan, aholining past zichligi, kapital solishtirma harajatlarning yuqori darajasi orqali aniqlanadi.

Hozirgi vaqtda sotali aloqani O‘zbekistonning katta yoshdagi aholisiga kirib borishi amaldagi darajasi 100% ga etgan, ya’ni ekstensiv rivojlanish (ya’ni abonentlar sonini tezkor oshirish hisobiga rivojlanish) bosqichi tugagan. Sotali aloqa bozorining keyingi rivojalanishi xizmatlar paketlarini kengaytirish (birinchi navbatda, ma’lumotlarni uzatish xizmatlari hisobiga) va ularning narxini pasaytirish hisobiga bo‘lib o‘tadi. Alohida yo‘nalishga past aholi zichligili hududlarda, avtotrassalar va temir yo‘llar bo‘ylab sotali aloqani ta’minlashga ajratiladi.

Bunday sharoitlarda eng sezlarli qismi elektr ta’minotiga to‘g‘ri keladigan (bazaviy stansiyalarni ishlatishga umumiy harajatlardan 40-50% [2]) tarmoqni ishlatishga operatsion harajatlarni kamaytirish muhim masala bo‘lib qoladi, borish qiyin bo‘lgan va olisdagi joylarda joylashtirilgan bazaviy stansiyalar uchun bunday harajatlar yanada yuqori bo‘ladi, chunki uzun elektr uzatish liniyalarini tortish kerak bo‘ladi yoki avtonom energiya manbalaridan (odatda dizel generatorlari) foydalanish kerak bo‘ladi.

Misol sifatida BTS Ericsson RBS6000 bazaviy stansiyani olamiz. RBS turkumdagi 6000 bazaviy stansiyasi Ericsson kompaniyasining mahsuloti hisoblanadi.

Konstruksiya RBS – 6201 bloki, 2G radio moduli va 3G va 4G radio modullari o‘rnatilgan ikkita bo‘lmalardan tashkil topgan quti (shkaf) ko‘rinishida bajarilgan. 1-rasmda bu qurulmalardan foydalaniladigan BTS Ericsson RBS6000 bazaviy stansiyaning tashqi ko‘rinishi tasvirlangan.

RBS600 blokining asosiy tashkil etuvchilari ma’lumotlarga ishlov berish uchun raqamli asbob (raqamli qurulma) va RF bloki (Radio blok) hisoblanadi.



a) RBS – 6201 shkafi



b) 2G radio moduli



c) 3G va 4G radio moduli

1-rasm. BTS Ericsson RBS6000 bazaviy stansiya va 2G, 3G va 4G radio modularning tashqi ko‘rinishi

RBS6000 raqamli bloki tashuvchi chastota signaligan ishlov berish va interfeys moduli, RF signalni interfeysi moslashtiradigan RF22 qabullash-uzatish blokidan tashkil topgan [3].

RBS 6201 qurulmasi har birida sovutish tizimi, raqamli asbob, RF blok, elektr ta’minoti moduli, uzatish moduli va RBS 6601 blok bo‘lgan 5ta seksiyalardan tashkil topgan. MU bloki 6ta radio bloklarni (RRUS) birlashtirishga imkon beradi.

Radio bloklar (RRUS) antenna yaqinida o‘rnatiladi va u signalni dastlabki kuchaytirish uchun mo‘ljallangan. Radio blok uncha katta bo‘lmagan joyni egallaydi va kichik hajm va og‘irlikka ega bo‘ladi.

1-jadval

Radio bloklarning chastotalar diapazonlari

RBS 6000	**Chastota, MHZ**
RUS01 B0	900MHZ
RUS01 B1	1800MHZ
RUG11 B5	850MHZ
RUG11 B0	900MHZ
RGU11 B1	1800MHZ
RUG11 B3	1800MHZ
RUG11 B2	2000MHZ

RBS 6000 bloki GSM/EDGE, WCDMA/HSPA va LTE standartlarini qo‘llaydi hamda RBS2000 va RBS3000 mahsulotlari bilan moslashuvchandir.

RBS 6000 Multi-standartli bazaviy stansiyalarning ko‘plab turlari mavjud. Mobil keng polosali xizmat ko‘rsatish, mobil TV va veb – ilovalar uchun yangi ilovalarni taqdim etish va o‘rnatish oqilona yechim hisoblanadi.

Yangi yuqori tezlikli mobil keng polosali xizmatlar, mobil TV va veb – ilovalarni qulay kengaytirish va o‘rnatish to‘g‘ri rejalashtirishni talab qiladi.

RBS 6000 oilasi nafaqat zamonaviy texnologiyalarga qulay o‘tishni kafolatlaydi, balki bu ekologik ta’sirni kamaytiradi.

Bazaviy stansiyalar sovutish modullariga ega. Ular ko‘pincha havo bilan sovutish uchun uzatkichlar tashqariga ham joylashtirilishi mumkin.

RRU bloki antenna yaqiniga mahkamlanadi va optik tolali uzatish moduli bilan birlashtiriladi. Boshqarish moduli maxsus bo‘lmada joylashgan bo‘lib, uning sovutilishi tashqi havo bilan issiqlik almashinuvi tufayli kafolatlanadi.

Optik tolali tizimdan foydalanish mis tizimdan foydalanishga qaraganda samarali usul hisoblanadi. Misning optikaga almashtirilishi tabiiy resurslarni tejalishini bildiradi [4].

Antennadagi nurlanish quvvatini oshirilishi bilan bazaviy stansiyaning qamrab olish zonasini oshirish mumkin.

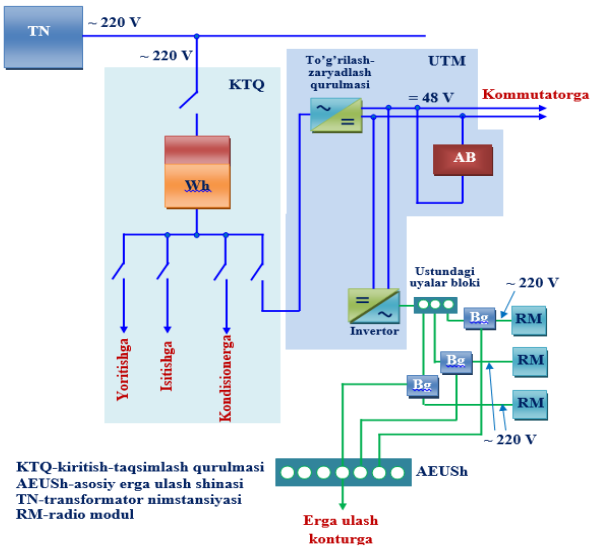
Bazaviy stansiyalarning an’anaviy elektr ta’minoti 220 V kuchlanishli o‘zgaruvchan tok tarmog‘idan amalga oshiriladi (2-rasm). Ta’miot kuchlanishi TP transformator nimstansiyadan olinadi va bazaviy stansiyaga etkaziladi. Ta’minot kuchlanish dastlab kiritish-taqsimlash bokiga beriladi, undan liniyalar bo‘ylab kuchlanish umumiy yoritish, isitish tizimi, konditsionirlash tizimi va uzluksiz elektr ta’minoti tizimiga beriladi.

Uzluksiz elektr ta’minoti tizimi to‘g‘rilash-zaryadlash qurulmasi, akkumulyatorlar batareyalari bloki va invertorni o‘z ichiga oladi. To‘g‘rilash-zaryadlash qurulmasidan 48 V kuchlanishli o‘zgarmas tok «Ericsson ME 3600 X 24CX» kommutatoriga beriladi, shuningdek akkumulyatorlar batareyalari va invertorga beriladi.

Akkumulyatorlar batareyalari asosiy ta’minot liniyasida uzilish bo‘lganida ishlashga ulanadi. Invertor 48 V kuchlanishli o‘zgarmas tokni 220 V kuchlanishli o‘zgaruvchan tokka o‘zgartiradi va «Flexi Multi radio» modullarini ta’minlaydi.

Ichki qurulmalarni o‘ta kuchlanishlardan himoyalash uchun ta’minot kabeli erga ulash shinasi (EUSH) orqali “Yer” bilan ulangan yashin o‘tkazgichlari qo‘yiladi.

Bazaviy stansiyalarning barcha elementlari - RRL (radioreleli qism releyka), SDH qatori 48 V o‘zgarmas kuchlanishdan ta’minlanadi. Bazaviy stansiyaga 380 V kuchlanishli uch fazali kuchlanish beriladi va o‘zgartirgich uni 48 V o‘zgarmas kuchlanishga o‘zgartiradi [5].



2-rasm. Bazaviy stansiyalarning an’anaviy elektr ta’minotini tashkil etish sxemasi

Elektr ta’minoti uzilganida ta’minotni akkumulyatorlar batareyalaridan (AB) zahiralashtirish ko‘zda tutilgan. Bazaviy stansiyalarning an’anaviy elektr ta’minotini tashkil etilishi sxemasida ta’minot shinasida konditsioner, ishchi va avariya yoritish lampalari, uzluksiz ta’minot manbai (UTM), qo‘riqlash-yong‘in signalizatsiyasi, isitkich va tortib oluvchi ventilyasiya uchun elektr hisoblagich, yordamchi uyalar, o‘ta kuchlanishni cheklagichlar va turli nominallardagi tok avtomatlari qo‘yilgan

Bu butun tizimni elektr ta’minotining miyasi bo‘lgan SmartPack moduli boshqaradi, unda barcha xarakteristikalar saqlanadi. SmartPack modulida lokal tarmoq bilan Ethetnet-chiqish mavjud bo‘lib, u orqali deyarli barcha amallarni bajarish, holatni nazorat qilish, ustundagi avariya signallarini kuzatish mumkin.

LVBD kontaktori boshqaruvi ostida RRL, SDH elementlari va boshqa qurulmalar umumiy shinaga ulanadi va ular ustivorlikli qurulmalar hisoblanadi, BS elementlari esa ustivorliksiz qurulmalar hisoblanadi. kontaktorlar ma’lumot parametrga etganida ulanadi.

3-rasmda keltirilgan UTM7-48/218-7 (2,0) uzlukiz elektr ta’minoti manbaida 4ta impulsli stabillash bloklari mavjud. UTM indikatorida 54,1 V nominal kuchlanish, 32 A yuklama toki, 0 A AB zaryadanish toki va ABning Selsiy bo‘yicha +18 gradus harorati (termodatchik AB kuchlanishini termokompensatsiyalash uchun kerak bo‘ladi) aks ettiriladi [6].



4-rasm. Uzluksiz elektr ta’minoti manbaining tashqi ko‘rinishi

Tok avtomatlarining ikkita turlari mavjud, ulardan birinchisi ustivorliksiz yuklamani (LVLD, yuklamali) uzadi, ikkinchisi shunga muvofiq ustivorlikli yuklamani (LVBD, batareyali) uzadi.

5-rasmda tasvirlangan UTMda qator tok avtomatlar mavjud bo‘lib, ulardan simlar bazaviy stansiyalarga, radioreleli liniyalar (RRL), AB va boshqalarga ketgan. Shu erning o‘zida kontaktlarli plata ko‘rsatlgan bo‘lib, u elektr ta’minotini o‘chirish va ABni razryadlash uchun tashqi avariya signalizatsiyasi uchun mo‘ljallangan.



5-rasm. UTMdagi tok avtomatlari

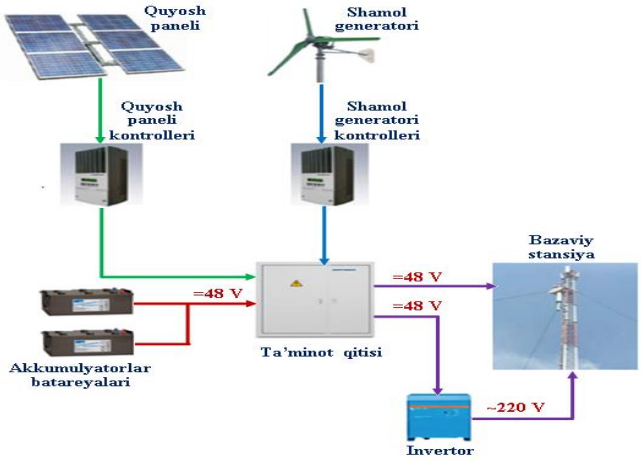
6-rasmda UTMning ichki qismi tasvirlangan bo‘lib, unga har biri 150 A·s sig‘imli Soslight 6-gfm-150x batareyalari o‘rnatilgan. ABni texnik ko‘zdan kechirishda yuklama rezistorlari qo‘llanadigan nazorat razryadlash o‘tkaziladi. Razryadlash natijalari bo‘yicha ABni almashtirilishi yoki almashtirilmasligi haqida xulosa qilinadi.



6-rasm. UTMning ichki qismi

3. Muqobil elektr ta’minoti tizimi

Muqobil elektr ta’minoti tizimining tuzilish sxemasi 7-rasmda keltirilgan. Elektr ta’minoti tizimida elektr energiyasining asosiy manbalari quyosh panellari va shamol generatori hisoblanadi. Quyosh panellari va shamol generatori quyosh yoki shamol energiyasini mos ravishdagi o‘zarmas va o‘zgaruvchan tok energiyasiga o‘zgartiradi. Shamol generatori liniyasidagi to‘g‘rilagich o‘zgaruvchan tokni o‘zgarmas tok energiyasiga o‘zgartiradi. Bu tok yoki quyosh panellari o‘zgarmas toki akkumulyatorlar batareyalarini zaryadlaydi.



7-rasm. Muqobil elektr ta’minoti tizimining tuzilish sxemasi

Akkumulyatorlar batareyalari (AB) to‘g‘rilagichdan o‘zgarmas tok kuchlanishini stabillash bilan qurulmalarni 48 V kuchlanishli o‘zgarmas tok energiyasi bilan ta’minlashni va elektr energiyasini to‘plashni amalga oshiradi. Akkumulyatorlar batareyalariga 48 V kuchlanishli o‘zgarmas tok energiyasini 220 V sinusoidal kuchlanishli va 50 Gs chastotali standart o‘zgaruvchan tokka o‘zgartiradigan va bazaviy tansiya qurulmalarini o‘zgaruvchan tok bilan ta’minlaydigan invertor ulanadi.

Sotali aloqa bozorining keyingi rivojalanishi xizmatlar paketlarini kengaytirish (birinchi navbatda, ma’lumotlarni uzatish xizmatlari hisobiga) va ularning narxini pasaytirish hisobiga bo‘lib o‘tadi. Alohida yo‘nalishga past aholi zichligili hududlarda, avtotrassalar va temir yo‘llar bo‘ylab sotali aloqani ta’minlashga ajratiladi [7].

Sotali aloqa tizimlarida qayta tiklanadigan energiya manbalaridan foydalanishning dolzarbligi shundan iboratki, quyosh elementlari va shamol generatorlari asosidagi elektr

stansiyalar yordamida elektr energiyasini ishlab chiqarish bugungi kunda deyarli butun dunyoda qo‘llanilmoqda. Quyosh batareyalaridan foydalanish hajmlari doimo ortib bormoqda.

Elektr energiyasi manbalari sifatida quyosh modullari, shamol generatori, to‘plagich, invertor, quyosh modullari va shamol generatorining ish rejimlarini optimallashtirish integratsiyalangan qurulmasi ishlatiladi. Bu qurulma quyosh nurlanishi va shamolning past intensivliklarida akkumulyatorlarning stabil zaryadlanishini va generatsiyalanadigan kuchlanishning stabillanishini ta’minlaydi. Bu yakuniy hisobda akkumulyatorlar batareyalarini o‘rnatish texnik darajasini oshirish va ishlatish muddatlarini uzaytirishga imkon beradi. Sotali aloqa olisdagi bazaviy stansiyalarini elektr nimstansiyalarga bog‘lamasdan uzluksiz elektr ta’minoti imkoniyatini ta’minlaydi.

Xulosa

Tahlil natijasida sotali aloqa bazaviy stansiyalarining uzluksiz elektr ta’minotini ta’minlashda an’anaviy tarmoq bilan bir qatorda quyosh panellari, shamol generatorlari, akkumulyatorlar va invertorlardan tashkil topgan muqobil tizimlardan foydalanish maqsadga muvofiq ekani ko‘rsatiladi. Bunday yondashuv, ayniqsa, elektr tarmoqlaridan uzoq hududlardagi bazaviy stansiyalarni ta’minlash va ekspluatatsion xarajatlarni kamaytirish imkonini beradi.

Foydalanilgan adabiyotlar

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SECTION 3

ARTIFICIAL INTELLIGENCE IN ARCHITECTURE, CONSTRUCTION, AND "SMART CITY" TECHNOLOGIES: MODERN APPLICATIONS

* * *

3-SHO‘BA

ARXITEKTURA, QURILISH VA “AQLLI SHAHAR” TEXNOLOGIYALARIDA SUN’IY INTELLEKTNING ZAMONAVIY QO‘LLANILISHI

ARTIFICIAL INTELLIGENCE IN ARCHITECTURAL DESIGN: GENERATING AND EVALUATING ALTERNATIVE DESIGN SOLUTIONS

Abdullaeva Sitorabonu Xasanjon kizi
Lecturer, «Architecture» department. AJOU University in Tashkent
e-mail: sitorik1997@gmail.com. https://orcid.org/0009-0003-5840-0605
https://doi.org/10.5281/zenodo.22896135

Abstract. *This article examines the use of Artificial Intelligence (AI) for generating and evaluating alternative architectural design solutions. The study analyzes current AI-based approaches and their application to floor plans, spatial configurations, architectural forms, façades, and conceptual design. The findings show that AI can expand the design search space and accelerate the exploration of alternatives, but generation alone does not ensure architectural quality. A framework is proposed that combines AI-based generation and evaluation with architect-led selection and refinement. The study emphasizes AI as a decision-support tool that complements rather than replaces professional architectural expertise.*

Keywords: *artificial intelligence, architectural design, generative AI, design alternatives, design evaluation, generative design, human–AI collaboration.*

Аннотация. *В статье рассматривается применение искусственного интеллекта (ИИ) для генерации и оценки альтернативных архитектурных решений. Проанализированы современные подходы к использованию ИИ при разработке планировочных решений, пространственных конфигураций, архитектурных форм, фасадов и концепций. Результаты показывают, что ИИ расширяет пространство проектного поиска и ускоряет разработку альтернатив, однако их генерация сама по себе не гарантирует архитектурного качества. Предложена модель, объединяющая генерацию и оценку решений с помощью ИИ, а также их выбор и доработку архитектором. ИИ рассматривается как инструмент поддержки проектных решений, дополняющий, а не заменяющий профессиональную экспертизу архитектора.*

Ключевые слова: *искусственный интеллект, архитектурное проектирование, генеративный ИИ, альтернативные проектные решения, оценка проектных решений, генеративное проектирование, взаимодействие человека и ИИ.*

INTRODUCTION. Artificial intelligence (AI) is increasingly transforming architectural design by supporting design generation, exploration, analysis, and decision-making. Machine-learning-based generative methods can learn relationships from existing architectural data and produce multiple design alternatives, expanding the range of solutions that architects can explore within a limited time [1]. Recent generative AI models, including GANs, VAEs, diffusion models, and foundation models, further support the generation of architectural images, floor plans, façades, and three-dimensional forms [2].

The use of AI is particularly significant at the early stages of architectural design, where exploring multiple alternatives is essential. A review of 161 studies found that 68.94% of AI applications in architectural design focus on the schematic design stage, demonstrating the strong potential of AI for design exploration [3]. However, generating multiple alternatives alone does

not guarantee their architectural quality. AI-generated solutions must also be evaluated according to functional organization, spatial quality, aesthetics, context, user requirements, constructability, environmental performance, and regulatory constraints.

Recent research highlights that evaluation remains a significant challenge. AI can improve generative design and spatial organization, but issues such as algorithmic bias, reliability, ethical concerns, and the preservation of architectural identity remain unresolved [4]. Moreover, comparative evaluation is still less developed than design generation, while many generative AI applications remain experimental and focus primarily on producing design outputs rather than their comprehensive assessment [3,5].

This creates an important research gap between the generation of architectural alternatives and their systematic evaluation. Although AI can rapidly produce numerous possible solutions, architects still need reliable criteria and methods for comparing these alternatives and determining which solutions are appropriate for a specific project.

Therefore, this study focuses on the relationship between AI-based generation and the evaluation of alternative architectural design solutions. The main objective is to examine how AI can support both the generation and systematic assessment of multiple design alternatives while maintaining the architect's role in final decision-making.

The study proposes a framework in which architectural requirements are translated into AI-generated alternatives, which are then evaluated according to relevant architectural criteria. The final selection and refinement remain part of an architect–AI collaborative process, positioning AI as a tool for expanding and supporting design exploration rather than replacing professional architectural judgment.

METHODOLOGY. This study employs a structured qualitative literature analysis to examine the role of artificial intelligence in generating and evaluating alternative architectural design solutions. The methodology focuses on identifying current AI-based approaches, analyzing the types of design alternatives they can produce, and examining the methods used to assess the quality and suitability of these alternatives.

The research was organized into four main stages. First, relevant academic studies on AI-assisted architectural design were reviewed to identify the principal technologies and approaches used for design generation. Particular attention was given to generative models, machine learning methods, and AI applications at the early stages of architectural design [6]. Second, the identified approaches were classified according to their design tasks and generated outputs, including floor plans, spatial configurations, architectural forms, façades, and conceptual images [7].

Third, the evaluation methods applied to AI-generated architectural solutions were analyzed. The study considered both quantitative and qualitative approaches, including geometric and topological metrics, performance-based assessment, comparative evaluation, and expert judgment. Previous research indicates that evaluation of AI-generated floor plans and other architectural outputs remains more complex than their generation because architectural quality involves both measurable characteristics and subjective professional judgments [8]. AI-generated residential floor plans, for example, can also be evaluated through building-performance indicators such as daylight availability [9].

Finally, the findings were synthesized to establish a framework for AI-assisted architectural decision-making. The framework considers architectural requirements as the starting point, followed by AI-based generation of multiple alternatives, systematic evaluation

according to relevant criteria, and architect-led selection and refinement. This approach allows the study to consider not only the technical capabilities of AI but also the interaction between computational generation and professional architectural judgment [10].

RESULTS. The analysis of recent scientific literature demonstrates that Artificial Intelligence (AI) is becoming an important tool for generating and exploring alternative architectural design solutions. AI-based methods allow designers to process different types of architectural information and produce multiple design options within a relatively short period. The reviewed studies indicate that these applications are particularly concentrated in the early stages of design, including conceptual development, spatial programming, floor-plan generation, form finding, and façade design [6].

One of the main results of the analysis is the growing diversity of AI-generated architectural outputs. Depending on the design task and input information, AI systems can generate two-dimensional floor plans, spatial configurations, conceptual images, three-dimensional forms, and façade alternatives. Machine-learning approaches can also incorporate geometric, topological, and semantic information, allowing generated solutions to reflect spatial relationships and design constraints [7]. This expands the traditional design search space and provides architects with a greater number of possible solutions for further consideration.

At the same time, the analysis reveals a clear difference between design generation and design evaluation. While AI methods for producing alternatives have developed rapidly, evaluating whether a generated solution is architecturally appropriate remains a more complex task. AI-generated designs cannot be assessed only according to visual characteristics or geometric similarity. Architectural alternatives should also be considered in terms of functionality, spatial organization, aesthetics, contextual compatibility, user requirements, constructability, and environmental performance. Research on AI-generated floor plans demonstrates the importance of combining quantitative indicators with qualitative assessment by designers or other experts [8].

Another important result concerns the integration of performance-based criteria into the evaluation process. AI-generated alternatives can be assessed not only according to their formal characteristics but also according to measurable building-performance indicators. For example, AI-based methods have been applied to predict and optimize daylight performance in generated residential floor plans, demonstrating the possibility of incorporating environmental performance into the comparison and selection of design alternatives [9].

The analysis also shows that the role of the architect remains essential within AI-assisted design workflows. AI systems can generate and analyze multiple alternatives, but the interpretation of architectural requirements, assessment of contextual appropriateness, and selection of the final solution require professional judgment. Existing classifications of AI techniques emphasize different forms of interaction between designers and computational systems, indicating that AI can function not only as an automated generator but also as an interactive design-support tool [10].

The main characteristics of AI-assisted generation and evaluation of architectural alternatives are summarized in Table 1.

Table 1

AI-Based Generation and Evaluation of Alternative Architectural Design Solutions[36]

AI application	Generated output	Main evaluation criteria	Role of the architect
Conceptual design	Architectural images and concepts	Aesthetics, concept, contextual relevance	Selection and refinement
Floor-plan generation	Alternative spatial layouts	Functionality, circulation, topology, spatial quality	Evaluation and modification
Form finding	3D forms and massing alternatives	Geometry, spatial quality, constructability	Definition of design direction
Façade generation	Façade alternatives	Aesthetics, context, performance	Comparative assessment
Performance-based generation	Optimized design alternatives	Daylight, environmental and functional performance	Interpretation of results
Multi-objective design	Multiple optimized solutions	Functional, aesthetic, and performance criteria	Final decision-making

Overall, the findings demonstrate that the principal value of AI in architectural design is not limited to its ability to generate many alternatives. Its greater potential lies in connecting generation, evaluation, comparison, and refinement within a single design workflow. This creates the basis for a more structured form of architect–AI collaboration, in which AI expands the range of possible solutions while the architect remains responsible for evaluating alternatives and determining the final design direction.

[36] Source: Compiled by the author based on the analysis of scientific literature.

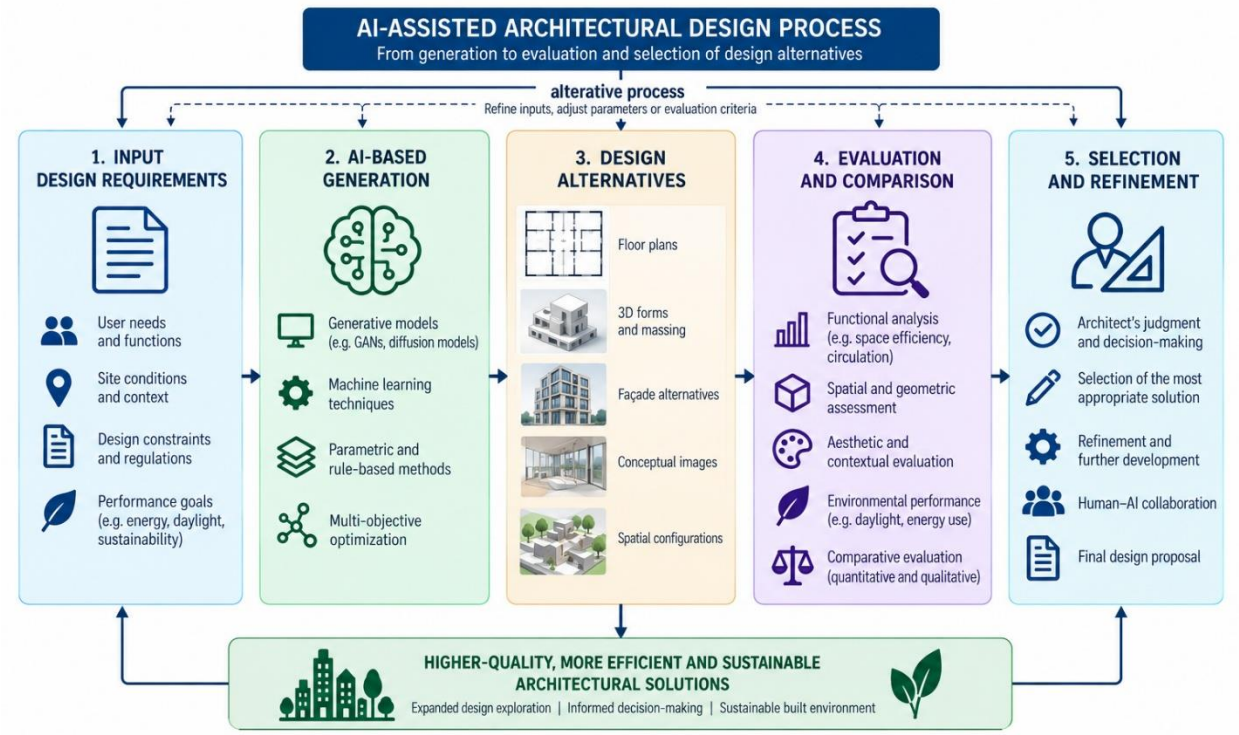


Figure 1. Framework for AI-Assisted Generation, Evaluation, and Selection of Architectural Design Alternatives[37]

Figure 1 illustrates the proposed workflow, beginning with architectural requirements and continuing through AI-based generation of multiple alternatives, their evaluation according to architectural and performance criteria, and the final selection and refinement by the architect. The iterative structure of the framework emphasizes that the generation and evaluation stages can be repeated as design requirements or evaluation criteria are modified.

DISCUSSION. The findings demonstrate that Artificial Intelligence is changing the architectural design process from a predominantly sequential workflow toward a more exploratory and iterative model. The ability of AI to generate multiple alternatives can significantly expand the range of solutions considered during the early design stages. However, the increasing number of generated options also creates a greater need for reliable methods of comparison and selection. Recent research emphasizes that effective AI-assisted design should combine generative capabilities with standardized evaluation criteria, performance-based methods, and architectural knowledge rather than treating generation as an end in itself [11].

An important implication concerns the changing role of the architect. AI can perform repetitive computational tasks, generate alternative configurations, and process large amounts of design information, while the architect remains responsible for defining design objectives and interpreting the generated results. This suggests a transition from direct production toward a role of strategic curator and decision-maker, in which professional knowledge is used to guide, evaluate, and refine AI-generated solutions [11].

The results also support the importance of human–AI collaboration rather than full automation. Recent research indicates that human-on-the-loop approaches remain dominant in architectural applications of AI, particularly because designers need to maintain control over the generation process and final decisions. The effectiveness of collaboration depends on factors

[37] Source: Developed by the author based on the analysis of AI-based architectural design generation and evaluation methods.

such as the amount of information provided to the AI system, transparency of its outputs, and the degree of control available to the designer [12]. Therefore, the proposed framework should be understood as an iterative process in which AI and the architect continuously exchange information rather than as a one-directional automated workflow.

The evaluation of architectural alternatives represents another critical issue. Although AI systems can assess measurable parameters such as geometry, topology, and environmental performance, architectural quality also includes contextual, aesthetic, functional, and experiential characteristics that are more difficult to quantify. Recent research comparing multimodal AI evaluation with human architectural juries demonstrates that AI can provide useful assessment support, but human expertise remains important for interpreting complex architectural qualities and making final judgments [13].

Consequently, the findings suggest that AI should be positioned as a decision-support technology rather than a replacement for architectural expertise. Its main contribution is the ability to increase the speed and diversity of design exploration while supporting the analysis of alternative solutions. The architect's role remains essential in establishing project priorities, interpreting evaluation results, considering contextual and cultural factors, and selecting the most appropriate solution.

The proposed framework therefore combines the complementary strengths of AI and human expertise: AI provides computational generation, comparison, and performance analysis, while the architect provides professional judgment, contextual interpretation, and creative direction. Such a model can make the architectural design process more systematic and informed while preserving human responsibility for the final design outcome.

CONCLUSION. This study examined the role of Artificial Intelligence in generating and evaluating alternative architectural design solutions. The analysis demonstrates that AI-based technologies can significantly expand the design search space by rapidly producing multiple alternatives at the conceptual, spatial, geometric, and performance levels. This capability provides architects with greater opportunities to explore different design directions within the early stages of the architectural process.

The findings also indicate that generation alone is insufficient to ensure the quality of an architectural solution. AI-generated alternatives require systematic evaluation based on functional organization, spatial quality, aesthetics, contextual compatibility, user requirements, constructability, and environmental performance. Combining quantitative performance indicators with qualitative professional assessment can provide a more comprehensive basis for comparing alternative solutions.

The study further demonstrates that the increasing use of AI does not eliminate the need for architectural expertise. Instead, it changes the nature of the architect's involvement from primarily producing individual solutions toward defining requirements, guiding AI-generated alternatives, interpreting evaluation results, and selecting and refining the most appropriate design. Human–AI collaboration therefore represents a more suitable approach than complete automation of architectural decision-making.

The proposed framework integrates architectural requirements, AI-based generation, alternative evaluation, comparison, and architect-led selection and refinement into an iterative workflow. Such an approach can improve the efficiency and breadth of design exploration while maintaining professional control over the final architectural outcome.

The practical significance of the research lies in demonstrating how AI can be incorporated into architectural design as a decision-support tool rather than simply a generative technology. Further research should focus on developing more reliable evaluation criteria, improving the transparency and controllability of AI systems, and testing the proposed framework through practical architectural design projects.

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AGRAR OLIY TA’LIM TASHKILOTLARIDA KADRLAR TAYYORLASHNING TAHLILI

Boltayev Nurali Shiramatovich
Toshkent davlat agrar universiteti
mustaqil izlanuvchisi, i.f.f.d. (PhD)
ORCID: 0009-0007-9142-6080
https://doi.org/10.5281/zenodo.22870605

Annotatsiya. *Mazkur tezisda agrar oliy ta’lim tashkilotlarida kadrlar tayyorlash tizimining bugungi holati, uning samaradorligi hamda rivojlanish tendensiyalari tahlil qilingan. Ta’lim sifati, o‘quv jarayonining mehnat bozori talablariga mosligi, ta’lim, fan va ishlab chiqarish integratsiyasining holati hamda zamonaviy kompetensiyalarga asoslangan yondashuvlar yoritilgan. Shuningdek, agrar soha uchun raqobatbardosh mutaxassislar tayyorlashda innovatsion ta’lim texnologiyalari, amaliyot bazalarini kengaytirish va ish beruvchilar bilan hamkorlikni kuchaytirishning ahamiyati asoslab berilgan. Tadqiqot natijalari agrar oliy ta’lim tizimida kadrlar tayyorlash sifatini oshirishga qaratilgan taklif va tavsiyalarni ishlab chiqishga xizmat qiladi.*

Kalit so‘zlar: *agrar oliy ta’lim, kadrlar tayyorlash, ta’lim sifati, mehnat bozori, rivojlantirish, mexanizm, raqobatbardosh mutaxassis, agrar soha.*

Mamlakatimizda qishloq xo‘jaligini modernizatsiya qilish va taraqqiy ettirish uchun xalqaro standartlar asosida kreativ fikrlaydigan, yuqori malakali kadrlar tayyorlash, inson kapitalini mehnat bozori talablari asosida rivojlantirish ustuvor vazifa hisoblanadi. Shu bois, “O‘zbekiston-2030” strategiyasida oliy ta’lim bilan qamrovni kengaytirish, oliy ma’lumotli mutaxassislar tayyorlash sifatini oshirish, oliy ta’lim muassasalari tashkiliy-boshqaruv faoliyatini takomillashtirish, ularning moddiy-texnik ta’minotini mustahkamlash, iqtisodiyotning eng tez o‘sib borayotgan yo‘nalishlarida amaliy tadqiqotlarni kuchaytirish, «korxona — oliygoh — ilmiy tashkilot» klaster tizimini joriy etish maqsadlari belgilangan[1].

O‘zbekiston Respublikasi Prezidenti Sh.Mirziyoyevning Oliy Majlis va O‘zbekiston xalqiga Murojaatnomasida qishloq xo‘jaligida – unumdorlikni oshirish uchun bioinjeneriyadan keng foydalanish, ilg‘or agrotexnika va suv tejaydigan usullarni faol qo‘llash; iqtisodiy o‘sish va ekologik barqarorlik o‘rtasidagi muvozanatni ta’minlash uchun “yashil” energetika, chiqindisiz ishlab chiqarishga o‘tish; ta’lim va tibbiyotda – sifatni yangi bosqichga olib chiqadigan ilg‘or xorijiy tajribalarni keng joriy etish uchun yangi texnologiyalarni olib kirsak, kadrlarni ilm-fan va innovatsiyalarga asoslangan zamonaviy kasblarga tayyorlasak, kelgusi besh yilda iqtisodiyotimiz hajmini 240 milliard dollardan oshirishga barcha imkoniyatlarimiz borligi ta’kidlandi[2]. Bu esa, o‘z navbatida hududlar kesimida agrar soha uchun kadrlar tayyorlashdagi nomutanosibliklarni bartaraf etish, qishloq xo‘jaligi tarmoqlarining barqaror rivojlanishiga salbiy ta’sir ko‘rsatayotgan omillarni kamaytira oladigan malakali kadrlarga bog‘liq bo‘ladi. Kadrlar ehtiyojini prognozlash, ta’lim jarayonini natijaga yo‘naltirilgan boshqarish, monitoring va

baholash tizimlarini takomillashtirish bo‘yicha ilmiy asoslangan metodologik yondashuvlarni ishlab chiqishni taqozo etadi.

Agrar sohada malakali kadrlar tayyorlashning hozirgi holatini chuqur tahlil qilish ushbu tizimning samaradorligini baholash va uni takomillashtirish yo‘nalishlarini aniqlashda muhim ahamiyat kasb etadi. Xususan, O‘zbekiston Respublikasida agrar tarmoqni rivojlantirishga qaratilgan islohotlar kadrlar tayyorlash tizimini tubdan yangilashni talab etmoqda. Avvalo, mehnat bozori ehtiyojlari bilan ta’lim tizimi o‘rtasidagi muvozanat yetarli darajada emasligi kuzatiladi. Ba’zi yo‘nalishlarda ortiqcha kadrlar tayyorlanayotgan bo‘lsa, ayrim zamonaviy yo‘nalishlar, jumladan agrotexnologiyalar, raqamli qishloq xo‘jaligi va agroinjiniring sohalarida malakali mutaxassislar yetishmovchiligi mavjud. Shuningdek, bitiruvchilarning bandlik darajasi va mutaxassisligi bo‘yicha ishga joylashish ko‘rsatkichlari ham tizim samaradorligini baholovchi muhim mezonlardan biridir. Amaliyot shuni ko‘rsatadiki, ayrim hollarda bitiruvchilarning nazariy bilimlari yetarli bo‘lsa-da, amaliy ko‘nikmalarning sustligi ularning ishlab chiqarish jarayoniga tez moslashishiga to‘sqinlik qilmoqda. Bu esa ta’lim jarayonida amaliyot ulushini oshirish, dual ta’lim tizimini keng joriy etish zarurligini ko‘rsatadi.

Agrar soha uchun yuqori malakali va raqobatbardosh mutaxassislar tayyorlash, agrar ta’lim tizimini sifat jihatidan yangi bosqichga olib chiqish, o‘quv jarayoniga ilg‘or ta’lim texnologiyalarini joriy etish, ta’lim sifati va ilmiy salohiyatni oshirish, shuningdek, agrar sohani barqaror rivojlantirish, ilm-fan, ta’lim va ishlab chiqarishni integratsiya qilish maqsadida O‘zbekiston Respublikasi Prezidentining 2026-yil 11-apreldagi “Toshkent davlat agrar universiteti faoliyatini takomillashtirishga oid qo‘shimcha chora-tadbirlar to‘g‘risida”gi PQ-135-sonli qarori qabul qilindi[3]. Mazkur qarorga muvofiq agrar sohada tayanch hisoblangan Toshkent davlat agrar universitetida ta’limning zamonaviy shakllarini joriy etish orqali agrar sohani malakali kadrlar bilan ta’minlashning chora-tadbirlari belgilandi.

Bundan tashqari, agrar ta’lim muassasalarining moddiy-texnik bazasi va infratuzilmasi holati ham muhim tahlil obyektidir. Zamonaviy laboratoriyalar, ilg‘or texnika va raqamli texnologiyalar bilan ta’minlanganlik darajasi ayrim hollarda talab darajasida emas. Bu esa talabalar tomonidan zamonaviy agrotexnologiyalarni chuqur o‘zlashtirish imkoniyatlarini cheklaydi. Shu bilan birga, professor-o‘qituvchilar salohiyati, ularning ilmiy darajasi, amaliy tajribasi hamda xalqaro hamkorlikdagi ishtiroki yetarli darajada tizimli rivojlantirilishi lozim. Xorijiy tajriba shuni ko‘rsatadiki, agrar sohada yuqori samaradorlikka erishgan davlatlarda ta’lim, ilm-fan va ishlab chiqarish o‘rtasidagi integratsiya kuchli yo‘lga qo‘yilgan. Shu nuqtai nazardan, xalqaro hamkorlikni kengaytirish, qo‘shma ta’lim dasturlarini joriy etish va akademik almashinuvni rivojlantirish dolzarb hisoblanadi. Ayniqsa, raqamli texnologiyalar, “aqlli qishloq xo‘jaligi” (smart agriculture), GIS tizimlari va agrostartaplarni qo‘llab-quvvatlash orqali zamonaviy kompetensiyalarni shakllantirish muhim ahamiyatga ega. Agrar sohada kadrlar tayyorlash tizimini takomillashtirish uchun mehnat bozori talablariga moslashgan o‘quv dasturlarini ishlab chiqish, amaliyotga yo‘naltirilgan ta’limni kuchaytirish, moddiy-texnik bazani modernizatsiya qilish hamda innovatsion va raqamli yondashuvlarni keng joriy etish zarur. Bu esa o‘z navbatida agrar tarmoqning raqobatbardoshligini oshirishga va barqaror rivojlanishiga xizmat qiladi.

Fikrimizcha, oliy ta’lim tizimini yanada rivojlantirish va uni isloh qilishda davlat tomonidan qo‘llab-quvvatlash mexanizmlarini mavjudligi bevosita ta’limni yuksaltirishda eng maqbul yechim hisoblanadi. Ayniqsa, oxirgi yillarda davlatimizda oliy ta’lim tizimini jadal rivojlantirish borasida hukumat tomonidan islohotlar amalga oshirilmoqda. Xususan,

O‘zbekiston Respublikasi Prezidenti Shavkat Mirziyoyev 2026-yilning 3-aprel kuni oliy ta’lim, fan va innovatsiyalar tizimini yanada takomillashtirishga qaratilgan takliflar taqdimoti bilan tanishdi. Bunda, mamlakatimizda so‘nggi yillarda oliy ta’lim qamrovini kengaytirish, ta’lim sifatini oshirish, ilmiy salohiyatni mustahkamlash va xalqaro hamkorlikni rivojlantirish bo‘yicha keng ko‘lamli islohotlar amalga oshirilayotganligi, tizimdagi mavjud salohiyatdan samarali foydalanish, ilm-fanni iqtisodiyot bilan uzviy bog‘lash, ta’lim va tadqiqot integratsiyasini chuqurlashtirish dolzarb vazifa bo‘lib qolayotganligi ta’kidlandi. Shuningdek, “U10 – O‘zbekistonning global darajadagi ilg‘or universitetlari” dasturi amalga oshiriladi. Dastur doirasida tanlov asosida 10 ta oliy ta’lim tashkilotiga milliy tadqiqot universiteti maqomi berilib, ularda ilmiy klasterlar tashkil etilishi belgilandi. Oliygohlarning “spin-off” korxonalarini tashkil etish orqali “tarmoq – korxona – oliy ta’lim tashkiloti – ilmiy tashkilot” zanjiri asosida innovatsion mahsulot va xizmatlar ishlab chiqarishni yo‘lga qo‘yish nazarda tutilayotganligi ta’kidlandi[38]. Ushbu berilgan topshiriqlar va amalga oshirilish lozim bo‘lgan vazifalar oliy ta’lim tizimining rivojlanishiga xalqaro ta’lim jarayonlarining respublikamiz bo‘yicha tadbiq etilishiga zamin yaratildi.

Agrar sohani rivojlantirishning ustuvor vazifalarning belgilanishi natijasida zamonaviy dunyo qarashga ega kadrlarga bo‘lgan talabning ortishi kuzatilmoqda. Bu esa, agrar yo‘nalishda kadrlar tayyorlaydigan oliy ta’lim tashkilotlariga oldiga qishloq xo‘jaligi tarmoqlarini jadal rivojlantirishga hissa qo‘sha oladigan kadrlar tayyorlash vazifasi qo‘yadi. Buning uchun OTTlari o‘quv jarayonini tashkil etish va ta’lim sifatini oshirishda jahon standartlari asosida o‘tishga moslashtirishi lozim.

Qishloq xo‘jaligi vazirligi tizimida faoliyat olib borayotgan hamda respublikamizda agrar soha uchun kadrlar tayyorlashni o‘z zimmasiga olgan oliy ta’lim tashkilotlarida 36 418 nafar talabalar tahsil olayotganligi ko‘rishimiz mumkin (1-jadval). Ushbu talabalarni bugungi kunda agrar sohada amalga oshirilayotgan izchil islohotlarni samarali joriy etish, mamlakatimiz oziq-ovqat xavfsizligini ta’minlashda faoliyat olib borayotgan qishloq xo‘jaligini subyektlariga oliy ma’lumotli kadrlarni o‘z sohasining yetuk mutaxassislarini tarbiyalashda o‘zlarining yuksak bilim va tajribalarini 2000 ga yaqin professor-o‘qituvchilar faoliyat ko‘rsatmoqda. Har yili ushbu oliy ta’lim tashkilotlarini 7 000 dan ortiq bitiruvchilar mehnat bozoriga kirib kelmoqda. Bu esa, agrar sohada olib borilayotgan islohotlar, yangi agrotexnologiyalarni tarmoqlarni rivojlantirishda qo‘llash va foydalanish samaradorligini oshirish uchun yosh mutaxassis kadrlar tomonidan amalga oshirilishini talab qiladi. Ya’ni, qishloq xo‘jaligidagi tadbirkorlik subyektlarida kadrlarga bo‘lgan talabini qondirishda muhim hisoblanadi.

[38] Oliy ta’lim, fan va innovatsiyalar tizimini takomillashtirish masalalari muhokama qilindi

1-jadval

Qishloq xo‘jaligi vazirligi tizimidagi oliy ta’lim tashkilotlarining faoliyati to‘g‘risida ma’lumot (2025/2026-o‘quv yili bo‘yicha)[39]

№	Oliy ta’lim tashkilotlari nomi	Talaba-lar soni	Shundan		Professor-o‘qituvchilar soni	Ilmiy salohiyat (%)	Bitiruvchilar soni (2025-yil)	Bitiruvchilar bandligi (%)	Bitiruvchilar soni (2026-yil)
			Bakalavriat	Magistratura					
	Jami	**36 418**	**35 293**	**1 125**	**1 831**	**53,5**	**7 003**	**91**	**8 220**
1	Toshkent davlat agrar universiteti	13608	13169	439	516	71,2	2491	93	2 950
2	Andijon qishloq xo‘jaligi va agrotexnologiyalar instituti	7322	7200	122	393	55	1491	92	1906
3	Samarqand davlat veterinariya meditsinasi, chorvachilik va biotexnologiyalar universiteti	5116	4980	136	304	56,6	1369	83,01	1252
4	Qoraqalpog‘iston qishloq xo‘jaligi va agrotexnologiyalar instituti	3085	2923	162	196	52,3	786	99	727
5	Samarqand davlat veterinariya meditsinasi, chorvachilik va biotexnologiyalar universiteti Toshkent filiali	2573	2521	52	139	43,9	319	85	596
6	Samarqand agroinnovatsiyalar va tadqiqotlar instituti	1709	1635	74	115	60	280	97,5	399
7	Samarqand davlat veterinariya meditsinasi, chorvachilik va biotexnologiyalar universiteti Nukus filiali	1 011	945	66	76	40,7	225	78	250
8	Xalqaro qishloq xo‘jaligi universiteti	847	810	37	58	40	42	100	140
9	Oziq-ovqat texnologiyasi va muhandisligi xalqaro instituti	1147	1110	37	34	62	-	-	-

[39] Manba: Oliy ta’lim tashkilotlari ma’lumotlari asosida muallif tomonidan ishlab chiqilgan.

Shu bilan birga, mazkur oliy ta’lim muassasalarining ilmiy salohiyati o‘rtacha 53,5 % ni tashkil etadi. Respublikamiz ta’lim tizimidagi amalga oshirilayotgan islohatlarning tub zaminida mehnat bozoriga kirib kelayotgan yangi ish va xizmat turlarini samarali ijro eta oladigan kadrlar bajarishini inobatga olib, 2025-yildan boshlab ilk marotaba Meteorologiya va iqlimshunoslik, Xalqaro qishloq xo‘jaligi, Atrof-muhit va suv resurslarini boshqarish, Geoaxborot tizimlari va texnologiyalari, Veterinariya jarrohligi kabi yangi mutaxassisliklar bo‘yicha kadrlar tayyorlash yo‘lga qo‘yildi.

Agrar oliy ta’lim tashkilotlaridagi mavjud resurs salohiyati va imkoniyatlaridan kelib chiqib, oliy ma’lumotli kadrlar tayyorlash tizimini rivojlantirish va boshqarish samaradorligini oshirish maqsadida quyidagi takliflarni amalga oshirish maqsadga muvofiq bo‘ladi:

birinchidan, ta’lim dasturlarini mehnat bozori talablariga moslashtirish orqali o‘quv reja va fan dasturlarini har yili ish beruvchilar, klasterlar, fermer xo‘jaliklari hamda agroklasterlar ishtirokida qayta ko‘rib chiqish;

ikkinchidan, ta’lim–fan–ishlab chiqarish integratsiyasini kuchaytirish maqsadida agrar korxonalar, ilmiy-tadqiqot institutlari va oliy ta’lim tashkilotlari o‘rtasida dual ta’lim va uzoq muddatli hamkorlik mexanizmlarini joriy etish;

uchinchidan, kadrlar tayyorlash sifatini boshqarishning raqamli tizimini yaratish, bunda talabalarning kompetensiyalari, amaliyot natijalari, bitiruvchilar bandligi va ish beruvchilar fikrini yagona elektron platforma orqali monitoring qilish;

to‘rtinchidan, amaliy mashg‘ulotlar ulushini oshirish, universitetlarning tajriba xo‘jaliklari, agrotexnoparklari va innovatsion laboratoriyalarini rivojlantirish orqali talabalarning kasbiy tayyorgarligini kuchaytirish hamda kadrlar tayyorlash samaradorligini baholash indikatorlarini ishlab chiqish, bunda bitiruvchilarning ishga joylashish darajasi, ish beruvchilar qoniqish indeksi, xalqaro sertifikatlar soni va ilmiy-innovatsion faoliyat natijalari asosiy mezon sifatida belgilash;

beshinchidan, agrar ta’limni strategik boshqarish mexanizmlarini takomillashtirish, bunda prognozlash, risklarni boshqarish, sifat menejmenti va natijadorlikka asoslangan boshqaruv (Performance Management) tamoyillaridan foydalanish hamda sun’iy intellekt va raqamli qishloq xo‘jaligi texnologiyalarini ta’lim jarayoniga integratsiya qilish.

Bizning fikrimizcha, mazkur takliflarning izchil amalga oshirilishi agrar oliy ta’lim tashkilotlarida boshqaruv samaradorligini oshirish, ta’lim sifati va amaliy yo‘naltirilganligini kuchaytirish, bitiruvchilarning mehnat bozoridagi raqobatbardoshligini ta’minlash hamda agrar tarmoq uchun zamonaviy bilim va kompetensiyalarga ega yuqori malakali mutaxassislar tayyorlashga xizmat qiladi. Ushbu yondashuv O‘zbekiston agrar ta’lim tizimini xalqaro standartlarga yaqinlashtirish va uning barqaror rivojlanishini ta’minlash uchun muhim ilmiy-amaliy asos bo‘lib xizmat qiladi.

Xulosa qilib aytganda, agrar oliy ta’lim tashkilotlarida kadrlar tayyorlash tizimini takomillashtirish zamonaviy iqtisodiyot va qishloq xo‘jaligi tarmoqlarining rivojlanishida muhim omil hisoblanadi. Bunda ta’lim dasturlarini mehnat bozori ehtiyojlari asosida muntazam yangilab borish, ishlab chiqarish korxonalari bilan hamkorlikni kengaytirish, amaliy mashg‘ulotlar ulushini oshirish, raqamli texnologiyalarni o‘quv jarayoniga keng joriy etish hamda professor-o‘qituvchilarning kasbiy salohiyatini muntazam rivojlantirish ustuvor vazifalardandir. Ushbu yo‘nalishlarda amalga oshiriladigan chora-tadbirlar agrar soha uchun yuqori malakali, raqobatbardosh va innovatsion fikrlaydigan mutaxassislar tayyorlash samaradorligini sezilarli darajada oshiradi. Chunki, har bir sohaning ta’lim tizimini o‘ziga xos xususiyatlarini inobatga

olish, kadrlar buyurtmachilari tomonidan qo‘llab-quvvatlash orqali inson kapitalini rivojlantirish, malakali kadrlar tayyorlash hamda jamiyat farovonligini oshirishga erishiladi.

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EKOLOGIYA VA SUV RESURSLARINI BOSHQARISHDA RAQAMLI INNOVATSIYALAR – SUN’IY INTELLEKT TEXNOLOGIYALARI

Djurayeva Dilnoza Fazliddin qizi
O‘zbekiston jurnalistika va ommaviy kommunikatsiyalar universiteti
To‘g‘on va Qudrat Ernazarovlar nomidagi Jamoatchilik bilan aloqalar kafedrasi mustaqil izlanuvchisi
ORCID: 0009-0003-0010-6796
https://doi.org/10.5281/zenodo.22896978

Annotatsiya. *Mazkur maqolada O‘zbekiston va Singapur davlatlarining ekologiya hamda suv xo‘jaligi sohasidagi raqamli mediakommunikatsiyasi va boshqaruv tizimi qiyosiy tahlil qilingan. Tadqiqot davomida har ikki mamlakat vazirliklarining rasmiy veb-saytlari hamda ijtimoiy tarmoqlardagi platformalarida sun’iy intellekt (SI) hamda Big Data texnologiyalarini atrof-muhit monitoringida qo‘llash strategiyalari lingvo-pragmatik va media-indeks tahlili metodlari orqali o‘rganilgan. O‘zbekiston Respublikasi Prezidentining PQ-4996 va PQ-358-sonli qarorlarida belgilangan sun’iy intellektni rivojlantirish strategiyasi Singapur tajribasi misolida qiyosiy tadqiq etilgan.*
Kalit so‘zlar: *Sun’iy intellekt, ekologik diskurs, Big Data, Smart Water, Singapur tajribasi, raqamli media, media-indeks, iqlim diplomatiyasi.*
Abstract. *This article provides a comparative analysis of the digital media communication and management systems in the ecology and water sectors of Uzbekistan and Singapore. Utilizing linguo-pragmatic and media-index analysis methods, the study examines the strategies for deploying Artificial Intelligence (AI) and Big Data technologies within the environmental monitoring systems on the official websites and social media platforms of the respective ministries. The national AI development strategies outlined in the Presidential Decrees of the Republic of Uzbekistan No. PP-4996 and No. PP-358 are critically examined through the prism of Singapore's advanced experience. Finally, the paper offers practical recommendations aimed at enhancing the national eco-communication framework and boosting the global "green brand" image of the state.*
Keywords: *Artificial Intelligence, ecological discourse, Big Data, Smart Water, Singapore experience, digital media, media-index, climate diplomacy, digital eco-communication, green brand.*

KIRISH. Global iqlim o‘zgarishi, transchegaraviy suv resurslarining tanqisligi va urbanizatsiya jarayonlarining jadallashuvi tabiiy resurslarni boshqarish tizimini tubdan isloh qilishni va raqamli platformalarga integratsiyalashni taqozo etmoqda. Zamonaviy ekologik jurnalistika va davlat organlarining mediakommunikatsiya strategiyasida sun’iy intellekt (SI) texnologiyalari nafaqat texnik instrument, balki transchegaraviy iqlim diplomatiyasini shakllantiruvchi yetakchi media-diskursga aylanib bormoqda. O‘zbekiston Respublikasi barqaror rivojlanish va "yashil iqtisodiyot"ga o‘tish sharoitida raqamli ekokommunikatsiyaning milliy modelini yaratish ustida faol ish olib bormoqda.

Mamlakatimizda sun’iy intellekt texnologiyalarining huquqiy va institutsional asoslari O‘zbekiston Respublikasi Prezidentining 2021-yil 17-fevraldagi “Sun’iy intellekt texnologiyalarini joriy etishni jadallashtirish uchun shart-sharoitlar yaratish chora-tadbirlari to‘g‘risida”gi PQ-4996-sonli Qarori [1] bilan belgilab berilgan edi. Mazkur hujjat idoralararo ma’lumotlar almashinuvi va Big Data tahliliy tizimlarini yaratishga turtki bo‘ldi. Ushbu islohotlarning mantiqiy va strategik davomi sifatida qabul qilingan O‘zbekiston Respublikasi Prezidentining 2024-yil 14-oktabrdagi “Sun’iy intellekt texnologiyalarini 2030-yilga qadar rivojlantirish strategiyasini tasdiqlash to‘g‘risida”gi PQ-358-sonli Qarori [2] milliy iqtisodiyot va boshqaruv tizimida, xususan, ekologiya va suv resurslarini prognozlashda intellektual algoritmlardan keng foydalanishning yangi davrini boshlab berdi. PQ-358-sonli qarorga muvofiq, atrof-muhit monitoringi va gidrometeorologiya jarayonlarini sun’iy intellekt yordamida modellashtirish davlatning strategik ustuvor vazifasi etib belgilandi.

Raqamli ekologik boshqaruv va intellektual media-makon shakllantirish bo‘yicha dunyoda yetakchi o‘rinlardan birini egallagan Singapur Respublikasi tajribasi O‘zbekiston uchun yuqori ilmiy-amaliy ahamiyatga ega. Singapurning "National AI Strategy 2.0" (Milliy SI strategiyasi 2.0) [5] hamda "Singapore Green Plan 2030" [6] dasturlari davlat ekologik tashkilotlarining ochiqligini ta’minlash, suv resurslarini intellektual boshqarish (Smart Water Grid) hamda ushbu jarayonlarni raqamli media platformalari orqali xalqaro hamjamiyatga innovatsion imij sifatida taqdim etishga yo‘naltirilgan. Mazkur tadqiqot har ikki davlatning ekologiya va suv xo‘jaligi vazirliklari idoralarining veb-saytlari hamda ijtimoiy tarmoqlardagi SMM platformalari kontentini qiyosiy tahlil qilish orqali milliy ekokommunikatsiyani takomillashtirish istiqbollarini aniqlashga qaratilgan.

ADABIYOTLAR TAHLILI VA METODOLOGIYA. Raqamli ekologik jurnalistika va ekologik mediadiskurs muammolari xorijiy va mahalliy olimlar tomonidan keng tadqiq etib kelinmoqda. Shuls va Karimova (2024) o‘z tadqiqotlarida Markaziy Osiyo mintaqasida iqlim diplomatiyasi va davlatlarning "yashil imiji" xalqaro media-diskurda qay darajada aks etishini tahlil qilganlar. Sabirova (2025) raqamli eko-jurnalistikada ijtimoiy tarmoqlar (SMM) va jamoatchilik nazorati o‘rtasidagi integratsiyaning sotsiomadaniy jihatlariga e’tibor qaratadi. Biroq, davlat organlarining rasmiy raqamli resurslarida sun’iy intellekt terminologiyasi va texnologiyalarining qo‘llanish dinamikasi hamda ularning lingvo-pragmatik xususiyatlari yetarlicha ochib berilmagan.

Tadqiqotning metodologik asosi sifatida **tizimli-funksional, qiyosiy-tipologik, kontent-analiz va lingvo-pragmatik tahlil metodlaridan** foydalanildi. Tadqiqot ob’yekti sifatida quyidagi rasmiy raqamli manbalar tanlab olindi:

1. O‘zbekiston Respublikasi Ekologiya va iqlim o‘zgarishi milliy qo‘mitasi (eco.gov.uz).
2. O‘zbekiston Respublikasi Suv xo‘jaligi vazirligi (water.gov.uz).
3. Singapur Barqaror rivojlanish va atrof-muhit vazirligi (*Ministry of Sustainability and the Environment – mse.gov.sg*).
4. Singapur Milliy suv agentligi (*PUB, Singapore's National Water Agency – pub.gov.sg*).

Ushbu veb-saytlar hamda ularning Telegram, Facebook, Instagram ijtimoiy tarmoqlaridagi rasmiy sahifalaridan 2025–2026-yillarga oid jami 450 dan ortiq media-matnlar, press-relizlar va axborot materiallari tanlab olinib, veb-skreping algoritmlari hamda media-indeks monitoringi yordamida tahlil qilindi.

NATIJALAR.

1. Veb-saytlar kontenti va huquqiy-strategik integratsiya tahlili

O‘zbekiston davlat idoralari rasmiy saytlarining (eco.gov.uz, water.gov.uz) tarkibiy tahlili shuni ko‘rsatadiki, so‘nggi yillarda matnlarda "raqamlashtirish", "geoportal", "masofadan zondlash" va "sun’iy intellekt" terminlarining qo‘llanish chastotasi (media-indeksi) 34% ga oshgan. Bu bevosita PQ-4996 va PQ-358-sonli Prezident qarorlarining ijrosini ta’minlash doirasida amalga oshirilayotgan islohotlar bilan bog‘liq.

Xususan, Suv xo‘jaligi vazirligi veb-saytida “Smart Water” (Aqlli suv) texnologiyalarining joriy etilishi bo‘yicha tizimli ma’lumotlar berib borilmoqda. Bugungi kunda 11 mingdan ortiq suv xo‘jaligi ob’yektlarida raqamli qurilmalar o‘rnatilgan bo‘lib, ulardan olinadigan Big Data (katta hajmli ma’lumotlar) onlayn monitoring qilinadi. Ekologiya va iqlim o‘zgarishi milliy qo‘mitasi tomonidan esa sun’iy intellekt elementlariga ega bo‘lgan geo-axborot tizimlari orqali "Yashil makon" umummilliy loyihasi doirasida daraxtlarning vegetatsiya indeksini (NDVI) yo‘ldosh qatlamlari orqali avtomatik hisoblash tizimi yo‘lga qo‘yilgan bo‘lib, u PQ-358-sonli qarorda belgilangan ekologik prognozlash talablariga to‘liq mos keladi.

Singapur vazirliklari (mse.gov.sg, pub.gov.sg) veb-saytlari tahlili shuni ko‘rsatadiki, ularning raqamli arxitekturasi "Smart Water Grid" (Intellektual suv tarmog‘i) tizimiga asoslangan. Saytda joylashtirilgan ochiq ma’lumotlar (Open Data) tahliliga ko‘ra, Singapurda sun’iy intellekt algoritmlari suv quvurlaridagi yashirin sizib chiqishlarni maxsus akustik sensorlar va mashinali o‘qitish modellari orqali inson aralashuvisiz 98% aniqlikda bashorat qiladi. Shuningdek, ularning raqamli platformalarida SI texnologiyalari iqlim simulyatsiyalarini yaratishda, ya’ni 2100-yilgacha dengiz sathining ko‘tarilish ssenariylarini modellashtirishda real vaqt rejimida qo‘llaniladi.

1-jadval. O‘zbekiston va Singapur raqamli ekoplatformalarining qiyosiy-tahlili

Tahlil mezonlari	**O‘zbekiston (eco.gov.uz / ter.gov.uz)**	**Singapur (mse.gov.sg / pub.gov.sg)**
Huquqiy-strategik asos	PQ-4996 va PQ-358-sonli Prezident Qarorlari	National AI Strategy 2.0 / Green Plan - 2030
SI texnologik yo‘nalishi	Geo-monitoring, "Smart Water", daraxtlar NDVI indeksi tahlili	Smart Water Grid, akustik sensorli ML, iqlim prognozlari
Ma’lumotlar formati	Press-reliz, hisobot, statistik jadvallar	Interaktiv xaritalar, Open Data, SI-simulyatsiyalar
Media-indeks darajasi	O‘rtacha (Rivojlanish va joriy etish bosqichida)	Yuqori (To‘liq avtomatlashtirilgan raqamli eko-imij)

2. Ijtimoiy tarmoqlardagi media-diskurs va SMM lingvo-pragmatikasi

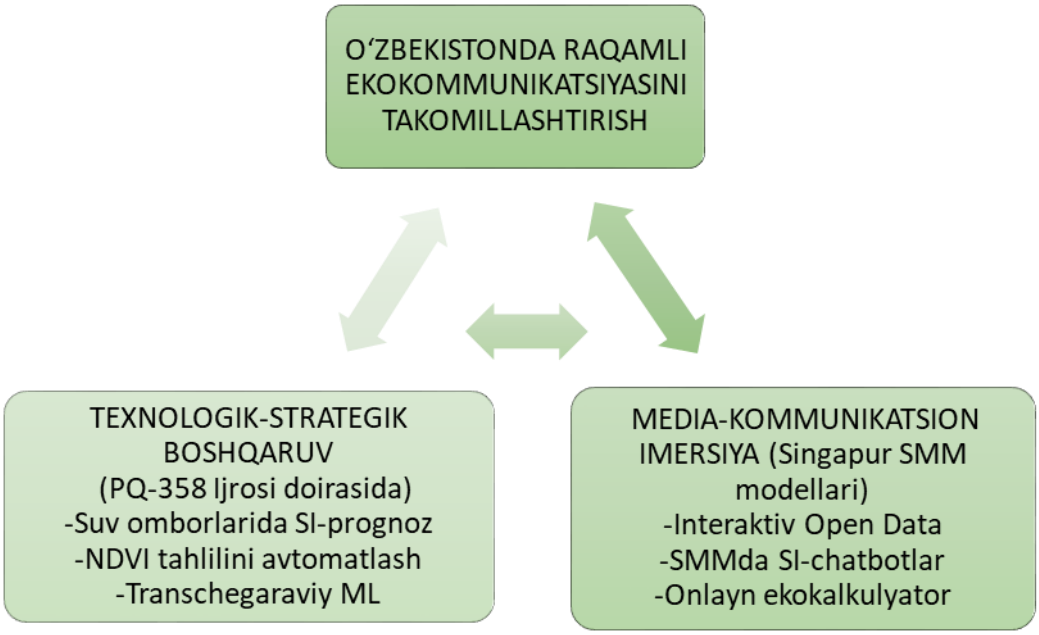
Ijtimoiy tarmoqlardagi (Telegram, Instagram, Facebook) media-matnlarni o‘rganish jarayonida har ikki davlat organlarining axborot uzatish prinsiplarida jiddiy pragmatik farqlar aniqlandi.

O‘zbekiston Ekologiya va Suv xo‘jaligi tashkilotlarining Telegram va Facebook sahifalaridagi postlar kontent-analizi shuni ko‘rsatadiki, lingvo-pragmatik jihatdan matnlar "direktiv" va "reklama-axborot" diskursiga tegishli. Ya’ni, postlarda ko‘proq bajarilgan ishlar hisoboti, rasmiy uchrashuvlar bayoni yoki aholini tabiatni asrashga undovchi umumiy chaqiriqlar

ustunlik qiladi. Sun’iy intellekt va innovatsiyalar mavzusi asosan PQ-358-sonli qaror doirasida kelajakda amalga oshiriladigan strategik maqsadlar va xalqaro hamkorlik uchrashuvlari kontekstida tilga olinadi.

Singapurning *PUB* va *MSE* ijtimoiy tarmoqlardagi (ayniqsa, Instagram va TikTok) SMM strategiyasi butunlay boshqacha pragmatik makonni qamrab olgan. Ularning media-matnlari "inklyuziv-interaktiv" xarakterga ega. Davlat aholi bilan murakkab texnologik jarayonlarni (masalan, oqova suvni qayta ishlovchi AI filtrlari — *NEWater*) oddiy va kreativ vizualizatsiyalar orqali tushuntiradi. Eng muhimi, ularning SMM sahifalarida foydalanuvchilar uchun SI-chatbotlar va shaxsiy "ekologik kalkulyatorlar" havolalari beriladi. Foydalanuvchi o‘zining kundalik suv sarfini kiritib, AI yordamida o‘ziga xos ekologik tavsiyalarni SMM platformasining o‘zida qabul qiladi.

MUHOKAMA. Tadqiqot natijalari shuni ko‘rsatadiki, O‘zbekistonda sun’iy intellekt texnologiyalarini joriy etishning huquqiy-normativ bazasi (PQ-4996 va PQ-358) juda mustahkam shakllangan bo‘lsa-da, ularning raqamli media makonida, ya’ni xalqaro va mahalliy hamjamiyat uchun ochiq interpretatsiya qilinishida ma’lum darajada konseptual bo‘shliqlar mavjud.



1-rasm. O‘zbekiston raqamli ekokommunikatsiya va texnologik boshqaruv tizimini takomillashtirish modeli

Model doirasida ekologik va suv boshqaruv tizimini takomillashtirishning asosiy komponentlari tarkibidagi ilmiy-texnik qisqartmalarga quyidagicha konseptual ta’rif beriladi:

PQ-358: O‘zbekiston Respublikasi Prezidentining 2024-yil 14-oktabrdagi “Sun’iy intellekt texnologiyalarini 2030-yilga qadar rivojlantirish strategiyasini tasdiqlash to‘g‘risida”gi Qarori bo‘lib, u milliy ekokommunikatsiya va ekologik prognozlash tizimlarining huquqiy-institutsional fundamenti hisoblanadi.

SI (Sun’iy intellekt / AI - Artificial Intelligence): Inson ongi va tahliliy imkoniyatlarini simulyatsiya qiluvchi neyrotarmoqlar va matematik algoritmlar majmui; modelda suv havzalari

hajmini dinamik prognozlash va media-diskurs monitoringini avtomatlashtirish funksiyasini bajaradi.

NDVI (Normalized Difference Vegetation Index — Normallashtirilgan nisbiy vegetatsiya indeksi): Sun’iy yo‘ldoshlar (masalan, Sentinel yoki Landsat) orqali masofadan zondlash sirtlaridan olingan va o‘simlik qatlamining (yashil fondning) zichligi hamda salomatligini avtomatik hisoblovchi raqamli-spektrometr ko‘rsatkich.

ML (Machine Learning — Mashinali o‘qitish): Sun’iy intellektning tarkibiy qismi bo‘lib, transchegaraviy suv resurslariga doir gidrologik Big Data (katta hajmli ma’lumotlar) asosida tizimni mustaqil ravishda bashorat qilishga o‘rgatuvchi matematik modellar to‘plami.

SMM (Social Media Marketing — Ijtimoiy tarmoqlar marketingi): Davlat ekologik tashkilotlarining ijtimoiy media platformalari (Telegram, Facebook, Instagram va b.) orqali aholi va xalqaro hamjamiyat bilan raqamli, interaktiv hamda imijmeyking xarakteridagi inklyuziv muloqot tizimi.

Open Data (Ochiq ma’lumotlar): Vazirliklar va idoralarning rasmiy veb-resurslarida har qanday foydalanuvchi yoki tadqiqotchi uchun cheklovsiz, mashina o‘qiydigan formatda taqdim etiladigan raqamli ekologik va gidrologik statistik ko‘rsatkichlar bazasi.

Singapur tajribasi shuni ko‘rsatadiki, sun’iy intellekt nafaqat ichki ishlab chiqarish quvvati, balki mamlakatning xalqaro reytinglardagi global ekologik jozibadorligini oshiruvchi asosiy PR vositasi hisoblanadi. O‘zbekiston PQ-358-sonli qarorda belgilangan 2030-yilgacha mo‘ljallangan strategik marralarga erishishda Singapurning "Smart Water Grid" boshqaruv modelidan va uning raqamli media arxitekturasidan quyidagi yo‘nalishlarda foydalanishi maqsadga muvofiq:

Gidrologik prognozlashda neyrotarmoqlar integratsiyasi: Amudaryo va Sirdaryo havzalaridagi transchegaraviy suv resurslarini samarali taqsimlashda, Singapurning mashinali o‘qitish sensorlari tajribasi asosida, suv oqimi hajmini real vaqt rejimida AI yordamida prognozlovchi yagona hududiy raqamli platforma yaratish va uning natijalarini veb-saytda ochiq e’lon qilib borish.

Media-matnlarni transformatsiya qilish: Ekologiya va Suv xo‘jaligi idoralarining ijtimoiy tarmoqlardagi chiqishlarida quruq statistik hisobotlardan raqamli vizualizatsiya va interaktivlikka (masalan, aholi uchun shaxsiy suv tejash AI-yordamchilarini yaratish) o‘tish. Bu jarayon aholida ekologik madaniyatni va "raqamli ishonch"ni yuksaltiradi.

XULOSA. O‘zbekiston va Singapur davlatlarining ekologik hamda suv resurslarini boshqarish tizimidagi raqamli mediakommunikatsiya strategiyalarini qiyosiy o‘rganish natijasida quyidagi xulosalarga kelindi:

O‘zbekiston Respublikasi Prezidentining PQ-4996 va PQ-358-sonli qarorlari mamlakatimizda sun’iy intellekt texnologiyalarini ekologik tarmoqlarga joriy etish uchun to‘liq huquqiy va iqtisodiy zamin yaratdi. Navbatdagi bosqich ushbu raqamli yutuqlarni xalqaro media makonida samarali taqdim eta olish (transmilliy ekokommunikatsiya) hisoblanadi.

Singapur tajribasi ko‘rsatganidek, sun’iy intellekt texnologiyalarining muvaffaqiyati nafaqat sensorlar soni bilan, balki davlat organlarining raqamli platformalarida ma’lumotlarning ochiqligi (Open Data) va SMM makonidagi interaktivlik darajasi bilan o‘lchanadi.

Tadqiqot doirasida ishlab chiqilgan tavsiyalar va integratsiyalashuv modeli milliy ekologik imijni xalqaro reytinglarda yuksaltirishga hamda mintaqaviy ekologik krizislarni boshqarishda raqamli texnologiyalar imkoniyatlaridan maksimal foydalanishga xizmat qiladi.

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EKOLOGIYA VA ATROF-MUHIT MUHOFAZASI MUTAXASSISLARINI TAYYORLASHDA SUN’IY INTELLEKTDAN FOYDALANISH

Faxriddin Kasimov Shadmankulovich[1,2], Mirzaev Sayibdjan[2]
Texnika fahlari bo‘yicha falsafa doktori(PhD), katta ilmiy xodim;
[1]O‘zR Fanlar Akademiyasi S.Azimov nomidagi Fizika-texnika instituti,
[2]“Toshkent irrigatsiya va qishloq xo‘jaligini mexanizatsiyalash muxandislari instituti“ Milliy tadqiqot universiteti“ E-mail: fahri2002@mail.ru
https://orcid.org/0009-0004-5722-3739
«Axborot texnologiyalari» kafedrasi mudiri, “Toshkent irrigatsiya va qishloq xo‘jaligini mexanizatsiyalash muhandislari instituti” Milliy tadqiqot universiteti, Toshkent, O‘zbekiston.
https://orcid.org/0000-0003-3891-2470
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Annotatsiya. *Mazkur maqolada ekologiya va atrof-muhit muhofazasi yo‘nalishida tahsil olayotgan talabalarni tayyorlash jarayonida sun’iy intellekt texnologiyalaridan foydalanishning ilmiy-pedagogik va amaliy jihatlari yoritilgan. Ekologik muammolarning murakkablashib borishi, katta hajmdagi ekologik ma’lumotlarning shakllanishi, iqlim o‘zgarishi, havo va suv sifatining monitoringi, biologik xilma-xillikni saqlash, chiqindilarni boshqarish hamda tabiiy resurslardan oqilona foydalanish masalalari zamonaviy ekolog mutaxassisidan raqamli texnologiyalar va sun’iy intellekt bo‘yicha qo‘shimcha kompetensiyalarni talab etmoqda. Maqolada mashinali o‘qitish, neyron tarmoqlar, tabiiy tilni qayta ishlash, kompyuter ko‘rishi, generativ sun’iy intellekt, masofadan zondlash va intellektual ekologik monitoring tizimlaridan ta’lim jarayonida foydalanish imkoniyatlari tahlil qilinadi. Shuningdek, ekologik ta’limda sun’iy intellekt (SI) yordamida individual ta’limni tashkil etish, ekologik ma’lumotlarni tahlil qilish, bashoratlash, amaliy mashg‘ulotlarni tashkil etish va ilmiy-tadqiqot ko‘nikmalarini rivojlantirish metodikasi taklif etiladi. Sun’iy intellektdan foydalanishning akademik halollik, ma’lumotlar xavfsizligi, algoritmik xatolik va ekologik barqarorlik bilan bog‘liq muammolari ham ko‘rib chiqilgan.*

Kalit so‘zlar*: sun’iy intellekt, ekologiya, atrof-muhit muhofazasi, ekologik monitoring, mashinali o‘qitish, neyron tarmoq, generativ SI, ekologik ta’lim, iqlim o‘zgarishi, masofadan zondlash, katta ma’lumotlar, raqamli texnologiyalar, barqaror rivojlanish.*

Abstract. *This article examines the scientific, pedagogical and practical aspects of using artificial intelligence technologies in the training of specialists in ecology and environmental protection. The increasing complexity of environmental problems, the growth of large-scale environmental datasets, climate change, air and water quality monitoring, biodiversity conservation, waste management and sustainable use of natural resources require modern environmental specialists to develop competencies in digital technologies and artificial intelligence. The article analyses the educational and practical applications of machine learning, neural networks, natural language processing, computer vision, generative artificial intelligence, remote sensing and intelligent environmental monitoring systems. Particular attention is paid to the use of artificial intelligence (AI) for personalised learning, environmental*

data analysis, forecasting, practical training and development of students’ research skills. The article also discusses the problems associated with academic integrity, data protection, algorithmic bias and the environmental footprint of artificial intelligence. Recommendations are proposed for integrating AI competencies into the curriculum of ecology and environmental protection specialists.

Keywords: *artificial intelligence, ecology, environmental protection, environmental monitoring, machine learning, neural networks, generative AI, environmental education, climate change, remote sensing, big data, digital technologies, sustainable development.*

Kirish. XXI asrda ekologik xavfsizlik va atrof-muhitni muhofaza qilish masalalari insoniyat oldida turgan eng muhim muammolardan biriga aylandi. Iqlim o‘zgarishi, atmosferaning ifloslanishi, suv resurslarining kamayishi, tuproq degradatsiyasi, o‘rmonlarning qisqarishi, biologik xilma-xillikning kamayishi va maishiy hamda sanoat chiqindilarining ortishi ekologik jarayonlarni doimiy monitoring qilish va ilmiy asoslangan qarorlar qabul qilishni talab etmoqda. An’anaviy ekologik tadqiqotlarda kuzatuv, laboratoriya tahlillari, statistik usullar va ekspert baholashidan keng foydalaniladi. Biroq hozirgi vaqtda ekologik tizimlarda juda katta hajmdagi ma’lumotlar hosil bo‘lmoqda. Masalan, meteorologik stansiyalar, avtomatik havo monitoring stansiyalari, suv sifatini nazorat qilish sensorlari, sun’iy yo‘ldoshlar, dronlar, Global Positioning System (GPS - sun’iy yo‘ldoshlar yordamida Yer yuzidagi qurilmaning aniq joylashuvini (koordinatalarini) aniqlash tizimi) qurilmalari va Internet of Things (IoT - turli qurilmalar, sensorlar va texnik vositalarning internet orqali bir-biri bilan bog‘lanib, ma’lumot almashishi va avtomatik ishlashi texnologiyasi) sensorlari uzluksiz ma’lumot ishlab chiqarmoqda.

Bunday sharoitda katta hajmdagi ma’lumotlarni inson tomonidan qo‘lda qayta ishlash qiyin. Shu sababli ekologik monitoring va tahlil jarayonlarida sun’iy intellekt texnologiyalaridan foydalanish muhim ahamiyat kasb etmoqda.

Sun’iy intellekt ekologik ma’lumotlardan yashirin qonuniyatlarni aniqlash, ekologik jarayonlarni tasniflash, kelajakdagi holatni bashorat qilish va xavfli ekologik vaziyatlarni oldindan aniqlash imkonini beradi.

Shu bilan birga, sun’iy intellekt faqat amaliy ekologik masalalarni yechish vositasi emas. U ekologiya va atrof-muhit muhofazasi mutaxassislarini tayyorlash jarayonini ham o‘zgartirmoqda. Talaba ekologik bilim bilan bir qatorda ma’lumotlar bilan ishlash, algoritmlarni tushunish, SI vositalaridan foydalanish, natijalarni tekshirish va sun’iy intellekt tomonidan berilgan xulosalarni tanqidiy baholash ko‘nikmalariga ega bo‘lishi zarur.

UNESCO tomonidan ishlab chiqilgan generativ SI bo‘yicha tavsiyalarda ham ta’limda sun’iy intellektdan foydalanish inson markazli, xavfsiz, adolatli va pedagogik maqsadga muvofiq bo‘lishi kerakligi ta’kidlanadi [1].

Shuning uchun ekologiya va atrof-muhit muhofazasi mutaxassislarini tayyorlashda SI texnologiyalaridan foydalanish nafaqat zamonaviy texnik tendensiya, balki ta’lim sifatini oshirishning muhim yo‘nalishlaridan biridir.

Tadqiqotning maqsadi va vazifalari. Tadqiqotning asosiy maqsadi ekologiya va atrof-muhit muhofazasi mutaxassislarini tayyorlash jarayonida sun’iy intellekt texnologiyalaridan foydalanish imkoniyatlarini aniqlash hamda ta’lim jarayoniga SI vositalarini integratsiya qilishning metodik yondashuvlarini ishlab chiqishdan iborat.

Mazkur maqsadga erishish uchun quyidagi vazifalar belgilandi: sun’iy intellektning ekologiya sohasidagi asosiy imkoniyatlarini o‘rganish; ekologik ta’limda SI texnologiyalaridan foydalanish yo‘nalishlarini aniqlash; mashinali o‘qitishning ekologik monitoringdagi o‘rnini ko‘rsatish; ekologik ma’lumotlarni tahlil qilishda SI algoritmlaridan foydalanish imkoniyatlarini tahlil qilish; masofadan zondlash ma’lumotlarini SI yordamida qayta ishlash usullarini ko‘rsatish; talabalarning ekologik va raqamli kompetensiyalarini rivojlantirish metodikasini taklif qilish; generativ SI vositalaridan ta’lim jarayonida foydalanishning afzallik va kamchiliklarini aniqlash va SI’dan foydalanish bilan bog‘liq akademik, etik va ekologik muammolarni tahlil qilish.

Ekologiya mutaxassislarini tayyorlash uchun SI asosidagi amaliy mashg‘ulotlar modelini ishlab chiqish.

Ekologiya va atrof-muhit muhofazasida sun’iy intellektning o‘rni. Sun’iy intellekt - kompyuter tizimlariga insonning ayrim intellektual faoliyatlarini modellashtirish imkonini beruvchi texnologiyalar majmuasidir.

SI quyidagi asosiy texnologiyalarni o‘z ichiga oladi: mashinali o‘qitish; chuqur o‘qitish; neyron tarmoqlar; kompyuter ko‘rishi; tabiiy tilni qayta ishlash; ekspert tizimlar; generativ SI; katta ma’lumotlarni intellektual tahlil qilish; bashoratlash algoritmlari. Ekologiyada ushbu texnologiyalar turli vazifalarni bajarishi mumkin.

Masalan, havo sifati monitoringida SI yordamida PM2.5, PM10, CO, CO_2, NO_2, SO_2 kabi ko‘rsatkichlarning o‘zgarishini tahlil qilish va ularning kelajakdagi qiymatlarini bashorat qilish mumkin.

Suv ekologiyasida esa suvning harorati, pH qiymati, erigan kislorod, loyqalik, elektr o‘tkazuvchanlik va boshqa parametrlar asosida suvning ekologik holatini baholash mumkin. Tuproq monitoringida namlik, sho‘rlanish, organik moddalar miqdori, harorat va boshqa ko‘rsatkichlardan foydalaniladi. Biologik xilma-xillikni monitoring qilishda esa kamera tuzoqlari, dronlar va akustik sensorlardan olingan ma’lumotlarni SI yordamida avtomatik tasniflash mumkin.

Demak, ekologiyada sun’iy intellektni qo‘llashning asosiy maqsadi inson ekolog mutaxassisini almashtirish emas, balki katta hajmdagi ma’lumotlarni tez va samarali qayta ishlash, mutaxassisning qaror qabul qilish jarayonini qo‘llab-quvvatlashdan iborat.

Ekologik ta’limda SI texnologiyalaridan foydalanish. Ekologiya va atrof-muhit muhofazasi bo‘yicha oliy ta’limda sun’iy intellektdan foydalanishning birinchi yo‘nalishi - o‘quv jarayonini individuallashtirishdir.

An’anaviy ta’limda barcha talabalar uchun bir xil o‘quv materiali taqdim etiladi. Biroq talabalarning bilim darajasi, qiziqishi va o‘zlashtirish tezligi turlicha bo‘ladi. SI asosidagi ta’lim vositalari talabaning bilim darajasini tahlil qilib, unga mos topshiriqlarni tavsiya qilishi mumkin.

Masalan, boshlang‘ich daraja: ekologiya asoslari; ekotizim tushunchasi; ifloslanish turlari; ekologik monitoring tushunchasi; o‘rta daraja: ekologik ma’lumotlarni statistik tahlil qilish; grafik va diagrammalar yaratish; korrelyatsiyani aniqlash; ekologik indekslarni hisoblash; yuqori daraja:

Python yordamida ekologik ma’lumotlarni tahlil qilish; mashinali o‘qitish modelini yaratish; ekologik parametrlarni bashoratlash; sun’iy yo‘ldosh tasvirlarini SI yordamida tasniflash. Bunday yondashuv talabaga o‘z imkoniyatlariga mos ta’lim olish imkonini beradi.

Mashinali o‘qitish va ekologik ma’lumotlar tahlili. Mashinali o‘qitish sun’iy intellektning ekologiyada eng ko‘p qo‘llanilishi mumkin bo‘lgan yo‘nalishlaridan biridir. Mashinali o‘qitish

algoritmi mavjud ma’lumotlardan qonuniyatlarni o‘rganadi va yangi ma’lumotlar asosida natija chiqaradi.

Ekologik masalalarda quyidagi algoritmlardan foydalanish mumkin: Linear Regression; Logistic Regression; Decision Tree; Random Forest; Support Vector Machine; K-Means; Gradient Boosting; Artificial Neural Networks; Convolutional Neural Networks [2-9].

Masalan, havo ifloslanishini bashorat qilish masalasini olaylik. Model uchun quyidagi ma’lumotlar berilishi mumkin:

Parametr	Belgilanishi
Harorat	T
Namlik	H
Shamol tezligi	V
Atmosfera bosimi	P
PM2.5	PM25
PM10	PM10
CO	CO
NO_2	NO2

Model ushbu ma’lumotlar orasidagi bog‘liqlikni o‘rganib, keyingi vaqt oralig‘idagi PM2.5 konsentratsiyasini bashorat qilishi mumkin.

Masalan, kirish ma’lumotlari: T = 31 °C; H = 42 %; V = 2,1 m/s; PM10 = 86 μg/m³; CO = 0,9 mg/m³.

Model natijasi: Prognoz PM2.5 = 48 μg/m³.

Talaba bunday amaliy topshiriq orqali ekologik bilim bilan bir qatorda dasturlash, statistika va SI ko‘nikmalarini ham egallaydi.

Masofadan zondlash va kompyuter ko‘rish texnologiyalari. Ekologik monitoringda sun’iy yo‘ldosh va dronlardan olinadigan tasvirlar juda katta ahamiyatga ega.

Sun’iy yo‘ldosh tasvirlari yordamida: o‘rmon maydonlarini; suv havzalarini; qishloq xo‘jaligi hududlarini; cho‘llanish jarayonlarini; shaharlarning kengayishini; suv toshqinlarini; yong‘inlarni;

yer degradatsiyasini monitoring qilish mumkin. SI algoritmlari ushbu tasvirlarni avtomatik tasniflash imkonini beradi.

Masofadan zondlash va SI bo‘yicha tadqiqotlarda mashinali o‘qitish, ma’lumotlarni birlashtirish va kompyuter ko‘rishi ekologik monitoringning samaradorligini oshirishi qayd etilgan [2]. Talabalar amaliy mashg‘ulotlarda sun’iy yo‘ldosh tasvirlaridan foydalanib, hududdagi o‘rmon yoki suv maydonining o‘zgarishini aniqlashlari mumkin.

Masalan, ikki xil yildagi tasvir taqqoslanadi: 2018-yil → 2026-yil; Natijada o‘rmon maydoni:

2018-yil - 1250 km²; 2026-yil - 1080 km². Kamayish: 1250 − 1080 = 170 km².

Foiz hisobida: 170 / 1250 × 100 = 13,6 %. Demak, o‘rmon maydoni taxminan 13,6 % ga kamaygan. Agar bu hisob-kitob sun’iy yo‘ldosh tasvirlari va SI algoritmi asosida avtomatlashtirilsa, talaba ekologik monitoringning zamonaviy texnologik mexanizmini amaliy ravishda o‘rganadi.

Iqlim o‘zgarishini o‘rganishda sun’iy intellect. Iqlim o‘zgarishi ekologik ta’limning eng muhim yo‘nalishlaridan biridir. SI yordamida quyidagi jarayonlarni modellashtirish mumkin: havo haroratining o‘zgarishi; yog‘ingarchilik miqdori; qurg‘oqchilik; suv resurslarining

o‘zgarishi; o‘rmon yong‘inlari; muzliklarning qisqarishi; dengiz sathining o‘zgarishi; issiqxona gazlari emissiyasi. Ekologiya talabalariga iqlim ma’lumotlari berilib, ulardan vaqt qatorlari asosida prognoz modelini yaratish talab qilinishi mumkin.

Masalan: Talaba ushbu ma’lumotlar asosida regressiya modelini tuzadi va kelgusi yillar uchun prognoz ishlab chiqadi. Bunday mashg‘ulotlar talabada quyidagi kompetensiyalarni shakllantiradi: ma’lumotlarni yig‘ish; tozalash; statistik tahlil; grafik tasvirlash; model yaratish; natijalarni baholash; ekologik xulosa chiqarish.

Yil	O‘rtacha harorat, °C
2018	14,2
2019	14,5
2020	14,7
2021	14,8
2022	15,0
2023	15,3
2024	15,5
2025	15,7

Iqlim o‘zgarishi ta’limi bo‘yicha so‘nggi tadqiqotlar ham inquiry-based, project-based va integratsiyalashgan yondashuvlarning talabalar bilim va faolligini rivojlantirishdagi ahamiyatini ko‘rsatmoqda [3].

Generativ sun’iy intellektning ekologik ta’limdagi imkoniyatlari. Generativ sun’iy intellekt texnologiyalari, jumladan katta til modellari ekologiya bo‘yicha ta’lim jarayonida yordamchi vosita sifatida ishlatilishi mumkin.

Talaba SI yordamida: mavzu bo‘yicha savollar tuzishi; murakkab ekologik tushunchalarni izohlashi; Python dasturini yozish bo‘yicha yordam olishi; statistik tahlil uchun kod yaratishi; ilmiy maqola rejasini tuzishi; ekologik monitoring bo‘yicha ssenariy yaratishi; test savollarini ishlab chiqishi; ma’lumotlarni dastlabki tahlil qilishi mumkin.

Masalan, talabaga quyidagi topshiriq beriladi: “PM2.5 miqdorini meteorologik ko‘rsatkichlar asosida bashorat qiluvchi Python dasturini ishlab chiqing.” Talaba generativ SI’dan dastlabki kod variantini olishi mumkin. Lekin tayyor kodni ko‘r-ko‘rona qabul qilish emas, balki: kodni tushunish;xatolarni aniqlash; ma’lumotlarni tekshirish; modelni sinash; natijani izohlash talabaning mustaqil vazifasi bo‘lishi kerak.

Shu jihatdan SI talabaning o‘rniga fikrlovchi vosita emas, balki o‘quv yordamchisi sifatida qo‘llanishi maqsadga muvofiq. UNESCO tavsiyalarida ham generativ AI’dan foydalanishda insonning mustaqil fikrlashi, ma’lumotlar maxfiyligi, xavfsizlik, tenglik va pedagogik maqsadga muvofiqlik masalalariga e’tibor qaratilgan [11-17].

SI yordamida amaliy mashg‘ulotlarni tashkil etish. Ekologiya yo‘nalishida SI asosidagi amaliy mashg‘ulotlarni quyidagi model asosida tashkil etish mumkin.

1-amaliy mashg‘ulot. Havo sifatini tahlil qilish. Talabalarga bir oy davomida yig‘ilgan PM2.5, PM10, CO, NO_2 ma’lumotlari beriladi.

Vazifa: o‘rtacha qiymatni aniqlash; maksimal qiymatni topish; minimal qiymatni topish; kunlik o‘zgarish grafigini yaratish; ifloslanishning yuqori bo‘lgan kunlarini aniqlash; SI yordamida keyingi kun uchun prognoz yaratish.

2-amaliy mashg‘ulot. Suv sifatini baholash. Talabalarga suv havzasining: pH; harorat; loyqalik; kislorod; mineralizatsiya ko‘rsatkichlari beriladi.

SI modeli yordamida suv sifatini “yaxshi”, “o‘rtacha”, “yomon” guruhlariga ajratish amalga oshiriladi.

3-amaliy mashg‘ulot. O‘rmon maydonlarini aniqlash. Talabalar sun’iy yo‘ldosh tasvirlaridan foydalanadilar.

SI yordamida: o‘rmon; suv; shahar; qishloq xo‘jaligi; yalang‘och tuproq sinflari ajratiladi.

4-amaliy mashg‘ulot. Ekologik xavfni prognozlash. Talabalarga tarixiy ekologik ma’lumotlar beriladi. Ular: Random Forest; Decision Tree; Logistic Regression modellaridan foydalanib ekologik xavf ehtimolini hisoblaydilar.

Ekologiya mutaxassisining SI kompetensiyalarini shakllantirish. Zamonaviy ekolog mutaxassis uchun faqat ekologik bilimning o‘zi yetarli emas. U quyidagi kompetensiyalarga ega bo‘lishi lozim: Ekologik kompetensiya, talaba: ekotizimlar; ekologik monitoring; ifloslanish; tabiiy resurslar; iqlim o‘zgarishi haqidagi fundamental bilimlarga ega bo‘lishi kerak.

Raqamli kompetensiya, talaba: Excel; Python; GIS; ma’lumotlar bazalari; bulutli texnologiyalar; sensorlar bilan ishlay olishi kerak.

SI kompetensiyasi, talaba: SI algoritmlarini tushunish; ma’lumotlarni tayyorlash; model tanlash; model natijasini baholash; SI xatolarini aniqlash ko‘nikmalariga ega bo‘lishi zarur.

Tanqidiy fikrlash. SI bergan javob har doim ham to‘g‘ri bo‘lmasligi mumkin. Shuning uchun talaba: “ SI nima dedi?” degan savoldan tashqari, “ SI nima uchun bunday xulosa chiqardi?” degan savolni ham bera olishi kerak.

Sun’iy intellektning afzalliklari. Ekologik ta’limda AI’dan foydalanish quyidagi afzalliklarga ega.

Birinchidan, ta’lim individuallashtiriladi.

Ikkinchidan, katta hajmdagi ekologik ma’lumotlarni tez qayta ishlash imkoniyati paydo bo‘ladi.

Uchinchidan, amaliy mashg‘ulotlar real ekologik ma’lumotlarga asoslanadi.

To‘rtinchidan, talabalarning dasturlash va ma’lumotlar tahlili ko‘nikmalari rivojlanadi.

Beshinchidan, ekologik jarayonlarni bashoratlash imkoniyati kengayadi.

Oltinchidan, masofadan zondlash va GIS texnologiyalarini SI bilan birlashtirish mumkin.

Yettinchidan, ilmiy-tadqiqot faoliyatini avtomatlashtirish imkoniyati paydo bo‘ladi.

SI va barqaror oliy ta’lim bo‘yicha 2025-yilgi sistematik tadqiqotlarda individual ta’lim, ta’limdan foydalanish imkoniyatlarini kengaytirish va resurslarni samarali taqsimlash SI’ning muhim yo‘nalishlari sifatida ko‘rsatilgan [4].

Sun’iy intellektning muammolari va xavflari. SI’dan foydalanish bilan bir qatorda bir qator muammolar ham mavjud.

1. Akademik halollik. Talaba barcha topshiriqlarni SI yordamida bajarib, o‘zining mustaqil fikrlash qobiliyatini rivojlantirmasligi mumkin. Shuning uchun o‘qituvchi: SI’dan foydalanishga ruxsat berilgan; cheklangan; taqiqlangan topshiriqlarni aniq ajratishi kerak.

2. Noto‘g‘ri ma’lumot. Generativ SI ba’zan ishonchli ko‘rinadigan, ammo noto‘g‘ri ma’lumot berishi mumkin. Shuning uchun ilmiy maqolalar, darsliklar, rasmiy ma’lumotlar va monitoring natijalari bilan tekshirish zarur.

3. Ma’lumotlar xavfsizligi. Ekologik monitoring ma’lumotlari ayrim hollarda muhim infratuzilma yoki hududlarga oid maxsus ma’lumotlarni o‘z ichiga olishi mumkin. Shuning uchun maxfiy ma’lumotlarni ochiq SI tizimlariga yuklashdan ehtiyot bo‘lish kerak.

4. Algoritmik xatolik. Agar SI modeli noto‘g‘ri yoki yetarli bo‘lmagan ma’lumotlar asosida o‘qitilsa, uning natijasi ham noto‘g‘ri bo‘lishi mumkin.

5. Raqamli tengsizlik. Barcha oliy ta’lim muassasalarida yuqori tezlikdagi internet, kuchli kompyuterlar, GPU va zamonaviy dasturiy vositalar mavjud bo‘lmasligi mumkin.

Shuning uchun AI asosidagi ta’limni tashkil etishda resurslar tengligini hisobga olish zarur.

SI texnologiyalarining o‘zining ekologik ta’siri. Muhim jihatlardan biri shundaki, sun’iy intellektning o‘zi ham ekologik resurslardan foydalanadi. Katta SI modellarini o‘qitish va ishlatish: elektr energiyasi; ma’lumotlar markazlari; sovutish tizimlari; suv resurslari; kompyuter uskunalari bilan bog‘liq.

Shuning uchun ekologiya mutaxassislarini tayyorlashda “yashil SI ” yoki “barqaror SI” tushunchalariga ham e’tibor qaratish kerak.

2026-yilda chop etilgan sistematik tadqiqot generativ SI’ning ta’limdagi ekologik ta’sirini elektr energiyasi, issiqxona gazlari, suv sarfi, apparat vositalarini ishlab chiqarish va elektron chiqindilar bilan bog‘liq omillar orqali baholagan [5].

Bu holat ekologiya talabalariga juda muhim savolni beradi: “Ekologik muammoni hal qilish uchun ishlatilayotgan SI texnologiyasining o‘zi qanday ekologik iz qoldirmoqda?”.

Shu savol asosida talabalarga SI texnologiyalarining foydasi va ekologik xarajatlarini birgalikda baholash topshirig‘i berilishi mumkin.

Ekologiya ta’limi uchun taklif etilayotgan SI modeli. Ekologiya va atrof-muhit muhofazasi mutaxassislarini tayyorlashda quyidagi “ SI -EKOLOG” ta’lim modelini taklif qilish mumkin.

1-bosqich - Ekologik bilim. Talaba ekologiyaning fundamental tushunchalarini egallaydi.

2-bosqich - Raqamli savodxonlik. Talaba Excel, GIS, ma’lumotlar bazasi va Python bilan ishlashni o‘rganadi.

3-bosqich - Ma’lumotlar tahlili. Talaba statistik va vizual tahlil usullarini o‘zlashtiradi.

4-bosqich - SI asoslari. Talaba: mashinali o‘qitish; neyron tarmoqlar; klassifikatsiya; regressiya; klasterlash tushunchalarini o‘rganadi.

5-bosqich - Ekologik SI. Talaba SI’ni: havo; suv; tuproq; o‘rmon; biologik xilma-xillik; iqlim

monitoringida qo‘llaydi.

6-bosqich - Mustaqil loyiha. Talaba real ekologik muammoni SI yordamida yechishga harakat qiladi.

Masalan: “Toshkent shahrida PM2.5 konsentratsiyasini SI yordamida prognozlash” yoki

“Sun’iy yo‘ldosh tasvirlari asosida yashil hududlarning o‘zgarishini aniqlash”.

O‘qituvchi faoliyatida sun’iy intellektdan foydalanish. SI faqat talabalar uchun emas, o‘qituvchilar uchun ham katta imkoniyatlar yaratadi. O‘qituvchi SI yordamida: ma’ruza rejasini ishlab chiqishi; amaliy topshiriqlar yaratishi; test savollarini tayyorlashi; individual topshiriqlar ishlab chiqishi; ekologik ma’lumotlar to‘plamini shakllantirishi; Python kodlarining namunalarini tayyorlashi; laboratoriya ishlarini ishlab chiqishi; talabalar xatolarini tahlil qilishi mumkin.

Biroq o‘qituvchi SI yaratgan materialni bevosita darsga kiritmasligi kerak. Material ilmiy manbalar asosida tekshirilishi, ekologik nuqtai nazardan tahlil qilinishi va mahalliy sharoitga moslashtirilishi lozim. Bu yondashuv o‘qituvchini SI bilan almashtirish emas, balki “o‘qituvchi + SI ” hamkorlik modelini shakllantirishga xizmat qiladi.

O‘zbekiston sharoitida foydalanish imkoniyatlari. O‘zbekistonda ekologik muammolarning o‘ziga xos xususiyatlari mavjud. Jumladan: suv resurslaridan oqilona foydalanish; Orolbo‘yi ekologik muammolari; cho‘llanish; tuproq sho‘rlanishi; havo ifloslanishi; chiqindilarni boshqarish; shahar ekologiyasi; qurg‘oqchilik; iqlim o‘zgarishi kabi masalalar ekologik monitoring va prognozlashni talab etadi.

Mazkur muammolarni ekologiya yo‘nalishidagi talabalar uchun SI asosidagi amaliy loyihalarga aylantirish mumkin.

Masalan:

Loyiha 1. “Orolbo‘yi hududlarida ekologik o‘zgarishlarni sun’iy yo‘ldosh ma’lumotlari asosida tahlil qilish.”

Loyiha 2. “Toshkent shahrida PM2.5 ko‘rsatkichlarini mashinali o‘qitish yordamida bashoratlash.”

Loyiha 3, “Qishloq xo‘jaligi yerlarida suv tanqisligini SI yordamida prognozlash.”

Loyiha 4. “Dron tasvirlari yordamida o‘simlik qoplamini avtomatik aniqlash.”

Loyiha 5. “Chiqindilarni avtomatik tasniflash uchun kompyuter ko‘rish modelini yaratish.”

Bunday loyihalar nazariy bilimlarni amaliy ekologik muammolar bilan bog‘lash imkonini beradi.

Muhokama. Tahlillar shuni ko‘rsatadiki, ekologiya va atrof-muhit muhofazasi ta’limini sun’iy intellekt bilan integratsiya qilish uchta asosiy natijani ta’minlaydi.

Birinchidan, ekologiya mutaxassisining kasbiy kompetensiyasi kengayadi. An’anaviy ekologik bilimlarga qo‘shimcha ravishda talaba ma’lumotlar tahlili, dasturlash, GIS va AI bo‘yicha bilimlarga ega bo‘ladi.

Ikkinchidan, ta’lim amaliyotga yaqinlashadi. Talaba real ekologik ma’lumotlar bilan ishlaydi va real muammolarni yechishga harakat qiladi.

Uchinchidan, ilmiy-tadqiqot faoliyati rivojlanadi. Talaba gipoteza yaratish, ma’lumot yig‘ish, model ishlab chiqish, natijalarni baholash va ilmiy xulosa chiqarishni o‘rganadi. Shu bilan birga, SI’ni ekologik ta’limga joriy etish faqat texnik masala emas. Bu o‘quv dasturining mazmuni, o‘qituvchilarning raqamli kompetensiyasi, ta’lim muassasasining texnik imkoniyatlari, akademik halollik va ma’lumotlar xavfsizligi bilan chambarchas bog‘liq. 2024-yildagi iqlim ta’limiga oid texnologiyalar sharhi ham texnologiya ekologik ta’limni qo‘llab-quvvatlash uchun turli shakllarda ishlatilayotganini ko‘rsatadi; bu SI’ni ekologik ta’limga kiritish uchun kengroq texnologik-pedagogik asos mavjudligini ko‘rsatadi [6]. Shuning uchun eng maqbul yondashuv - SI’ni mustaqil maqsad sifatida emas, balki ekologik muammolarni o‘rganish va yechishga xizmat qiluvchi vosita sifatida qo‘llashdir[7-10].

Xulosa. Ekologik muammolarning murakkablashib borishi ekologiya va atrof-muhit muhofazasi mutaxassislarini tayyorlash tizimiga yangi talablarni qo‘ymoqda. Zamonaviy ekolog mutaxassis ekologik jarayonlarni bilish bilan birga raqamli texnologiyalar, ma’lumotlar tahlili va sun’iy intellekt vositalaridan foydalanish ko‘nikmalariga ham ega bo‘lishi zarur. Sun’iy intellekt ekologik ta’limda individual o‘qitish, ekologik ma’lumotlarni tahlil qilish, ekologik jarayonlarni modellashtirish, bashoratlash, masofadan zondlash tasvirlarini qayta ishlash, ekologik monitoring va ilmiy tadqiqotlarni tashkil etish uchun keng imkoniyatlar yaratadi. Mashinali o‘qitish yordamida havo, suv va tuproq parametrlarini tahlil qilish; kompyuter ko‘rishi yordamida ekologik tasvirlarni tasniflash; masofadan zondlash ma’lumotlari asosida yer qoplami

o‘zgarishini aniqlash; generativ SI yordamida o‘quv va ilmiy faoliyatni qo‘llab-quvvatlash mumkin.

Biroq SI’dan foydalanish akademik halollik, ma’lumotlar maxfiyligi, algoritmik xatolar, noto‘g‘ri ma’lumotlar va SI texnologiyalarining ekologik izi kabi muammolarni ham yuzaga keltiradi. Shu sababli ekologiya ta’limida “ SI’dan foydalanish” bilan bir qatorda “ SI natijalarini tanqidiy baholash” kompetensiyasini ham shakllantirish muhimdir.

Tadqiqot natijasida ekologiya va atrof-muhit muhofazasi mutaxassislarini tayyorlash uchun quyidagi kompetensiyalar majmuasini shakllantirish maqsadga muvofiq deb hisoblanadi: ekologik bilim + raqamli savodxonlik + ma’lumotlar tahlili + dasturlash + GIS + sun’iy intellekt + tanqidiy fikrlash + ekologik mas’uliyat.

Kelgusida O‘zbekiston oliy ta’lim muassasalarida ekologik ta’lim uchun mahalliy ekologik ma’lumotlar asosida SI laboratoriyalarini tashkil etish, ekologik monitoring ma’lumotlar bazalarini yaratish, Python va GIS asosidagi amaliy mashg‘ulotlarni ko‘paytirish hamda ekologiya va SI fanlarini integratsiyalashgan o‘quv modullarini ishlab chiqish maqsadga muvofiqdir. Natijada ekologik muammolarni zamonaviy raqamli texnologiyalar yordamida tahlil qila oladigan, ilmiy asoslangan qarorlar qabul qilishga qodir va mehnat bozorining yangi talablariga javob beradigan ekolog mutaxassislarni tayyorlash imkoniyati kengayadi.

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FOSTERING ENVIRONMENTAL SUSTAINABILITY THROUGH GREEN HUMAN RESOURCE MANAGEMENT, GREEN LEADERSHIP, AND WORK ENGAGEMENT: EXAMINING THE EMERGING ROLE OF ARTIFICIAL INTELLIGENCE

Muhammad Ramzan ALI, Muhammad Sharjeel Aziz, Muhammad Younis
[1]https://orcid.org/0000-0002-6510-4877
Assistant Professor at AJOU University in Tashkent, Tashkent, Uzbekistan
[2]Email: Ramzan.ali@ajou.uz
[2]Research Scholar at RIGA Technical University, Latvia(Liepaja Campus)
Email: Sharjeel9200@gmail.com
[3]Research Scholar at RIGA Technical University, Latvia(Liepaja Campus)
Email: Younischauhan44@gmail.com
https://doi.org/10.5281/zenodo.22897287

Abstract. *Climate change, resource pressure, and the pressure of stakeholders for company accountability have redefined the role of human resource as a strategic factor for organization sustainability. This paper offers an integrative literature review, which combines empirical and conceptual research on green human resource management (GHRM), green leadership, green work engagement, and the new phenomenon of the use of artificial intelligence (AI) for boosting environmentally sustainable organizations. The review is based on 120 sources published since 2013 and most of which appeared between 2013 and 2026, and encompasses foundational literature and a systematic search of Scopus-, Web of Science- and EBSCO-indexed databases, revealing a shift from a set of distinct practices (green recruitment, training, performance management, compensation, and involvement) to a strategic, leadership-oriented and increasingly AI-enhanced system. The review is integrated with the Ability-Motivation-Opportunity (AMO) framework, the Resource-Based View (RBV), Social Exchange Theory (SET), and Affective Events Theory (AET), as an integrating theoretical scaffold, in order to develop a conceptual model that shows how green transformational leadership, green servant leadership, and green HRM systems can stimulate green work engagement and employee green behavior, and how AI-based HR analytics can augment each of these relationships, making it more precise, personalized, and accountable in terms of sustainability management in HRM systems. The review reveals convergent evidence that both green leadership and GHRM are associated with green work engagement, organizational citizenship behavior for environment and firm-level environmental performance, and that AI has a promising association with all three and is still under-theorized, under-sectored and has ethical and readiness concerns. Finally, the paper provides a research agenda that highlights the need for longitudinal, multilevel and algorithmically clear designs, while providing practical advice for HR practitioners who would like to incorporate AI responsibly into green people-management architectures.*

Keywords: *Green human resource management; green leadership; green transformational leadership; green work engagement; employee green behavior; artificial intelligence; environmental sustainability; AMO theory*

Introduction. The concept of sustainable development has gone from the outside to the inside of the corporate agenda. With growing regulations and pressure, investors are paying attention to environmental, social and governance (ESG) performance, and a workforce that is far more demanding of an employer's commitment to environmental stewardship, “greening” has become an imperative for organizations instead of a corporate social responsibility (CSR) choice (Ali, Kadirova, & Ismoyilov, 2024; Renwick, Redman, & Maguire, 2013). In this context, green human resource management (GHRM) has become the pathway through which organisations can put their policies and actions on the environment into practice in daily employee practices (Jackson et al., 2024; Yong et al., 2020). GHRM includes the linking of all HR functions (recruitment, selection, training and development, performance management, compensation, employee involvement) with environmental management goals, in such a way that each employee touch point strengthens the organisation's ecological commitments (Rani & Mishra, 2014; Renwick et al., 2013).

Two other parallel scholarships have emerged as unindistinguishable from the GHRM story. The first is green leadership, specifically green transformational and green servant leadership, which provides vision, role modeling, and psychological resources to turn GHRM policy into action (Robertson & Barling, 2013; Singh et al., 2020; Zacher et al., 2024). The latter is employee green behavior and its motivational driver, green work engagement (the vigor, dedication, and absorption of employees towards environmental-related work tasks) (Aboramadan, 2022; Tran, 2023). The third stream, albeit smaller and growing at a quicker pace, discusses the influence of artificial intelligence (AI) technologies (Machine Learning, Natural Language Processing, Predictive Analytics, Algorithmic Decision Support) on the design, delivery and measurement of GHRM, ranging from AI-enabled green recruitment to real-time environmental performance dashboards (Dawra, Pathak, & Sharma, 2024; Gao, Al Mamun, Masukujjaman, & Yang, 2025; Shaikh, Sohu, Shaikh, Kherazi, & Soomro, 2025).

While there are numerous empirical studies on combinations of these constructs (e.g., GHRM and environmental performance, green leadership and employee green behaviour, GHRM and engagement), there are relatively few reviews that have tried to integrate all four domains and fewer that have included AI as an overarching enabling component of GHRM, and not as a standalone ‘technology for tech's sake'. Notably, this gap is important as GHRM, green leadership development and digital HR transformation are not separate, but interconnected parts of a single sustainability architecture. The aim of this paper is therefore threefold: (a) synthesising the theoretical and empirical background literature on GHRM, green leadership, and green work engagement published primarily during the period 2020-2026 and seminal foundational studies; (b) exploring how AI is starting to intersect with and enhance these relationships; and (c) introducing a conceptual framework and research agenda that can inform empirical research at the Q1/Q2 level in the future.

This synthesis isn't just about tidiness. In the absence of a link between GHRM and leadership development and digital transformation strategy, organisations run a risk of what has been termed in the literature “greenwashing fatigue” employee cynicism towards environmental initiatives perceived as symbolic rather than substantive (Ma, Zhao, Chen, Hu, & Qu, 2025). On

the other hand, companies that embrace green leadership, GHRM architecture, and responsible governance of AI are likely to realize a number of benefits, including environmental performance and, crucially, enhanced employee engagement, commitment, and retention, as younger generations of workers have begun to prefer companies with sustainable, transparent leadership (Rani & Mishra, 2014). The review can therefore be seen as both a research exercise, aimed at summarising scattered research and making it testable in a conceptual framework, and a practical exercise, to help HR leaders to identify which of the four levers leadership development, practice design, cultural signaling, or technology governance are likely to provide their practice with the greatest return on their sustainability investment.

The rest of the paper is structured as follows. A methodology for conducting the review is described in Section 2. The theoretical groundwork is discussed in section 3. In Section 4, GHRM conceptualization and practice bundles are reviewed. Green leadership is tackled in Section 5. This section reviews green work engagement and green behaviour of the employees. Assuming the role of AI is discussed in Section 7. A conceptual model and testable propositions are presented in Section 8. Theoretical and managerial implications, limitations, and directions for future research are discussed in sections 9-12, followed by a conclusion.

2. Review Methodology

This review is a hybrid narrative–systematic type, which draws from the PRISMA approach (Ali et al., 2024; Gyensare, Adomako, & Amankwah-Amoah, 2024; Kaur & Gupta, 2024), but uses a structured approach for a search procedure and an interpretive, theory-building approach for the synthesis, which was deemed suitable for an emerging, cross-disciplinary field like this one. Search strings included the terms “green HRM” OR “green human resource management,” “green leadership” OR “green transformational leadership” OR “green servant leadership,” “green work engagement” OR “employee green behavior” OR “environmental engagement,” and “artificial intelligence” OR “AI” OR “algorithmic management” and were limited to peer-reviewed journal articles, book chapters and conference proceedings published in English between 2013 and 2026 and prioritizing publications from 2020–2026. The databases searched were Scopus, Web of Science, ScienceDirect, SAGE, Emerald, Springer, MDPI, Wiley, Taylor & Francis, EBSCO (Academic Search Complete and GreenFILE), and an additional set of source articles provided by the author and retrieved from the EBSCO and open-access databases. The inclusion criteria were that the study had to substantively discuss at least one of the four constructs (GHRM, green leadership, green engagement/behavior, and AI in HRM) in an organization or workplace context. Hand searching was used to find a few additional foundational and recent studies (snowballing) in reference lists of retrieved systematic reviews and meta-analyses (e.g., Efranto, Sipayung, & Amrulloh, 2026; Gul, Karaatmaca, & Raza, 2025; Jackson et al., 2024). The final corpus consists of about 120 sources which range from seminal theoretical papers (e.g., Barney, 1991; Kahn, 1990; Renwick et al., 2013) to empirical research in different industry settings (manufacturing, hospitality, banking, healthcare, higher education, and SME), along with the more recent bibliometric and systematic reviews that map the intersection between AI and the GHRM.

3. Theoretical Foundations

3.1 The Resource-Based View (RBV)

The RBV (Barney, 1991) defines human capital, among which the employees with environment skills and motivated, as a valuable, rare, difficult-to-imitate resource that can be used to create sustainable competitive advantage in a firm. Singh et al. (2020) use the RBV to

propose that, green transformational leadership and GHRM together serve as strategic resources that foster the competence of green innovation and environmental performance within organizations, a logic that has been further elaborated by many subsequent GHRM–performance studies (Fang, Shi, Gao, & Li, 2022; Marrucci, Daddi, & Iraldo, 2021).

3.2 Ability-Motivation-Opportunity (AMO) Theory

AMO theory (Appelbaum, Bailey, Berg, & Kalleberg, 2000) suggests that HR policies affect performance by influencing the capacity of employees to engage in desired behaviors (ability), their desire to engage in those behaviors (motivation), and their ability to do so (opportunity). The taxonomy of AMO is the primary structure that organizes the field of GHRM with the first systematic mapping of GHRM practices to the taxonomy being undertaken by Renwick et al. (2013); this structure was then followed by Gao et al. (2025), Sohail et al. (2023 in PMC10481185), and Singh et al. (2020). In this review, AMO provides context for why GHRM practices are not enough to make a difference; motivational mechanisms, like leadership and engagement, are required to trigger GHRM practices to influence behavior.

3.3 Social Exchange Theory (SET) and Signaling Theory

SET (Blau, 1964) sees the employee–organization relationship as a reciprocal exchange; when the organizations invest in the environmental capability and well-being of their employees through GHRM, employees reciprocate by engaging in green effort and discretionary green effort (Gyensare et al., 2024; “Fostering sustainable development,” 2025, Discover Sustainability). The visible GHRM practices, such as green recruitment branding and transparent environmental performance appraisal, are expected to communicate the authentic values of the organisation to employees and external groups, minimizing the perceived “greenwashing” risk (Ma, Zhao, Chen, Hu & Qu, 2025).

3.4 Affective Events Theory (AET) and Social Learning Theory

AET (Weiss & Cropanzano, 1996) states that emotional responses to workplace events, such as CSR activities or leader green behavior, lead to employee green behavior. This is complemented by social learning theory (Bandura, 1977) which has been cited in the literature of green transformational leadership many times (e.g., Asfahani, 2025; Liu & Yu, 2023; Zaid & Yaqub, 2024).

3.5 Kahn’s Engagement Theory and the Job Demands-Resources Model

The psychological underpinning of “green work engagement” is derived from Kahn's (1990) seminal theory of personal engagement psychological meaningfulness, safety, and availability and the tradition of work engagement as established by Utrecht Work Engagement Scale (UWES) family (Schaufeli, Salanova, González-Romá, & Bakker, 2002; Schaufeli & Bakker, 2004) and the Job Demands-Resources model. Rich, Lepine, and Crawford (2010) and Macey and Schneider (2008) also define engagement as a unique motivational state that is separate from job satisfaction, a distinction that will be the basis for examining the GHRM–engagement–behavior causal chain explored in Section 6.

4. Green Human Resource Management: Conceptualization and Practice Bundles

4.1 Defining GHRM

GHRM is generally understood as the implementation of HRM policies, philosophies and practices to support the sustainable use of resources in business organisations, and, more broadly, to further the agenda of environmental sustainability (Rani & Mishra, 2014; Renwick et al., 2013). Mishra (2017) and Ali et al. (2024) note that there are two fundamental aspects of GHRM: environmental friendly HR practices and knowledge capital preservation. Defining web

4.0 has shifted from an operational perspective (paperless office, video interviews, etc.) to a strategic perspective in which the whole experience of managing the environment is integrated in the employee lifecycle (Ren & Jackson 2020).

4.2 Core Practice Bundles

he literature brings together five intertwined practice bundles:

Green recruitment and selection. Organisations recruit and recruit on candidates who value, know and act in line with environmental management systems, while offering a signal of authenticity through the implementation of employer branding and green job design (Bauer & Aiman-Smith, 1996 as cited by Renwick et al., 2013; Yusoff et al., 2020).

Green training and development for Green Economy. By using the systematic approach to environmental training, employee “green ability” and environmental literacy are achieved as well as the skills required to complete tasks in a more eco-efficient manner (Pinzone, Guerci, Lettieri, & Redman, 2016, as cited in Ali et al., 2024; Zhu, Tang, Wang, & Chen, 2021).

Performance Management and Appraisal in green. Environmental criteria (energy use, waste reduction, green targets) are integrated in performance evaluation, and give feedback that influences the “opportunity” dimension of AMO (Gao et al., 2025; Jabbour & de Sousa Jabbour, 2016).

Green incentives and rewards. Sustaining environmental efforts through incentives is possible through both financial and non-financial measures, such as green bonuses, variable pay based on environmental outcomes, and recognition (Das & Dash, as quoted in the AI-Driven Green HRM chapter; Odhiambo et al., 2023, as quoted in Green HRM and organisational responsible performance review).

The fact of the matter is that green employee involvement and empowerment. Fostering employee involvement in environmental problem-solving, suggestion schemes, and green teams can create a sense of ownership and potential to act (Boiral, 2005; Kaur & Gupta, 2024; Ramus, 2001).

4.3 Antecedents and Outcomes

According to the review “Greening the workforce”, there are eight determinants of GHRM, which are green transformational leadership, the “human element” (employee values and attitudes), organizational commitment to sustainability, knowledge acquisition, environmental orientation, pressure for green innovation, market/competitive pressure, and corporate social responsibility (CSR) (Weber & Kassab, 2024). Meta-analytic and systematic evidence strongly indicates a link between GHRM and (a) employee-level outcomes such as employee green behavior (Chaudhary, 2020; Dumont, Shen, & Deng, 2017), pro-environmental behavior (Nurul Alam, Mashi, Azizan, Alotaibi, & Hashim, 2023), well-being (Gyensare et al., 2024), and sustainable work behavior (Tran, 2023), and (b) firm-level outcomes, including environmental performance (Hameed, Khan, Islam, Sheikh, & Naeem, 2020; Singh et al., 2020), green innovation (Fang et al., 2022), organizational reputation (Nguyen, Pham, & Nguyen, 2024), and circular economy performance (Marrucci et al., 2021; Punia, Singh, & Chauhan, 2023, as cited in circular economy AI chapter). In addition, Kaur and Gupta (2024) demonstrate that green interpersonal citizenship behavior lies between the relationship between GHRM and green outcomes, highlighting the indirect nature of the relationship between GHRM and green outcomes, which this review emphasizes in the areas of leadership and engagement.

4.4 Sectoral and Contextual Variation

Research on GHRM is still sector-specific. Two main sectors are responsible for empirical output, hospitality and tourism, due to its strong footprint in the environment and customers' perception of sustainability branding (Kim, Kim, Choi, & Phetvaroon, 2019; Nurul Alam et al., 2023; Wikhamn, 2019). Environmental management systems and green innovation are highlighted in manufacturing and SME contexts (Buffa, Franch, & Rizio, 2018; Singh et al., 2020; Zahrani, 2022); and banking (Gul et al., 2025) and higher education contexts (Aboramadan, 2022; Lashari et al., 2022, as cited in Ali et al., 2024) account for the spread of GHRM beyond the traditional “dirty” industries. When examining environmental management practices adopted by small and medium enterprises (SMEs) in the Italian Alps, Buffa et al. (2018) confirm that public subsidies play a significant role in reducing the impact of environmental management practices. A similar finding is seen in the studies of the adoption of artificial intelligence by SMEs in developing economies (Shaikh et al., 2025), where the influence of institutional and resource constraints on the implementation of environmental management practices is highlighted.

5. Green Leadership and Its Link to Green HRM

5.1 Green Transformational Leadership

Green transformational leadership (GTL) is the extension of Bass transformational leadership model to the environmental field: green transformational leadership involves articulating the inspiring vision for the environment, demonstrating the behaviour of the leader in the field, stimulating the problem-solving of the leader in the green field, and individually considering the employees' environmental issues (Chen & Chang, 2013, as cited in Singh et al, 2020; Robertson & Barling, 2013). Singh et al. (2020) with triadic SME data and RBV and AMO theory confirm that GHRM is a mediator between leadership and environmental performance and not an independent or parallel determinant of environmental performance of enterprises as it is a determinant of employee green ability, motivation and opportunity. This mediating mechanism is consistently demonstrated, such as Liu and Yu (2023), who reveal that green organizational climate is a mediator between GTL and OCBE; Asfahani (2025), which concludes that green organizational climate is a different mediator between GTL and employee green behavior; and Zaid and Yaqub (2024), who reveal that green organizational climate is a different mediator between transformational leadership and employee green behavior at the time of the organizational crisis.

5.2 Green Servant and Ethical Leadership

In addition to transformational styles, the green servant leadership approach that prioritizes employee growth and environmental well-being over authority is associated with green psychological climate, as well as employee green creativity and voluntary pro-environmental behavior (Zafar et al., 2025). Ethical leadership also influences environmental performance through green organizational identity and culture (Rihal, Alzubi, Aljuhmani, & Berberoğlu, 2025); authentic leadership, on the other hand, promotes green creativity through psychological safety and trust (Rehman & Zeb, 2023). Together, these studies indicate that "greenness" of the leadership style is not as significant as the relational mechanisms (vision communication, role modeling, psychological empowerment, and trust) by which any leadership style can be "greened.”

5.3 Leadership as an Antecedent, Amplifier, and Boundary Condition of GHRM

Zacher et al. (2024) suggest an integrative multilevel model, where leader green behavior functions simultaneously as a predictor of the adoption of GHRM, as a predictor of follower green behavior, and as a boundary condition for how follower green behavior is experienced when GHRM practices are implemented. In line with this, a recent meta-analysis (Katz, Rauvola, Rudolph, & Zacher, 2022) found moderate positive correlations between ESL, servant leadership and supervisory support and employee green behaviors. Similarly, in Chinese manufacturing and service organizations, green transformational leadership, along with performance appraisal and employee empowerment, is found to influence the green organizational culture, which in turn affects employees' green values and pro-environmental behaviors at work (Gao, Al Mamun, Masukujjaman, and Yang, 2025). Research on sustainable leadership in Saudi Arabia also reveals that there is an important link between leaders' expressed values and the formal GHRM policy to prevent the perception of greenwashing by employees and to embed the concept of sustainability in the organizational culture (Sustainable Leadership and Green HRM, Sustainability, 2025).

5.4 Toward Green Work Engagement

This review has integrative goal and in the field of agricultural leadership, Tran (2023) is one of the first empirical studies that found that work engagement in the field of green is positively and significantly predicted by direct relationships between GHRM and green work engagement as well as between green organizational culture and green work engagement, in the agricultural field of Vietnam. The study was supported by several studies, such as studies by Umair et al. (2024) which revealed that the combined effects of green talent management and transformational leadership positively affect employee engagement towards green initiatives, and by another study by Linking transformational leadership to GHRM and employee engagement (2024) that highlighted the moderating effects of intrinsic motivation between the joint effects of transformational leadership and GHRM on the engagement of university faculty in green initiatives. The above studies all confirm that green leadership is not only an antecedent of GHRM, but it is also a parallel and complementary motivator of the motivational states — engagement that lead to green behavior.

6. Green Work Engagement and Employee Green Behavior

6.1 From General to Green Engagement

The current options for general to green engagement might be revised.

Work engagement, which is a positive state of mind towards work that is characterized by vigor, dedication and absorption (Schaufeli & Bakker, 2004; Schaufeli et al., 2002) is built upon Kahn's (1990) original conception of employees being physically, cognitively and emotionally present in their work when they feel meaningfully connected to the job, psychologically safe to take risks, and available to do their work. Green work engagement specifically focuses on work roles and tasks that are relevant to the environment, meaning that “green engaged” employees are ones who “bring energy, involvement, and focus to environmental work roles and tasks” (Aboramadan, 2022; Tran, 2023).

6.2 GHRM, Engagement, and Behavior: The Mediating Chain

Empirical results consistently reveal that green work engagement is found to mediate between the GHRM/leadership and downstream green behavior. In higher education, Aboramadan (2022) confirms that green work engagement is a mediator between GHRM and employee green behavior. Similarly, the study Discover Sustainability (2025) citing RBV and

SET, revealed that green work engagement partially mediates the relationship between GHRM and sustainable performance of Saudi manufacturing SMEs. Ababneh (2021) indicates that, employee engagement and personality attributes moderate the relationship between GHRM and green behavior; Gyensare et al. (2024) indicate that employee green behavior mediates the relationship between GHRM and subjective well-being, moderated by resource commitment. Kaur and Gupta (2024) build on this, demonstrating a discretionary, engagement-adjacent construct, green interpersonal citizenship behavior, is the intervening variable to connect the relationship between GHRM and green outcomes in manufacturing.

6.3 Affective and Moral Pathways

In addition to the motivational (AMO/engagement) pathway, an affective and moral pathway has grown. Drawing on Affective Events Theory, Zhang et al. (2024) demonstrate the negative moderating influence of environmental passion climate on the relationship between CSR characteristics and green behavior, as well as the interaction between emotional and moral processes and purely motivational factors. Similarly, Ma, Zhao, Chen, Hu, and Qu (2025) demonstrate that, beyond just a GHRM policy, positive employee green behavior is affected by positive green organizational identity, with negative green behavior being affected by negative green organizational identity.

6.4 A Synthesis of Key Empirical Studies

Table 1 summarizes a representative sample of the empirical studies underpinning the causal architecture developed in this review, organized by theoretical lens, context, and principal finding, to illustrate the convergence of evidence across sectors and geographies.

Study	Context / Sample	Theoretical Lens	Key Finding
Singh et al. (2020)	309 manufacturing SMEs, UAE	RBV; AMO	GHRM mediates the effect of green transformational leadership on green innovation and environmental performance
Tran (2023)	380 employees, Vietnam agricultural sector	RBV	GHRM and green leadership both positively predict green work engagement; green organizational culture mediates
Aboramadan (2022)	Higher education, Palestine	AMO; SET	Green work engagement mediates the GHRM–employee green behavior relationship
Gyensare et al. (2024)	249 SME employee–supervisor dyads, Ghana	SET	Employee green behavior mediates GHRM–subjective well-being; resource commitment strengthens the effect
Nurul Alam et al. (2023)	305 subordinates / 135 supervisors, Nigerian hotels	AMO	Green commitment mediates, and green self-efficacy moderates, the GHRM–pro-environmental behavior link
Kaur & Gupta (2024)	371 manufacturing employees, India	AMO; RBV; Social	Green interpersonal citizenship behavior mediates GHRM–green

Study	Context / Sample	Theoretical Lens	Key Finding
		Learning	outcomes relationship
Liu & Yu (2023)	Manufacturing industry, China	Social Information Processing	Green transformational leadership enhances OCBE via green organizational climate
Zafar et al. (2025)	Cross-industry	Social Learning	Green servant leadership enhances organizational green performance via green creativity and psychological climate
Zhang et al. (2024)	267 employees, China	Affective Events Theory	CSR characteristics shape employee green behavior via organizational pride; environmental passion climate moderates
Gao et al. (2025)	412 employees, manufacturing/service, China	AMO; Social Identity Theory	GHRM bundle and green transformational leadership shape green organizational culture, which drives pro-environmental behavior
Shaikh et al. (2025)	Manufacturing SMEs, Pakistan	Social Cognitive Theory	AI adoption and GHRM jointly predict employee green behavior; organizational culture moderates the relationship
Zacher et al. (2024)	Conceptual, multilevel	Integrative leadership model	Leader green behavior functions as antecedent, direct predictor, and boundary condition of GHRM effectiveness
Buffa et al. (2018)	247 SMEs, Italian hospitality sector	Multi-dimensional EMP framework	Public subsidies significantly moderate adoption of environmental management practices in resource-constrained SMEs

This synthesis illustrates that, despite considerable heterogeneity in sample, sector, and geography, the reviewed studies converge on a shared causal logic: leadership and organizational signals activate GHRM; GHRM operates through cultural, climatic, and psychological mediators; and these mediators chief among them green work engagement — produce employee and firm-level green outcomes.

6.5 Boundary Conditions: Culture, Climate, and Self-Efficacy

Green organizational culture and green psychological climate are always identified as influencing factors or mediators between GHRM and leadership and engagement and behavior (Dumont et al., 2017; Gao et al., 2025; Shah, Jiang, Wu, Ahmed, Ullah, & Adebayo, 2021; Tran, 2023). The connection between GHRM and pro-environmental behaviour is also mediated by employee green self-efficacy and green commitment, especially in hospitality settings where employees are in close contact with customers and emotionally labouring (Nurul Alam et al.,

2023). Together, the sections create a logical causal model: Green leadership and organizational context trigger the GHRM systems, GHRM systems, in turn, filtered through green organizational culture and green climate, lead to green work engagement, which, combined with affective and moral mechanisms, result in employee green behaviors and eventually, firm-level environmental performance.

7. The Emerging Role of Artificial Intelligence in Green HRM and Sustainability

7.1 The Rationale for AI in Green People Management

The application of AI-driven technologies such as machine learning, NLP, predictive analytics, RPA, and algorithmic decision support is now being touted as a way to make GHRM more precise, scalable, and efficient than manual HR processes (Dawra, Pathak, & Sharma, 2024; Vanisree, 2024). From 2018 to 2025, a recent systematic review published in Sustainability, following the PRISMA framework, of 53 articles revealed five prevailing themes of the literature on AI–GHRM: AI-supported green training, AI-driven green performance management, AI-enhanced green recruitment, ethical concerns in using AI for GHRM, and organizational readiness for AI in GHRM (A Systematic Literature Review of AI Advancements in GHRM, Sustainability, 2025). This literature has experienced an astounding 57.46% yearly increase over the past 6 years (94 publications from Scopus-indexed, 2019-2026), and the number of publications has nearly quadrupled from 2024 to 2025, indicating that AI–GHRM is among the fastest-growing sub-fields in sustainable HRM (Bibliometric analysis of AI-enabled GHRM, Discover Sustainability, 2026).

7.2 AI Applications Across the GHRM Practice Bundle

In each of the 8 practice bundles in Section 4, AI-powered tools are being Integrated. Natural language processing (NLP) algorithms are used in recruitment to identify candidates with a sustainability mindset and experience (Alzyoud, 2021, as cited in Shaikh et al., 2025). Adaptive learning platforms customize the environmental training material to the needs of individual employees during their training (Alzoubi & Mishra, 2024) cited in (Shaikh et al., 2025). In the context of performance management, AI-based systems could be used to evaluate employees' actual impact on sustainability initiatives on a real-time basis, transforming sustainability into a constant performance metric and not just something tackled as an afterthought at the end of the year (Sohu et al., 2025, as cited in Shaikh et al., 2025). The introduction of IoT with AI offers another chance to monitor and optimise energy use in real time, such as in manufacturing environments in developing nations, where some studies have demonstrated an energy savings of up to 30% (Aliyah et al., 2023; Schwäke, Ahn, & Lee, 2024, as cited in Shaikh et al., 2025). In terms of strategy, AI is proven to have a positive influence on green finance and sustainable performance via GHRM, and a Socio-Technical Framework means that AI is the interface between Industry 4.0 technologies and GHRM to promote transition towards ‘circular economy' (Role of AI and GHRM in promoting green finance, Discover Sustainability 2026; A Socio-Technical Framework for Integrating Industry 4.0 and Green HRM, Circular Economy and Sustainability 2026).

7.3 AI, Green Leadership, and Engagement: An Underexplored Nexus

The connection between AI and green leadership or green work engagement is still under-researched and there is a significant gap in the empirical research literature linking AI to these domains compared to the AI–GHRM literature as identified in this review. This potential for using vision communication and personalized feedback – which are key features of GTL's effectiveness (Section 5.1) – is largely speculative and untested, but could be greatly improved

by using AI-generated environmental dashboards and predictive analytics (Pillai, Sunitha, Sastri, Adarsh, & Preethi, 2024; Zeid & Louafi, 2025). Shaikh et al. (2025), one of the few studies that modeled AI adoption, GHRM and employee green behavior together, found that the relationship between AI and employee green behavior, like GHRM, is culturally and contextually-specific and is not necessarily universal among Pakistani manufacturing SMEs, based on Social Cognitive Theory, which suggests that the behavioral effects of AI adoption, such as GHRM, are culturally and contextually contingent.

7.4 Risks, Ethics, and Readiness

Risk is a prominent theme in the literature on AI–GHRM. None of these concerns, however, can be overlooked, all of which are interconnected, such as concerns for algorithmic fairness/ethical concerns of the use of AI in HRM generally, and carbon costs or energy consumption of the systems themselves a paradox in itself as the technology designed to help improve environmental sustainability is energy-intensive and carbon-causing (Huang & Gopal 2025). The organizational readiness digital infrastructure, employee AI literacy, and resistance to change are frequently cited as a limiting factor in the implementation of AI–GHRM, especially for SMEs in developing countries (Shaikh et al., 2025). The phenomenon is best understood as an AI force multiplier, enhancing the impact of the current GHRM and leadership systems, either positive or negative, depending on how it is designed, managed, and communicated to staff.

8. Integrated Conceptual Framework and Propositions

Overall, this review suggests that green leadership (transformational, servant, ethical) serves as the upstream drivers, and GHRM practice bundles (recruitment, training, performance management, compensation, and involvement) as the structural mechanism. Green organizational culture and climate act as contextual moderators/mediators, while green work engagement is the proximal psychological mechanism. AI can be used as a cross-layer enabler to enhance (or diminish, if poorly controlled) the relationships between all five layers. Based on this, the review proposes the following hypotheses for empirical testing in the future:

Proposition 1: Green transformational and green servant leadership are positive predictors of the adoption and perceived authenticity of GHRM practices.

Proposition 2: The practices of GHRM have a positive direct effect on green work engagement, and a positive indirect effect through green organizational culture/climate.

The relationship between green leadership and green work engagement is partially mediated by GHRM, as green leadership positively predicts green work engagement both directly and indirectly through GHRM.

Proposition 4: Green work engagement is a positive predictor of employee green behavior and organizational citizenship behavior for the environment, which consequently combine to form the level of environmental performance for the firm.

Proposition 5: HRM–engagement relationship is mediated by AI-powered HR analytics; the relationship is stronger if both the AI application and the HRM is perceived as fair, transparent, and well-governed in an organization, and weaker or even negative if it is perceived as threatening or opaque.

In the model, the strength of all downstream relationships is moderated by perceived authenticity (versus greenwashing) of leadership and GHRM signals and this is in accord with signaling theory.

9. Discussion

The synthesis presented in this review shows that GHRM as a strategic system and one that is part of leadership has become well developed, but, is somewhat less developed in the area of using AI as a legitimate causal mechanism, as opposed to a topical add-on. There are three patterns that stand out. The mediating role of green work engagement and related constructs (green organizational culture and green psychological climate) has been found consistently across contexts (higher education, manufacturing, hospitality, banking, SMEs) and can now be considered as a universal mechanism by which GHRM and green leadership create behavioral and performance outcomes (Aboramadan, 2022; Gao et al., 2025; Tran, 2023). Second, all of these relationships are moderated repeatedly by authenticity and perceived sincerity, either as a sign of commitment, moral emotion, or as an anti-greenwashing message, which indicates that the positive effects of GHRM and green leadership rely more on how employees interpret the organizational vision and intent than on the simple presence of green policies (Ma et al., 2025; Zhang et al., 2024). Third, although the literature on AI–GHRM is proliferating, there is still a significant lack of empirical studies that directly link AI to measures of engagement or leadership outcomes that test theories, rather than merely providing conceptual frameworks or bibliometric mapping (Dawra et al., 2024; Shaikh et al., 2025).

10. Theoretical Contributions

This review has made a contribution to the theory in three ways. First of all, it combines four streams of literature (GHRM, green leadership, green engagement, and AI in HRM), and provides a parsimonious framework for understanding how sustainability is co-produced by structural (GHRM), relational (green leadership), psychological (green engagement), and technological (AI in HRM) mechanisms, underpinned by the theory of the RBV, AMO, SET, and AET. Second, it explains the order of these mechanisms, making green work engagement the “engine” that leadership and GHRM should both act upon in order to bring about behavior, which addresses the apparent inconsistencies of previous research that considered the two factors as competing predictors. Third, the review explicitly includes signaling theory and concerns about authenticity/greenwashing, allowing for a boundary-conditioned account of the diversity in engagement across studies and settings.

11. Practical and Managerial Implications

The review's results have several implications for HR and organizational leaders. GHRM practices should not be just a checklist for organizations and they should focus on cultivating green leadership in their employees, especially their transformational and servant leadership practices, and make sure that GHRM policies are lived and experienced by employees as genuine and motivationally appealing (Gul et al., 2025; Sustainable Leadership and Green HRM, 2025). Creating a green organizational culture and psychological climate should be seen as a strategic prerequisite for the effectiveness of GHRM, not a successive thing that occurs after the implementation of a green policy (Dumont et al., 2017; Shah et al., 2021). Organizations must consider algorithmic fairness and transparency and ensure that employees are knowledgeable about AI tools, as their use in recruitment, training, and performance management could potentially harm or enhance employee engagement, depending on the transparency and fairness of the HR processes (Bangura et al., 2025; Lima & Rahman, 2024). Last but not least, as documented among SMEs (Buffa et al., 2018; Shaikh et al., 2025), policy makers and industry associations have a part to play in helping smaller firms who do not have the capital or expertise to invest independently in GHRM and green-AI.

12. Limitations and Future Research Directions

Like other narrative-systematic reviews, this review has a number of limitations, such as the use of published literature of mostly quantitative and cross-sectional studies, which may result in publication bias, as well as the fact that the literature on AI–GHRM has grown rapidly, and this has been reflected in the search window of this review, which may have failed to capture all relevant literature; in addition, language limitation to English-language publications may have excluded non-English relevant literature. Based on this limitation and the gaps found throughout, five priorities for future research are identified. First, a causal ordering is needed between leadership, GHRM, engagement and behavior – most of the studies reviewed have been conducted on cross sectional survey data. Second, multilevel research designs that simultaneously account for variance within the leader, team, and organization would help answer the question of whether mechanisms identified are the same at the level of the team and/or the organization (Zacher et al., 2024). Third, empirical research to directly test AI as a mediator or moderator between GHRM and leadership and engagement is in dire need: despite significant progress in the literature, there is a lack of empirical studies on how AI fits into the chain between GHRM and leadership and engagement.Third, there is a lack of empirical studies in which AI is directly tested in the chain between GHRM and leadership and employee engagement, as proposed in Section 8, and this is an urgent call for research. Forth, comparative studies between different institutional settings (developed versus developing economy; regulated versus unregulated industry) would help to determine the range of conditions which would enable or hinder GHRM, green leadership and the adoption of AI. Finally, future research should directly tackle the “Green AI paradox” (Huang & Gopal, 2025), which presents a paradox between the energy and carbon intensity of AI systems and their ability to promote sustainability in the environment.

13. Conclusion

This integrative review is intended to show that the most recent and comprehensive literature on environmental sustainability in organizations reveals that it can be seen as the result of the interaction between three key factors: green leadership, green human resource management and the psychological state of green work engagement, and that the latter is amplified by the use of artificial intelligence, which is an emerging factor but still poorly theorized. Green transformational and servant leadership provide the vision and role modeling that legitimizes GHRM; GHRM practices nurture green employees' capacity, motivation, and opportunity to enact green behaviors; green organizational culture and green climate create the conditions under which GHRM are experienced as genuine; green work engagement serves as the mediation mechanism between green policy and green leadership and green employees' green behaviors with cumulative green organizational performance. While AI has significant potential to improve the accuracy and scale of this system, the ability to realize that potential will rely on organizations' ability to govern AI transparently, equitably and ways that will not undermine employee confidence. The conceptual framework and propositions put forward here serve as a basis for the next generation of empirical research at the crossroads of sustainability, human resource management, leadership and technology at the Q1/Q2 level.

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HUMAN-AI COLLABORATION IN ESP SIMULATIONS FOR ARCHITECTURE STUDENTS: A BAD-MODEL FRAMEWORK FOR REFLECTIVE DEBRIEFING

Shokirov Bahodir Ismoilovich[1], Ruzimov Ulugbek[2]
[1]Ajou University in Tashkent, Lecturer; Uzbekistan State World Languages University, Independent Researcher
E-mail: b.shokirov@ajou.uz
[2]Ajou University in Tashkent, Head of Academic Affairs Department
https://doi.org/10.5281/zenodo.22896776

Abstract. *This conceptual-methodological paper addresses how human-AI collaboration can be integrated into the Debriefing stage of simulation-based English for Specific Purposes (ESP) instruction for architecture students without transferring pedagogical authority to AI. The study uses theoretical synthesis of simulation pedagogy, ESP, Kolb's experiential learning cycle, reflective practice, and recent human-centred AI research. The resulting framework positions AI as bounded pedagogical support that can review selected speech samples, flag terminology and grammar issues, propose alternative professional wording, and generate criterion-linked reflective prompts. The principal result is a five-step human-AI debriefing algorithm comprising student-first recall, AI-assisted language review, teacher verification, criterion-referenced self-reflection, and transfer-goal setting. The sequence is aligned with a performance-oriented analytical rubric covering Task Completion, Language Use, Communicative Effectiveness, and Debriefing Quality. The student retains reflective agency and the teacher retains final professional, pragmatic, and pedagogical judgement. The paper concludes that AI is most defensible when embedded as a verified support layer within reflective Debriefing rather than used as an autonomous evaluator. The framework is proposed for future empirical validation in architecture ESP scenarios such as client meetings, project presentations, design critiques, and technical discussions.*

Keywords: *ESP; simulation method; BAD model; reflective debriefing; artificial intelligence; human-AI collaboration; speaking skills; performance-oriented analytical rubric.*

1. INTRODUCTION

The rapid expansion of generative artificial intelligence in higher education is changing how feedback, practice, and reflection can be organised. AI systems can provide rapid explanations, reformulations, prompts, and individualised support, yet pedagogical purpose, professional context, and final educational judgement should remain under human control [1-4]. Meniado [4] describes human-AI collaboration in language education as a complementary relationship in which intelligent tools can support teaching, learning, and assessment while human agency remains central. Empirical work also shows that the quality of interaction matters: Wang et al. [5] identified distinct patterns of learner-AI interaction and cautioned that passive or mechanical following of AI guidance may weaken the human-AI learning community. A systematic review by Ji, Han, and Ko [6] similarly argues that conversational AI should be orchestrated in collaboration with human teachers rather than treated as an autonomous instructional replacement. UNESCO‘s guidance on generative AI likewise emphasises human

agency, transparency, privacy, and professional responsibility as central conditions for educational use [3]. The relevant question is therefore not whether AI should replace the teacher, but how its affordances can be placed inside a pedagogically controlled learning cycle.

This issue is especially relevant to architecture ESP. Future architects need to present projects, negotiate with clients, participate in technical discussions, defend design decisions, and respond to critique in English. These tasks require more than grammatical knowledge. They involve terminological precision, fluency, interactive communication, task fulfilment, pragmatic appropriateness, and the ability to reflect on one's own professional communication. Simulation provides a suitable environment because it recreates professional roles, constraints, problems, and decisions in a safe educational setting [9, 10].

In an earlier study, Shokirov [11] conceptualised simulation-based ESP instruction for architecture education as an integrated methodological framework linking professional scenarios, structured interaction, and performance-oriented assessment. The present paper narrows that framework to one pedagogically critical point: reflective Debriefing. In the broader methodology developed for architecture ESP, problem-based simulation scenarios, thematic units, professional terminology, the BAD structure, and a four-criterion performance-oriented analytical rubric are interconnected. Debriefing is treated not as a final classroom discussion but as the stage where learners reconstruct performance, identify why communication succeeded or failed, and formulate a specific goal for the next professional task [11].

The purpose of this paper is to propose a human-in-the-loop model for integrating AI into the Debriefing stage without transferring pedagogical authority to the system. Two questions guide the conceptual analysis: (1) What functions can AI legitimately perform during reflective Debriefing in architecture ESP simulations? (2) How can AI-supported feedback be aligned with student self-reflection, teacher verification, and performance-oriented criteria?

2. THEORETICAL AND METHODOLOGICAL FOUNDATIONS

The pedagogical strength of simulation lies in the recurring relationship between experience, reflection, conceptualisation, and re-application. Kolb's experiential learning cycle connects Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation [12]. In a simulation lesson, Action creates direct professional-communicative experience. Debriefing then enables learners to revisit that experience, explain the reasons behind decisions and language choices, and derive principles that can be tested in a subsequent simulation.

Schön's concepts of reflection-in-action and reflection-on-action provide a complementary professional-learning perspective [13]. During a client negotiation, for example, a learner may adjust a response while the interaction is unfolding. After the task, the learner can examine whether a selected phrase, technical term, argument, or politeness strategy was appropriate. This post-performance reflection is particularly important in architecture because effective communication depends on the interaction of language, visual evidence, technical constraints, stakeholder interests, and professional judgement.

Within the BAD model, Briefing establishes the professional context, roles, constraints, language support, and assessment criteria; Action engages learners in the simulated task; and Debriefing analyses the outcome, language use, communicative strategies, errors, and alternative solutions [14]. This makes Debriefing the most defensible point for bounded AI support. The AI system can work with already produced language and help learners notice options, while the

teacher remains responsible for interpreting whether those options are professionally and pragmatically suitable.

Recent research supports the need for a balanced position. Large language models can provide flexible support but may produce inaccurate, decontextualised, or overconfident responses [2]. Wang et al. [5] demonstrate that learner outcomes depend on how students interact with AI rather than on access to AI alone. Ji, Han, and Ko [6] likewise conclude that effective conversational-AI use requires teacher orchestration and intelligence amplification. More recent evidence from Central Asian EFL classrooms shows the value of teacher-mediated AI assessment for timely feedback and workload reduction, while also warning against unmediated use [7]. Cui et al. [8] further conceptualise human-AI collaborative competence through cognitive, applicative, and regulatory dimensions, reinforcing the importance of learner judgement and regulatory control. In a different EFL context, Qu and Chen [15] reported that GenAI interlocutors can support speaking performance, engagement, and lower-anxiety practice. These findings are relevant to the broader potential of AI-mediated language learning, but they do not directly validate AI-supported Debriefing in architecture ESP. The professional context, the function of AI, and the assessment architecture are different. Accordingly, the model proposed here is framed as a methodological hypothesis for future empirical testing rather than as a demonstrated effect. Figure 1 summarises this BAD-Kolb alignment and shows why bounded AI support is concentrated in reflective Debriefing.

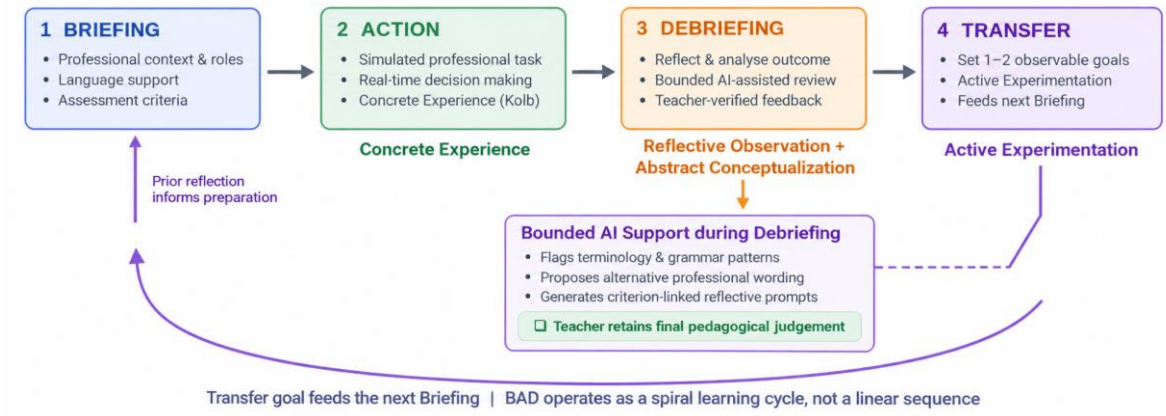


Figure 1. BAD-Kolb alignment with bounded AI support in architecture ESP (author-developed conceptual model).

3. STUDY DESIGN AND SCOPE

The article follows a conceptual-methodological design. The unit of analysis is the Debriefing stage of a BAD-structured architecture ESP simulation. The framework was constructed through theoretical synthesis across simulation pedagogy, ESP, experiential learning, reflective practice, and human-centred AI. It is also aligned with the author's existing architecture ESP methodological framework and assessment system [11].

Three design constraints were established. First, AI must support reflection rather than independently determine speaking quality. Second, feedback must be anchored in the professional scenario and in explicit criteria rather than generated as generic language correction. Third, final pedagogical interpretation must remain with the teacher. These constraints operationalise the human-in-the-loop principle and protect the distinction between machine-generated suggestions and educational judgement.

No new experimental or inferential statistical claim is advanced in this article. The proposed model therefore does not claim that AI improves speaking skills, reduces speaking

anxiety, or produces higher assessment scores. Instead, it specifies where AI may be inserted into an established pedagogical cycle, what it may do, what it should not do, and how its output can be verified. This boundary is essential for methodological validity and for future experimental design.

4. HUMAN-AI REFLECTIVE DEBRIEFING WITHIN THE BAD MODEL

The proposed Debriefing process consists of five sequential stages. The first stage is student-first recall. Immediately after the simulation, the learner reconstructs what happened, identifies whether the communicative objective was achieved, and names one point of difficulty. AI is intentionally delayed at this point so that the initial reflection is not outsourced.

The second stage is AI-assisted language review. The learner provides a short selected transcript, several key utterances, or a concise reflective note rather than an unrestricted record of the entire lesson. AI may identify possible terminological or grammatical problems, highlight repeated expressions, suggest alternative professional wording, and generate questions for closer analysis. Its output is treated as provisional feedback, not as a score or authoritative correction.

The third stage is teacher verification. The teacher checks AI suggestions against the scenario objective, professional role, stakeholder relationship, disciplinary discourse, and pragmatic appropriateness. A sentence may be grammatically correct yet unsuitable for a client meeting, public hearing, or design critique. Teacher verification therefore protects the professional authenticity of the feedback.

The fourth stage is criterion-referenced self-reflection. Learners revisit performance through four dimensions of the performance-oriented analytical rubric: Task Completion, Language Use, Communicative Effectiveness, and Debriefing Quality. AI may generate evidence-oriented prompts, but it does not assign the final rating. Questions such as 'Did you identify the client's core requirement?', 'Which technical term could be more precise?', 'How did you respond to disagreement?', and 'What will you change in the next interaction?' move reflection from general impressions to observable performance evidence.

The fifth stage is transfer-goal setting. The learner and teacher agree on one or two specific, observable targets for the next simulation. Examples include comparing three design alternatives with explicit criteria, responding to a client objection with two diplomatic strategies, or using a clear signpost before moving from presentation to questions. The transfer goal then becomes part of the next Briefing, turning BAD into a spiral learning cycle rather than a set of disconnected activities. Figure 2 summarises the five-stage sequence and its human-in-the-loop logic.

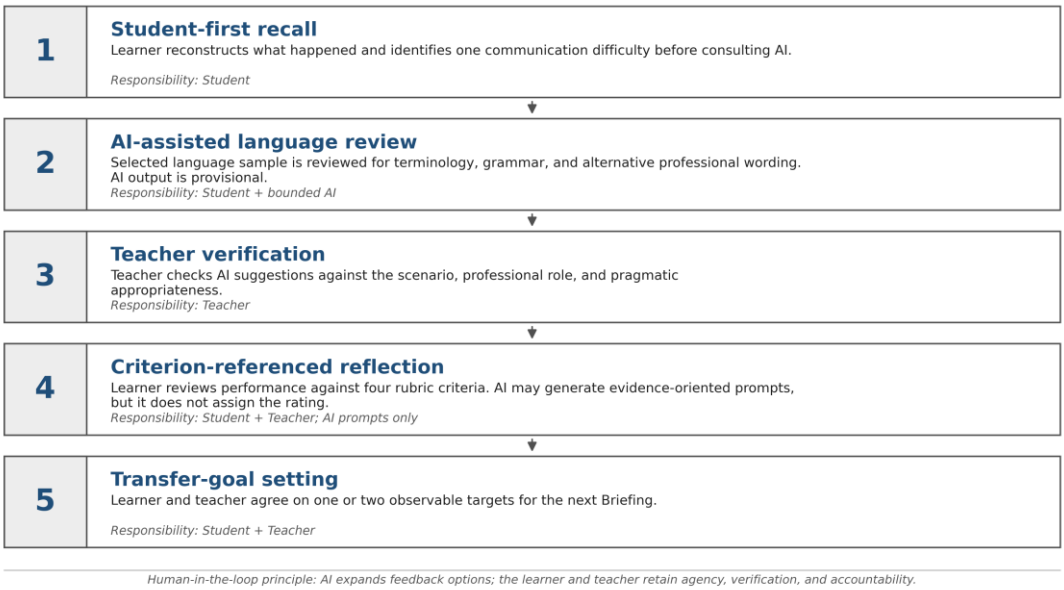


Figure 2. Five-step human-AI reflective debriefing algorithm (author-developed model).

Table 1 specifies the complementary roles of the student, AI, and teacher at each stage of the proposed debriefing model.

Table 1. Role distribution in the human-AI debriefing model

Stage	Student role	AI role	Teacher role	Expected output
1. Student-first recall	Reconstructs events and identifies a communication difficulty	Does not lead the reflection; may only provide a neutral structure prompt	Creates a psychologically safe reflection space	Initial self-reflection
2. Language review	Provides a selected speech sample or short transcript	Flags possible terminology, grammar and lexical issues; proposes alternatives	Frames AI output as provisional and verifiable	Candidate feedback
3. Professional-pragmatic verification	Compares suggestions with the scenario	Offers clarification or additional variants	Validates professional discourse, role and pragmatic fit	Human-verified feedback
4. Criterion-referenced reflection	Examines performance through four rubric criteria	Generates evidence-oriented prompts and examples	Guides interpretation using the performance-oriented analytical rubric	Specific strengths and improvement points
5. Transfer	Selects a next-task target	Suggests practice phrases or	Confirms a realistic and	Goal for the next Briefing

Stage	Student role	AI role	Teacher role	Expected output
		rehearsal options	observable development target	

5. APPLIED EXAMPLE: CLIENT-ARCHITECT NEGOTIATION

The model can be illustrated through a Client-Architect Negotiation simulation. During Action, the learner takes the role of an architect responding to a client's requirements related to budget, accessibility, functionality, and aesthetics. Immediately after the simulation, the learner writes a short independent reflection identifying which requirement was handled successfully, where interaction became difficult, and which technical terms created uncertainty.

The learner then submits only a selected language sample to the AI tool. For instance, a general utterance such as 'I think this plan is good for you' might be reformulated as 'This option better addresses your accessibility and budget requirements.' The alternative is not automatically accepted. The teacher checks whether the wording matches the client's actual priorities, whether the claim is supported by the design information available in the scenario, and whether the tone is appropriately professional.

Next, the learner reviews the interaction through the four criteria. Task Completion concerns whether the client's needs were identified and whether a workable decision emerged. Language Use focuses on terminology, grammar, pronunciation, and precision. Communicative Effectiveness concerns clarification, turn-taking, persuasion, negotiation, and response to objections. Debriefing Quality concerns the learner's ability to identify causes of difficulty, explain successful strategies, and define a realistic improvement target. The AI may help locate evidence or propose reflective prompts, but teacher judgement remains decisive.

The same logic can be adapted to project presentations, design critiques, technical meetings, and public hearings. Importantly, AI should not remain a generic grammar checker across all scenarios. Its prompt and feedback function should be aligned with the communicative purpose of each task. Presentation debriefing may emphasise signposting and Q&A management; negotiation may emphasise clarification, persuasion, and diplomatic disagreement; technical discussion may prioritise terminology and cause-effect reasoning; and reflective debriefing may foreground evidence-based self-explanation.

6. DISCUSSION

The first advantage of the proposed model is that it combines feedback speed with pedagogical control. In large classes, teachers may not be able to comment in detail on every learner's complete speaking performance. AI can support preliminary review and produce alternative formulations, while the teacher concentrates on higher-level questions of professional discourse, communicative purpose, and individual development. This division of labour is consistent with recent human-AI collaboration research that positions the teacher as a feedback mediator rather than a displaced evaluator [4, 6, 7]. The value therefore lies in functional complementarity rather than automation of judgement.

The second advantage is the shift from generic reflection to criterion-linked reflection. Debriefing can easily become a broad conversation about whether a task was enjoyable or difficult. By generating prompts from a selected speech sample and explicit criteria, AI can help the learner connect reflection to observable evidence. This criterion-referenced orientation is compatible with emerging work on human-AI collaborative competence, which emphasises not

only the use of AI but also the learner's ability to evaluate, regulate, and apply AI-supported input [8]. However, prompt design, data privacy, hallucination risk, and over-reliance remain important concerns [2, 3, 5-8]. Learners should avoid uploading unnecessary personal data or confidential project information, and AI suggestions should never be treated as automatically correct.

The third issue is academic and metacognitive responsibility. If a learner simply copies an AI-generated reflection, the primary purpose of Debriefing is lost. For that reason, the framework uses a student-first principle: the learner reflects before consulting AI, compares personal analysis with machine suggestions, and then discusses discrepancies with the teacher. AI becomes a second perspective that can deepen reflection, not the author of the reflection itself.

A further strength is compatibility with multi-rater and formative assessment. The proposed sequence can be combined with teacher assessment, peer feedback, and self-assessment because it does not create a competing fifth 'AI score'. Instead, AI remains a support layer for noticing and questioning. This distinction is particularly important for a performance-oriented analytical rubric, where criteria should describe observable speaking performance and reflection quality rather than the output of an automated system.

The principal limitation is that the framework is presently conceptual. Its effect on speaking skills, speaking anxiety, reflective quality, self-regulation, or teacher workload requires empirical testing. Future research could compare AI-supported debriefing with teacher-only debriefing, analyse the agreement between AI suggestions and teacher judgement, examine which rubric dimensions benefit most from AI-supported reflection, and investigate whether benefits differ across CEFR levels. Such studies should also report data-governance procedures and specify the exact AI function rather than treating 'AI use' as a single undifferentiated intervention.

7. CONCLUSION

The methodological value of artificial intelligence in architecture ESP simulations depends less on the mere presence of AI than on its precise position within a pedagogical cycle. The BAD model offers a clear location for such integration: reflective Debriefing. At this stage, learners revisit professional communication, analyse problems, identify effective strategies, and formulate a target for the next task.

The proposed human-AI debriefing model consists of five stages: student-first recall, AI-assisted language review, teacher verification, criterion-referenced self-reflection, and transfer-goal setting. The sequence links AI-generated options with learner agency and teacher professional judgement. AI therefore functions as a bounded pedagogical support tool that can expand feedback options and generate reflective prompts without becoming an autonomous evaluator.

For architecture ESP, this approach can support project presentations, client negotiations, technical discussions, and design critiques while preserving professional authenticity and assessment transparency. The next research step is empirical validation of the model, including teacher-AI agreement, learner uptake of feedback, changes in reflective response quality, and the relationship between AI-supported Debriefing and the four criteria of the performance-oriented analytical rubric.

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TALABALARDA EKOLOGIK MAS’ULIYATNI RIVOJLANTIRISHNING PEDAGOGIK ASOSLARI VA DOLZARB MASALALARI

Teshayeva Dilnoza Chori qizi
Buxoro davlat universiteti Pedagogika kafedrasi 1-bosqich tayanch doktoranti
https://doi.org/10.5281/zenodo.22875339

Annotatsiya. *Mazkur tezisda talabalarda ekologik mas’uliyatni rivojlantirishning pedagogik asoslari, uning mazmun-mohiyati hamda zamonaviy ta’lim jarayonidagi ahamiyati yoritilgan. Tadqiqotda ekologik ta’lim va tarbiyaning talabalarda ekologik ong, ekologik madaniyat hamda mas’uliyatli munosabatni shakllantirishdagi o‘rni tahlil qilinadi. Shuningdek, oliy ta’lim muassasalarida ekologik mas’uliyatni rivojlantirishga to‘sqinlik qilayotgan dolzarb muammolar aniqlanib, ularni bartaraf etishga qaratilgan pedagogik yondashuv va amaliy tavsiyalar ishlab chiqilgan. Tadqiqot natijalari talabalarda ekologik mas’uliyatni samarali rivojlantirishga xizmat qiluvchi ta’limiy va tarbiyaviy faoliyatni takomillashtirishga yo‘naltirilgan.*

Kalit so‘zlar: *ekologik mas'uliyat, ekologik madaniyat, barqaror rivojlanish, chiqindilarni boshqarish, ekologik ta'lim, "yashil" iqtisodiyot, institutsional islohot.*

Аннотация. В настоящих тезисах рассматриваются педагогические основы формирования экологической ответственности у студентов, раскрываются её сущность и значение в современном образовательном процессе. В исследовании анализируется роль экологического образования и воспитания в формировании экологического сознания, экологической культуры и ответственного отношения студентов к окружающей среде. Также выявлены актуальные проблемы, препятствующие развитию экологической ответственности в высших учебных заведениях, и предложены педагогические подходы и практические рекомендации по их решению. Результаты исследования направлены на совершенствование образовательной и воспитательной деятельности, способствующей эффективному формированию экологической ответственности у студентов.

Ключевые слова: *экологическая ответственность, экологическая культура, устойчивое развитие, управление отходами, экологическое образование, «зелёная» экономика, институциональная реформа.*

Abstract. This thesis examines the pedagogical foundations of developing environmental responsibility among university students, its essence, and its significance in the modern educational process. The study analyzes the role of environmental education in fostering students’ environmental awareness, ecological culture, and responsible attitudes toward the environment. It also identifies current challenges that hinder the development of environmental responsibility in higher education institutions and proposes pedagogical approaches and practical recommendations to address these issues. The findings of the study are aimed at improving educational and instructional activities that contribute to the effective development of environmental responsibility among students.

Key words: *ecological responsibility, ecological culture, sustainable development, waste management, ecological education, green economy, institutional reform.*

KIRISH

2024-yil 20-noyabrda Prezident Sh.Mirziyoyev Oliy Majlis Qonunchilik palatasi majlisidagi nutqida 2025-yilni "Atrof-muhitni asrash va 'yashil' iqtisodiyot yili" deb e'lon qildi hamda havo va suvning ifloslanishi, tuproq erroziyasi, cho‘llanish kabi muammolarning global isishga va tabiiy ofatlarning ko‘payishiga olib kelayotganini alohida ta'kidladi[10]. Bu ekologik mas'uliyat masalasining O‘zbekiston uchun ham strategik ustuvorlik kasb etganidan dalolat beradi.

So‘nggi ikki-uch yil ichida ekologiya sohasini institutsional jihatdan isloh qilish yuzasidan izchil chora-tadbirlar amalga oshirildi. Xususan, 2023-yil 31-maydagi PF-81-son Farmon bilan sobiq Tabiat resurslari vazirligi Ekologiya, atrof-muhitni muhofaza qilish va iqlim o‘zgarishi vazirligi etib qayta tashkil etildi[1], shu bilan bir qatorda Markaziy Osiyo atrof-muhit va iqlim o‘zgarishini o‘rganish universiteti ("Green University") tashkil etilishi to‘g‘risida qaror qabul qilindi[3].

Shu bilan birga, huquqiy-institutsional bazaning tez-tez o‘zgarishi (jumladan, 2025-yil noyabr oyida vazirlik negizida yangi tuzilma tashkil etilishi) hamda chiqindilarni qayta ishlash va ekologik ta'lim sohasidagi amaliy natijalarning hali ham yetarli emasligi ekologik mas'uliyatni rivojlantirish borasida bir qator dolzarb muammolarning saqlanib qolganidan dalolat beradi. Ushbu holat mazkur tezisning dolzarbligini belgilaydi.

Ekologik mas'uliyat muammosining dolzarbligi yana shu bilan izohlanadiki, u faqat huquqiy-institutsional o‘zgarishlar bilan emas, balki jamiyat a'zolarining kundalik xulq-atvori, tadbirkorlik subyektlarining ishlab chiqarish faoliyati va davlat organlarining amaliy boshqaruv uslubi bilan chambarchas bog‘liq. Boshqacha aytganda, qanchalik puxta me'yoriy-huquqiy baza yaratilmasin, agar u amaliyotda real natijaga aylanmasa (masalan, chiqindilarni qayta ishlash ko‘rsatkichlari past darajada qolaversa), ekologik mas'uliyat tushunchasi deklarativ xususiyat kasb etaveradi. Aynan shu sabab tezisning empiric, ya'ni rasmiy statistik ma'lumotlarga tayangan qismiga alohida e'tibor qaratilgan.

Tadqiqotning maqsadi: ekologik mas'uliyatni rivojlantirishning institutsional-huquqiy asoslarini tahlil qilish, ushbu jarayondagi dolzarb muammolarni aniqlash va ularni bartaraf etish bo‘yicha ilmiy asoslangan tavsiyalar ishlab chiqishdan iborat.

Ushbu maqsadga erishish uchun quyidagi vazifalar belgilandi: O‘zbekistonda ekologiya sohasidagi so‘nggi (2023-2025) huquqiy-institutsional islohotlarni tahlil qilish; chiqindilarni boshqarish sohasidagi rasmiy statistik ko‘rsatkichlarni o‘rganish; ekologik mas'uliyatni rivojlantirishdagi asosiy muammolarni tizimlashtirish; amaliy tavsiyalar shakllantirish.

ASOSIY QISM

Ekologik mas'uliyatni shaxs, jamoat va davlat organlarining tabiiy resurslardan oqilona foydalanish, atrof-muhitga zarar yetkazmaslik hamda ekologik huquqbuzarliklar oqibatlari uchun javobgarlikni his qilish darajasidagi ma'naviy-huquqiy munosabat, deb ta'riflash mumkin. Ekologik mas'uliyat tuzilishi jihatidan uch bosqichni o‘z ichiga oladi: bilim (ekologik savodxonlik), qadriyat-motivatsion bosqich (tabiatga munosabat) va amaliy-faoliyat bosqichi (real xatti-harakatlar). Ushbu bosqichlarning uzviy bog‘liqligi ta'minlanmasa, ekologik mas'uliyat deklarativ xususiyat kasb etadi.

Bu uch bosqichli tizimni sub'ektlar kesimida ham ko‘rib chiqish mumkin. Xususan, individual darajada ekologik mas'uliyat fuqarolarning kundalik xulq-atvorida (chiqindilarni saralash, suv va energiyadan tejamkorlik bilan foydalanish) namoyon bo‘ladi. Korporativ darajada u tadbirkorlik subyektlarining ishlab chiqarish jarayonida ekologik standartlarga rioya

etishi, "yashil" texnologiyalarni joriy etishi bilan bog‘liq. Institutsional darajada esa davlat organlarining me'yoriy-huquqiy bazani ishlab chiqishi va uning ijrosini nazorat qilishi orqali amalga oshadi. Mazkur tezisda, xususan, aynan institutsional darajaga — ya'ni davlat boshqaruv tizimining ekologik mas'uliyatni shakllantirishdagi o‘rniga — alohida e'tibor qaratiladi, chunki O‘zbekistonda so‘nggi yillardagi islohotlarning aksariyati aynan shu darajada amalga oshirilmoqda.

2023-yil 31-maydagi PQ-171-son Qaror bilan yangi tashkil etilgan vazirlik faoliyati tartibga solindi hamda 2023-yil 1-iyuldan boshlab "Jamoatchilik ekologiya nazoratchisi" tizimi joriy etildi[2] — bu fuqarolarning ekologik nazoratga bevosita jalb etilishining muhim instituti hisoblanadi. Biroq institutsional barqarorlik masalasi hamon dolzarb bo‘lib qolmoqda: 2025-yil 18-noyabrdagi PQ-343-son Qaror bilan Ekologiya vazirligi negizida O‘zbekiston Respublikasi Ekologiya va iqlim o‘zgarishi milliy qo‘mitasi tashkil etildi hamda 2026-yil 1-sentabrga qadar Yagona ekologik onlayn platformani ishga tushirish vazifasi belgilandi[5].

Shunday qilib, so‘nggi ikki-uch yil mobaynida ekologiya sohasini boshqaruvchi davlat organi kamida ikki marta qayta tashkil etildi (vazirlikdan milliy qo‘mitaga). Bu, bir tomondan, sohaga davlat e'tiborining kuchayganidan dalolat bersa, ikkinchi tomondan, institutsional barqarorlik va uzluksiz kadrlar salohiyatini saqlash borasida qo‘shimcha muammolar yuzaga kelishi mumkinligini ko‘rsatadi.

Institutsional o‘zgarishlarning tezligi ekologik mas'uliyatni rivojlantirish nuqtayi nazaridan ikki xil ta'sirga ega bo‘lishi mumkin. Ijobiy jihatdan, har bir qayta tashkil etish davlat organining vakolatlarini kengaytirish va yangi vazifalar (masalan, Yagona ekologik onlayn platformasi kabi raqamli mexanizmlar) bilan boyitishga xizmat qilmoqda. Salbiy jihatdan esa, tez-tez o‘zgarishlar quyi bo‘g‘in — hududiy boshqarmalar va mahalliy ijro etuvchi hokimiyat organlari — darajasida vazifalarning aniq taqsimlanishiga va ijro intizomiga salbiy ta'sir ko‘rsatishi mumkin. Shu bois institutsional islohotlarni amalga oshirishda nafaqat markaziy, balki mahalliy darajadagi ijro salohiyatini ham mustahkamlash zarur.

Ekologik ta'lim infratuzilmasini mustahkamlash borasida ham muhim qadam qo‘yildi: 2023-yil 31-maydagi PQ-174-son Qaror bilan Markaziy Osiyo atrof-muhit va iqlim o‘zgarishini o‘rganish universiteti ("Green University") tashkil etilishi belgilandi[3] va 2024-yil 12-fevral kuni Toshkent viloyatida ushbu universitetning ochilish marosimi bo‘lib o‘tdi[9]. Prezident Sh.Mirziyoyev 2024-yil 21-oktabr kuni universitetga tashrif buyurib, kelajakda barcha sohalar ekologiya bilan hamohanglikda rivojlanishini ta'kidladi[6].

O‘tkazilgan tahlil natijasida ekologik mas'uliyatni rivojlantirish jarayonidagi asosiy muammoli jihatlar quyidagi jadvalda tizimlashtirilgan (1-jadval):

1-jadval.

Ekologik mas'uliyatni rivojlantirishdagi asosiy muammolar va ularni bartaraf etish yo‘llari

Muammo	Yuzaga kelish sababi	Bartaraf etish bo‘yicha yechim
Chiqindilarni qayta ishlash darajasining pastligi	Saralash va qayta ishlash infratuzilmasining yetarli rivojlanmaganligi (yiliga 14 mln tonna chiqindidan atigi 4-5 foizi qayta ishlanadi)	Chiqindilarni boshqarish va sirkulyar iqtisodiyotni rivojlantirish agentligi orqali investitsiyalarni kengaytirish
Ekologik ta'lim va tarbiyaning uzluksizligi	Maktabgacha, umumta'lim va oliy ta'lim bosqichlari o‘rtasida yagona	Barcha ta'lim bosqichlari uchun uzluksiz ekologik ta'lim

ta'minlanmaganligi	metodik yondashuvning yo‘qligi	konsepsiyasini joriy etish (PQ-184-son Qaror asosida)
Fuqarolarning ekologik bilim va madaniyat darajasi pastligi	Ekologik ma'rifat targ‘iboti tizimli emasligi, fuqarolik jamiyati institutlari yetarli jalb etilmaganligi	"Ekolog-olimlar hamjamiyati" va talaba-ekoko‘ngillilar harakatini kengaytirish
Institutsional tuzilmaning tez-tez o‘zgarishi	2022-2025-yillarda boshqaruv organi uch marta qayta tashkil etilgan (Vazirlik → Milliy qo‘mita)	Yagona ekologik onlayn platformani barqaror rivojlantirish va institutsional barqarorlikni ta'minlash

Jadvaldan ko‘rinib turibdiki, muammolarning aksariyati amaliy infratuzilma (chiqindilarni qayta ishlash quvvatlari), ta'lim uzluksizligi va institutsional barqarorlik bilan bog‘liq. Bu esa ekologik mas'uliyatni rivojlantirish borasida tarmoqlararo yondashuvni talab etadi.

2025-yil 15-maydagi PQ-184-son Qaror bilan tasdiqlangan "2030-yilgacha bo‘lgan davrda aholining ekologik madaniyatini yuksaltirish Konsepsiyasi"ning asosiy maqsadi o‘sib kelayotgan yosh avlodda ekologik bilim, ong va madaniyatni shakllantirish hamda rivojlantirish, ushbu yo‘nalishda ta'lim-tarbiya jarayonini takomillashtirishdan iborat etib belgilangan[4]. Konsepsiyaning 2-bobida qayd etilishicha, jamiyatda, oilada, mahallada va ta'lim muassasalarida ekologik madaniyatni yuksaltirishning uzluksiz mexanizmi hali yetarli darajada takomillashtirilmagan, targ‘ibotning innovatsion usullaridan yetarlicha foydalanilmagan[4].

Konsepsiya doirasida davlat organlari rahbarlarining Oliy Majlis Qonunchilik palatasida ekologik ko‘rsatkichlar yuzasidan muntazam hisobot berishi, shuningdek talaba-ekoko‘ngillilar harakati va "Ekolog-olimlar hamjamiyati"ni tashkil etish nazarda tutilgan. Bu — ekologik mas'uliyatni nafaqat davlat, balki fuqarolik jamiyati darajasida ham institutsionallashtirishga qaratilgan muhim qadamdir.

Rasmiy ma'lumotlarga ko‘ra, O‘zbekistonda yiliga o‘rtacha 14 million tonna maishiy chiqindi hosil bo‘ladi, biroq ularning atigi 4-5 foizigina qayta ishlanadi — qolgan qismi poligonlarga jo‘natiladi[8]. Bu ko‘rsatkich chiqindilarni boshqarish sohasida ekologik mas'uliyat madaniyatining hali yetarli shakllanmaganligini ko‘rsatadi.

Muammoni bartaraf etish maqsadida davlat tomonidan jiddiy chora-tadbirlar ko‘rilmoqda: 2025-yil 14-avgust kuni Prezident chiqindilarni qayta ishlashni kengaytirish bo‘yicha taqdimot bilan tanishgan bo‘lib, so‘nggi uch yilda sohaga 2 trillion so‘mdan ziyod mablag‘ yo‘naltirilgani, Chiqindilarni boshqarish va sirkulyar iqtisodiyotni rivojlantirish agentligi tashkil etilgani hamda chiqindi korxonalari uchun 1200 ta yangi texnika berilgani ma'lum qilindi[7]. Shuningdek, chiqindidan energiya ishlab chiqaruvchi 6 ta zavod qurilishi rejalashtirilib, ularning umumiy qiymati 933 million dollarni tashkil etadi.

PQ-184-son Konsepsiyada nazarda tutilgan "Ekolog-olimlar hamjamiyati" va talaba-ekoko‘ngillilar harakati kabi institutlarning tashkil etilishi shundan dalolat beradiki, davlat ekologik mas'uliyatni endilikda faqat ma'muriy-buyruqbozlik usulida emas, balki fuqarolik jamiyati institutlari bilan hamkorlikda shakllantirishga intilmoqda. Bu yondashuv xalqaro tajribada ham keng qo‘llaniladigan "ko‘p tomonlama boshqaruv" (multi-stakeholder governance) tamoyiliga mos keladi, unga ko‘ra ekologik muammolarni faqat davlat resurslari bilan emas, balki jamiyat, ilm-fan va biznes sektorining birgalikdagi sa'y-harakatlari bilan hal etish mumkin.

Shu bilan birga, bunday institutlarning samaradorligi ko‘p jihatdan ularning moliyaviy va tashkiliy mustaqilligiga bog‘liq. Agar "Jamoatchilik ekologiya nazoratchisi" yoki "Ekolog-

olimlar hamjamiyati" kabi tuzilmalar faqat rasmiy hujjatlarda mavjud bo‘lib, amaliy vakolatlar va resurslardan mahrum qolsa, ular ekologik mas'uliyatni real oshirish o‘rniga shunchaki qo‘shimcha byurokratik qatlamga aylanib qolishi mumkin. Shu sababli, ushbu institutlarning amaliy faoliyat samaradorligini muntazam monitoring qilish va baholash mexanizmlarini joriy etish muhim ilmiy-amaliy ahamiyat kasb etadi.

Mazkur tezisning ilmiy yangiligi shundan iboratki, unda O‘zbekistonda ekologik boshqaruv tizimining 2023-2025-yillardagi institutsional evolyutsiyasi (vazirlikdan milliy qo‘mitagacha) birinchi marta yaxlit tizimda tahlil qilindi hamda ushbu tez-tez o‘zgarib turuvchi institutsional tuzilma bilan ekologik mas'uliyatning amaliy shakllanishi o‘rtasidagi bog‘liqlik aniqlandi. Bundan tashqari, rasmiy statistik ma'lumotlar (chiqindilarning atigi 4-5 foizi qayta ishlanishi) asosida ekologik ta'lim islohotlari bilan amaliy natijalar o‘rtasidagi tafovut ilmiy jihatdan asoslab berildi.

Tadqiqotning yana bir yangilik jihati shundaki, unda ekologik mas'uliyat sub'ektlar kesimida (individual, korporativ, institutsional) tahlil qilinib, aynan institutsional darajadagi barqarorlik muammosi boshqa ikki darajaga (ta'lim va fuqarolik jamiyati institutlari) ko‘rsatadigan zanjirsimon ta'siri asoslab berildi. Bu yondashuv ekologik mas'uliyatni endilikda yagona, statik hodisa sifatida emas, balki turli darajalarda o‘zaro bog‘liq holda rivojlanib boruvchi dinamik tizim sifatida ko‘rib chiqish zaruratini ilmiy jihatdan asoslaydi.

O‘tkazilgan tadqiqot natijasida quyidagi xulosalarga kelindi:

1. Ekologik mas'uliyat — bilim, qadriyat-motivatsion va amaliy-faoliyat komponentlarining uzviy birligidan iborat murakkab ijtimoiy-huquqiy kategoriya bo‘lib, uni faqat tashkiliy-institutsional o‘zgartirishlar orqali emas, balki amaliy infratuzilma va ta'lim mexanizmlari bilan uyg‘unlikda shakllantirish zarur.

2. 2023-2025-yillarda O‘zbekistonda ekologiya sohasini boshqaruvchi davlat organi kamida ikki marta qayta tashkil etildi (Tabiat resurslari vazirligi → Ekologiya vazirligi → Ekologiya va iqlim o‘zgarishi milliy qo‘mitasi), bu institutsional barqarorlikni ta'minlash zaruratini keltirib chiqaradi.

3. "2030-yilgacha bo‘lgan davrda aholining ekologik madaniyatini yuksaltirish Konsepsiyasi" (PQ-184-son) qabul qilinganiga qaramay, uning 2-bobida qayd etilganidek, jamiyatda ekologik targ‘ibotning uzluksiz va innovatsion mexanizmi hali to‘liq shakllantirilmagan.

4. Rasmiy statistik ma'lumotlarga ko‘ra, mamlakatda yiliga hosil bo‘ladigan 14 million tonna chiqindining atigi 4-5 foizigina qayta ishlanmoqda, bu ko‘rsatkich amaliy ekologik mas'uliyat darajasining institutsional islohotlardan orqada qolayotganini ko‘rsatadi.

5. So‘nggi yillarda chiqindilarni boshqarish sohasiga yo‘naltirilayotgan investitsiyalarning (2 trln so‘mdan ziyod) ortishi va ixtisoslashtirilgan agentlikning tashkil etilishi ekologik mas'uliyatni amaliy faoliyatga tatbiq etishning ijobiy tendensiyasidan dalolat beradi.

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AQLLI TURIZM (SMART TOURISM) KONSEPSIYASI: INSON-SUN'IY INTELLEKT HAMKORLIGI ORQALI HUDUDIY BARQAROR RIVOJLANISHNI TA'MINLASH

Zaripov Toxirjon Yusufboy o‘g‘li
Toshkent davlat iqtisodiyot universiteti tayanch doktaranti
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Annotatsiya. *Ushbu tezisda oliy ta'lim va turizm sohasini uyg‘unlashtiruvchi dolzarb yo‘nalish — aqlli turizm (smart tourism) konsepsiyasi hamda inson va sun'iy intellekt hamkorligi asosida hududiy barqaror rivojlanishni ta'minlash masalalari tahlil qilingan. Tadqiqotda sun'iy intellekt texnologiyalarining turizm tashkiliy-iqtisodiy mexanizmlariga ta'siri, ularning ta'lim jarayoniga integratsiyalashuvi, shuningdek O‘zbekiston Respublikasi hududlarida barqaror turizmni rivojlantirishda raqamli boshqaruv vositalaridan foydalanishning ilmiy-amaliy asoslari yoritilgan. Muallif tomonidan aqlli turizm ekotizimini shakllantirishning uch bosqichli modeli — ma'lumot yig‘ish, tahliliy qayta ishlash va qaror qabul qilishni qo‘llab-quvvatlash — taklif etilgan bo‘lib, ushbu model orqali hududiy turizm resurslaridan oqilona foydalanish, atrof-muhitga tashkiliy-iqtisodiy yuklamani kamaytirish va sayyohlar tajribasini sifat jihatidan yaxshilash imkoniyatlari asoslab berilgan.*

Kalit so‘zlar: *aqlli turizm, sun'iy intellekt, inson-SI hamkorligi, barqaror rivojlanish, tashkiliy-iqtisodiy mexanizm, raqamli transformatsiya, turizm menejmenti, hududiy rivojlanish, ta'lim va texnologiya integratsiyasi.*

KIRISH

Zamonaviy jahon iqtisodiyotida turizm sohasi nafaqat valyuta tushumlarining muhim manbai, balki hududlarning ijtimoiy-iqtisodiy rivojlanishini ta'minlovchi strategik yo‘nalishlardan biri sifatida e'tirof etilmoqda. Biroq, turizm oqimlarining beqaror o‘sishi, tabiiy va madaniy resurslarga ortiqcha antropogen yuklama, shuningdek boshqaruv qarorlarining o‘z vaqtida va asosli qabul qilinmasligi barqaror turizmni rivojlantirish yo‘lidagi asosiy to‘siqlardan hisoblanadi. Ushbu muammolarni bartaraf etishda sun'iy intellekt (SI) texnologiyalari, xususan, katta ma'lumotlarni tahlil qilish, mashinali o‘rganish va prognozlashtirish algoritmlari muhim tashkiliy-iqtisodiy vosita sifatida namoyon bo‘lmoqda.

"Oliy ta'limda inson va sun'iy intellekt hamkorligi: ta'lim kelajagi" mavzusidagi ushbu anjuman doirasida turizm sohasini raqamlashtirish va uni ta'lim tizimi bilan uzviy bog‘lash masalasi alohida ahamiyat kasb etadi, chunki kelajak turizm mutaxassislari aynan inson-SI hamkorligi tamoyillari asosida tayyorlanishi lozim. O‘zbekiston Respublikasi hududida barqaror turizmni rivojlantirishning tashkiliy-iqtisodiy mexanizmlarini takomillashtirish, shu jumladan, aqlli turizm konsepsiyasini joriy etish orqali amalga oshirilishi maqsadga muvofiqdir.

Tadqiqotning maqsadi — aqlli turizm konsepsiyasining nazariy-uslubiy asoslarini tahlil qilish, inson va sun'iy intellekt hamkorligi orqali hududiy barqaror rivojlanishni ta'minlashning tashkiliy-iqtisodiy mexanizmlarini ishlab chiqish hamda ularni O‘zbekiston sharoitida qo‘llash bo‘yicha ilmiy-amaliy tavsiyalar berishdan iborat.

ASOSIY QISM

1. Aqlli turizm konsepsiyasining nazariy asoslari

Aqlli turizm (smart tourism) tushunchasi xalqaro ilmiy adabiyotda axborot-kommunikatsiya texnologiyalari, katta ma'lumotlar (big data) va sun'iy intellekt vositalarining turizm ekotizimiga integratsiyalashuvi natijasida yuzaga kelgan yangi paradigma sifatida talqin etiladi. Aqlli turizm uch asosiy komponentdan iborat ekotizimni tashkil etadi: aqlli manzil (smart destination), aqlli tajriba (smart experience) va aqlli biznes (smart business). Ushbu komponentlar o‘zaro uzviy bog‘liq bo‘lib, ularning samarali faoliyat yuritishi hududiy turizm resurslarini boshqarishning yangi tashkiliy-iqtisodiy modellarini talab qiladi.

Sun'iy intellekt texnologiyalari turizm sohasida quyidagi yo‘nalishlarda qo‘llanilmoqda: sayyohlar oqimini prognozlash va boshqarish, individuallashtirilgan turistik xizmatlar taklif etish, narx siyosatini dinamik shakllantirish (revenue management), tabiiy va madaniy meros ob'ektlariga tushayotgan yuklamani monitoring qilish, shuningdek turizm infratuzilmasini rejalashtirishda qaror qabul qilishni qo‘llab-quvvatlash tizimlarini yaratish. Ushbu jarayonlarning barchasi inson omili — mahalliy hokimiyat organlari, turizm operatorlari, mahalliy aholi va ilmiy-ta'lim muassasalari — bilan uzviy hamkorlikda amalga oshirilgandagina kutilgan natijani beradi.

2. Inson-SI hamkorligi orqali hududiy barqaror rivojlanishni ta'minlash mexanizmlari

Barqaror turizmni rivojlantirishning tashkiliy-iqtisodiy mexanizmlarini takomillashtirishda inson va sun'iy intellekt o‘rtasidagi hamkorlikni uch bosqichli model asosida ko‘rib chiqish maqsadga muvofiq:

Birinchi bosqich — ma'lumot yig‘ish va monitoring. Ushbu bosqichda IoT-sensorlar, mobil ilovalar va geografik axborot tizimlari (GIS) yordamida sayyohlar oqimi, tabiiy resurslardan foydalanish darajasi va infratuzilma holati haqida real vaqt rejimida ma'lumotlar to‘planadi. Bunda inson vazifasi — ma'lumot yig‘ish tizimlarini to‘g‘ri loyihalashtirish va ularning ishonchliligini nazorat qilishdan iborat.

Ikkinchi bosqich — tahliliy qayta ishlash. Sun'iy intellekt algoritmlari to‘plangan ma'lumotlarni tahlil qilib, hududiy turizm yuklamasining chegaraviy ko‘rsatkichlarini (carrying capacity) aniqlaydi, mavsumiy tebranishlarni prognozlashtiradi va potensial xavf omillarini (ekologik, iqtisodiy, ijtimoiy) belgilaydi. Bu bosqichda insonning vazifasi natijalarni ekspert baholash va mahalliy kontekstga moslashtirishdan iborat bo‘ladi.

Uchinchi bosqich — qaror qabul qilishni qo‘llab-quvvatlash. SI tomonidan taklif etilgan variantlar asosida yakuniy boshqaruv qarori inson — davlat organlari, mahalliy hokimiyat va turizm sub'ektlari — tomonidan qabul qilinadi. Bu yondashuv "inson markazida" (human-in-the-loop) tamoyiliga asoslanib, sun'iy intellektni qaror qabul qiluvchi emas, balki qarorni asoslovchi vosita sifatida talqin etadi.

Ushbu model O‘zbekiston Respublikasi hududlarida, xususan, Samarqand, Buxoro, Xiva kabi tarixiy-madaniy markazlarda hamda Farg‘ona vodiysi va Zarafshon vohasi kabi tabiiy-rekreatsion zonalarda qo‘llanilishi mumkin bo‘lib, bu orqali turizm resurslaridan oqilona foydalanish, ekologik muvozanatni saqlash va mahalliy iqtisodiyotni rivojlantirish o‘rtasidagi muvozanat ta'minlanadi.

3. Oliy ta'limda inson-SI hamkorligini shakllantirishning ahamiyati

Aqlli turizm konsepsiyasini amalda samarali joriy etish, avvalambor, tegishli kadrlar salohiyatiga bog‘liq. Shu sababli oliy ta'lim tizimida turizm yo‘nalishi talabalariga sun'iy intellekt asoslari, ma'lumotlar tahlili va raqamli boshqaruv vositalarini o‘qitish dolzarb vazifaga aylanmoqda. Bunda ta'lim jarayonining o‘zi ham inson-SI hamkorligi namunasi sifatida tashkil

etilishi — ya'ni, o‘qituvchi va sun'iy intellekt tizimlarining birgalikda talabalarga individuallashtirilgan ta'lim traektoriyasini taqdim etishi — kelajak turizm mutaxassislarini tayyorlashning yangi metodologik asosini tashkil etadi.

Bundan tashqari, oliy ta'lim muassasalari va turizm sohasi o‘rtasidagi ilmiy-amaliy hamkorlikni mustahkamlash, talabalarni real loyihalar — masalan, hududiy turizm yuklamasini SI yordamida tahlil qilish loyihalari — ga jalb etish orqali nazariy bilim va amaliy ko‘nikmalar o‘rtasidagi bog‘liqlikni kuchaytirish mumkin.

4. Tashkiliy-iqtisodiy mexanizmlarni takomillashtirish yo‘nalishlari

O‘zbekiston Respublikasi hududida barqaror turizmni rivojlantirishning tashkiliy-iqtisodiy mexanizmlarini aqlli turizm konsepsiyasi asosida takomillashtirish quyidagi yo‘nalishlarni o‘z ichiga oladi: birinchidan, hududiy turizm boshqaruv organlarida raqamli monitoring va prognozlash tizimlarini joriy etish; ikkinchidan, davlat-xususiy sheriklik asosida SI platformalarini yaratishga xususiy investitsiyalarni jalb qilish; uchinchidan, turizm sub'ektlari uchun SI asosidagi qaror qabul qilish vositalaridan foydalanish bo‘yicha me'yoriy-huquqiy bazani takomillashtirish; to‘rtinchidan, oliy ta'lim muassasalarida tegishli mutaxassislar tayyorlash dasturlarini yangilash.

Ushbu yo‘nalishlarning kompleks tarzda amalga oshirilishi natijasida turizm sohasida resurslardan foydalanish samaradorligi oshadi, hududiy ekologik yuklama kamayadi va sayyohlik xizmatlari sifati xalqaro standartlar darajasiga yaqinlashadi.

5. Xorijiy tajriba va O‘zbekiston sharoitiga moslashtirish imkoniyatlari

Jahon amaliyotida aqlli turizm konsepsiyasini joriy etishning turli modellari mavjud. Xususan, Janubi-Sharqiy Osiyo davlatlarida (Singapur, Janubiy Koreya) sun'iy intellekt asosidagi "raqamli egizak" (digital twin) texnologiyalari yordamida shahar va turizm hududlarining virtual modeli yaratilib, unda turistik oqimlar, transport tizimi va infratuzilma yuklamasi oldindan simulyatsiya qilinadi. Yevropa Ittifoqi davlatlarida esa sun'iy intellekt asosidagi "aqlli manzil" platformalari orqali mahalliy hokimiyat organlari, biznes sub'ektlari va sayyohlar o‘rtasida real vaqt rejimida ma'lumot almashinuvi ta'minlanadi.

O‘zbekiston Respublikasi sharoitida ushbu tajribani moslashtirishda milliy xususiyatlarni — jumladan, tarixiy-madaniy meros ob'ektlarining zichligi, mahalliy hunarmandchilik an'analari va hududlararo infratuzilma tafovutlarini — hisobga olish zarur. Shu bois, aqlli turizm tizimlarini bosqichma-bosqich, dastlab eng yuqori turistik salohiyatga ega hududlarda (Buxoro-Samarqand-Xiva "Oltin uchburchagi", Toshkent shahri, Chorvoq va Zomin rekreatsion zonalari) sinovdan o‘tkazib, so‘ngra respublika miqyosida kengaytirish maqsadga muvofiqdir.

Bunday bosqichma-bosqich yondashuv nafaqat moliyaviy resurslarni oqilona taqsimlash, balki mahalliy kadrlarning yangi texnologiyalarga moslashish jarayonini ham izchil boshqarish imkonini beradi, bu esa o‘z navbatida oliy ta'lim muassasalarida tayyorlanayotgan mutaxassislarning amaliyotga bosqichma-bosqich jalb etilishini ta'minlaydi.

XULOSA

Xulosa qilib aytganda, aqlli turizm konsepsiyasi inson va sun'iy intellekt hamkorligining amaliy namunasi sifatida O‘zbekiston Respublikasi hududlarida barqaror turizmni rivojlantirishning tashkiliy-iqtisodiy mexanizmlarini tubdan yangilash imkonini beradi. Taklif etilgan uch bosqichli — ma'lumot yig‘ish, tahliliy qayta ishlash va qaror qabul qilishni qo‘llab-quvvatlash — model orqali sun'iy intellekt insonning o‘rnini egallamasdan, balki uning imkoniyatlarini kengaytiruvchi vosita sifatida faoliyat yuritadi. Bunday yondashuvni oliy ta'lim tizimiga integratsiyalash, kelajak turizm mutaxassislarini raqamli iqtisodiyot talablariga mos

ravishda tayyorlash imkonini beradi hamda "ta'lim kelajagi" konsepsiyasining amaliy ifodasiga aylanadi.

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SECTION 4

PROSPECTS OF ARTIFICIAL INTELLIGENCE IN SCIENCE, INNOVATION, BUSINESS, AND SOCIETY DEVELOPMENT: ETHICAL, LEGAL, AND ECONOMIC APPROACHES

* * *

4-SHO‘BA

SUN’IY INTELLEKTNING ILM-FAN, INNOVATSIYALAR, BIZNES VA JAMIYAT RIVOJLANISHIDAGI ISTIQBOLLARI: ETIK, HUQUQIY VA IQTISODIY YONDASHUVLAR

TRANSFORMATION OF CORRUPTION IN THE ERA OF DIGITAL TECHNOLOGIES (ANALYSIS OF NEW FORMS AND RISKS)

Abdumajitova Shaxrizoda Shuxrat qizi
PhD student at the University of World Economy and Diplomacy
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Abstract. *Since the beginning of the 21st century, the rapid development and widespread adoption of digital technologies have been radically transforming the system of socio-economic relations around the world. These changes create opportunities to make public administration and business processes more efficient and transparent on the one hand, while on the other hand, they also create new opportunities and risks in the field of corruption. Digital transformation processes are creating new forms and methods of corruption, while also necessitating the improvement of mechanisms to combat it. This article discusses the concept of digital transformation and corruption, corruption in the context of digital transformation and its new forms, as well as the emergence of risks and their prevention.*

Keywords: *digital transformation, digital technologies, corruption, risks, corruption crimes, new forms of corruption, conflict of interest, Big Data, artificial intelligence, money transfer, cryptocurrencies, cybercorruption, digital economy.*

Annotatsiya. *XXI asrning boshlaridan buyon raqamli texnologiyalarning jadal rivojlanishi va keng tarqalishi butun dunyoda ijtimoiy-iqtisodiy munosabatlar tizimini tubdan o‘zgartirmoqda. Ushbu o‘zgarishlar bir tomondan davlat boshqaruvi va biznes jarayonlarini yanada samarali va shaffof qilish imkoniyatlarini yaratsa, boshqa tomondan korrupsion faoliyat sohasida ham yangi imkoniyatlar va xatarlar yuzaga kelmoqda. Raqamli transformatsiya jarayonlari korrupsiyaning yangi shakl va usullarini vujudga keltirishi bilan birga, unga qarshi kurash mexanizmlarini ham mukammallashtirish zaruratini keltirib chiqarmoqda. Ushbu maqolada raqamli transformatsiya va korrupsiya tushunchasi, raqamli transformatsiya kontekstida korrupsiya hamda uning yangi shakllari, shuningdek, xatarlarining vujudga kelishi va ularni oldini olish yoritib beriladi.*

Kalit so‘zlar: *raqamli transformatsiya, raqamli texnologiyalar, korrupsiya, xavf-xatarlar, korrupsion jinoyatlar, korrupsiyaning yangi shakllari, manfaatlar to‘qnashuvi, Big Data, sun’iy intellekt, pul o‘tkazmasi, kriptovalyutalar, kiberkorrupsiya, raqamli iqtisodiyot.*

KIRISH

Korrupsiya, o‘z mohiyati jihatidan, bir nechta davlatlar hududida amalga oshiriladigan va turli milliy huquqiy tizimlarning zaifliklarini o‘zaro bog‘laydigan murakkab jinoyat faoliyati turidir. Raqamli texnologiyalarning rivojlanishi bu jarayonlarni yanada murakkablashtirgan holda, korrupsiyaning yangi – raqamli shakllari paydo bo‘lishiga olib kelmoqda. Ushbu yangi shakllar an’anaviy korrupsion sxemalardan farqli o‘laroq, virtual muhitda amalga oshiriladi va ko‘pincha ularni aniqlash hamda oldini olish ancha murakkab bo‘ladi. Hozirgi kunda raqamli transformatsiya jarayonlari davlat boshqaruvi tizimlarida keng qo‘llanilmoqda, bu esa korrupsiyaga qarshi kurashda ham yangi imkoniyatlar yaratmoqda. Raqamli transformatsiya darajasi yuqori bo‘lgan mamlakatlar korrupsiya darajasi pastroq bo‘ladi, chunki texnologiyalar

tarqalishi va raqamli transformatsiya jamoatchilik xabardorligi va ma’lumotlar darajasini oshiradi. Biroq, bir vaqtning o‘zida raqamlilashtirish salbiy ta’sirlarini o‘rganish korrupsiyaning davlatlar bo‘ylab tarqalishini ma’yub innovatsiya shaklida osonlashtirishini ko‘rsatadi. Ushbu masalaning dolzarbligi shundaki, raqamli texnologiyalar nafaqat korrupsiya bilan kurashish vositasi sifatida xizmat qiladi, balki yangi korrupsion xatarlar manbai ham hisoblanadi. Bu ikki tomonlama ta’sir korrupsiyaga qarshi kurash strategiyalarini qayta ko‘rib chiqish va raqamli muhitning o‘ziga xos xususiyatlarini hisobga olgan holda yangi yondashuvlar ishlab chiqish zaruratini keltirib chiqaradi.

ASOSIY QISM

Raqamli inqilob korrupsiya tenglamasining qoidalarini uch asosiy yo‘l bilan o‘zgartirmoqda. Birinchidan, yangi texnologiyalar shaffoflikni yaxshilash va javobgarlikni rag‘batlantirishga yordam beradi. Davlatlar o‘z ma’lumotlarini ochiq qilmoqda va fuqarolik faollari hamda nazorat institutlari ulardan foydalanib davlatni javobgarlikka tortmoqda. Ikkinchidan, raqamli texnologiyalar davlat xizmatchilar va fuqarolar o‘rtasidagi bevosita aloqani minimallashtirib, korrupsion to‘lovlar talab qilish yoki berish imkoniyatlarini kamaytirmoqda. Uchinchidan, algoritmik qarorlar qabul qilish tizimlari insoniy omilni yo‘q qilib, korrupsiya uchun imkoniyatlarni cheklaydi. Biroq, ushbu tizimlarning o‘zi ham manipulyatsiya va korrupsiya obyekti bo‘lishi mumkin.

Hozirgi kunda korrupsiyaga qarshi kurashda raqamli texnologiyalarning rolini baholashda ularning ikki tomonlama ta’sirini hisobga olish muhim ahamiyat kasb etadi. Bir tomondan bu texnologiyalar korrupsion faoliyatni yanada murakkablashtirsa, boshqa tomondan esa ularning oldini olish va aniqlash jarayonlarini ham samarali amalga oshirish imkoniyatlarini yaratadi. korrupsiyaning raqamli shakllarining vujudga kelishi zamonaviy texnologik rivojlanishning natijasidir. Ushbu yangi shakllar an’anaviy korrupsion sxemalardan tubdan farq qilib, virtual muhitning o‘ziga xos imkoniyatlaridan foydalangan holda amalga oshiriladi. Raqamli korrupsiyaning asosiy xususiyati shundaki, u geografik chegaralardan qat’i nazar, turli davlatlar va yurisdiksiyalar o‘rtasida tezkor va samarali tarzda amalga oshirilishi mumkin. korrupsiyaning eng keng tarqalgan raqamli shakllaridan biri kiber-korrupsiya hisoblanadi. Ushbu korrupsiya turi davlat xizmatchilarining o‘zlarining raqamli imtiyozlari va axborotlarga kirish huquqlarini noqonuniy moliyaviy manfaatlar uchun sotish yoki ijaraga berish jarayonlarini o‘z ichiga oladi. Masalan, davlat ma’lumotlar bazalariga kirish huquqiga ega bo‘lgan amaldorlar bu ma’lumotlarni uchinchi shaxslarga pul mukofoti evaziga taqdim etishlari mumkin. Bunday jarayonlar odatda shifrlangan aloqa kanallari orqali amalga oshiriladi va ularni aniqlash ancha murakkabdir.

Raqamli korrupsiyaning boshqa muhim shakli raqamli to‘lov tizimlari orqali korrupsion mablag‘larning legalizatsiyasidir[40]. Zamonaviy fintech kompaniyalari va kriptovalyuta birjalari korrupsion harakatlar ishtirokchilari uchun o‘zlarining noqonuniy daromadlarini qonuniy moliyaviy aktivlarga aylantirish imkoniyatlarini yaratmoqda. Bu jarayonlarda ko‘pincha bir nechta davlat hududida joylashgan turli platformalar va xizmatlardan foydalaniladi, bu esa ularni kuzatish va nazorat qilish jarayonlarini sezilarli darajada murakkablashtiradi.

Shuningdek, korrupsiyaning yangi raqamli shakli sifatida algoritmik korrupsiya paydo bo‘lmoqda. Ushbu korrupsiya turi sun’iy intellekt va algoritmlardan foydalangan holda davlat qarorlar qabul qilish jarayonlariga noqonuniy ta’sir ko‘rsatish hamda manipulyatsiya qilish

[40] Данилов С. В. Цифровая идентификация и коррупционные риски. Информационная безопасность, 2020, № 5. – С. 69.

jarayonlarini o‘z ichiga oladi. Masalan, davlat tenderlarida g‘olib aniqlash algoritmlari korrupsion maqsadlarda ma’lum kompaniyalar foydasiga o‘zgartirilishi mumkin. Bunday manipulyatsiyalarni aniqlash uchun yuqori malakali mutaxassislar va maxsus texnik vositalar zarur bo‘ladi. Virtual korrupsiya ham korrupsiyaning zamonaviy shakllaridan biridir. Bu turdagi korrupsiya virtual olamlar, onlayn o‘yinlar va boshqa raqamli platformalarda amalga oshiriladigan korrupsion faoliyatlarni o‘z ichiga oladi. Garchi bu faoliyat virtual muhitda amalga oshirilsa-da, uning real iqtisodiy oqibatlari bo‘lishi mumkin. Masalan, virtual aktivlarning real pulga aylantirilishi yoki virtual xizmatlar evaziga haqiqiy moliyaviy manfaatlar olish jarayonlari korrupsiyaning ushbu shaklini tashkil etadi. Raqamli iqtisodiyot kiber firibgarlik, xakerlik, samarasizlik va odamlarning ushbu yangi qarorni qabul qilishga nisbatan munosabati kabi AKT bilan bog‘liq xatarlardan aziyat chekadi. Bu xatarlar korrupsiyaning raqamli shakllarini yanada murakkablashtiradi va ularni bartaraf etish uchun kompleks yondashuvlar talab qiladi. Blokcheyn texnologiyasi bir vaqtning o‘zida almashinuv vositasi sifatida pul yoki ma’lumotlar almashinuvi va tranzaksiyalarni avtomatik ravishda ro‘yxatga oladigan ma’lumotlar bazasi sifatida xizmat qiladi. Biroq, bu texnologiyaning noto‘g‘ri qo‘llanilishi yoki manipulyatsiya qilinishi korrupsion faoliyat uchun yangi imkoniyatlar yaratishi mumkin. Ayniqsa, ruxsat beriladigan (permissioned) blokcheyn tarmoqlarida nazorat organlarining korrupsiyasi butun tizimni buzishi mumkin. Smart-kontraktlar asosidagi korrupsiya ham yangi raqamli shakl hisoblanadi. Smart-kontraktlarning kodlarini manipulyatsiya qilish yoki ularni loyihalash jarayonida korrupsion manfaatlarni hisobga olish korrupsiyaning murakkab shakllarini keltirib chiqaradi. Bu turdagi korrupsiyani aniqlash uchun kodni tahlil qilish va algoritmik audit jarayonlari zarurdir.

Olimlarning fikricha, raqamli transformatsiya jarayonida “raqamli korrupsiya” (digital corruption) deb ataladigan yangi fenomen paydo bo‘lmoqda. Bu korrupsiyaning an’anaviy shakllarining kiberfazoga ko‘chishi va yangi texnologik imkoniyatlardan korrupsion maqsadlarda foydalanishni o‘z ichiga oladi. Ular kiberpora (cyber-bribery), raqamli davlat xaridlarida manipulyatsiya, elektron hukumat tizimlaridagi ziddiyatli manfaatlar kabi yangi xatarlarni ta’kidlaydilar[41]. Sovacool va van Zylning yondashuvi muhim metodologik muammoni ko‘rsatadi ya’ni raqamli transformatsiya nafaqat korrupsiyaga qarshi kurashning vositasi, balki yangi korrupsion imkoniyatlar manbai ham bo‘lishi mumkin. Raqamli korrupsiya an’anaviy korrupsiyadan bir qancha jihatlari bilan farqlanadi. Birinchidan, u ko‘rinmas va aniqlash qiyin – raqamli tizimlar murakkabligi tufayli korrupsion amallar kodlar, algoritmlar va dasturiy ta’minot ichida yashirilishi mumkin. Ikkinchidan, u masofaviy amalga oshirilishi mumkin korrupsioner va pora beruvchi bir-biri bilan bevosita uchrashmaydi, bu esa jinoyatni isbotlashni qiyinlashtiradi. Uchinchidan, o‘lchamlari sezilarli darajada kattaroq bo‘lishi mumkin – raqamli tizimlar orqali millionlab dollar miqdoridagi mablag‘larni tezkor o‘tkazish mumkin. Kiberpora – bu an’anaviy poraning raqamli shakli bo‘lib, kriptovalyutalar, anonim to‘lov tizimlari va darknet orqali amalga oshirilishi mumkin. Elektron davlat xaridlari tizimlarida esa dasturiy ta’minotni manipulyatsiya qilish, tender ma’lumotlarini oldindan ko‘rish, algoritmlarni o‘zgartirish kabi yangi xavflar paydo bo‘lmoqda. Bu olimlarning qarashi shuni ko‘rsatadiki, raqamlashtirishning o‘zi avtomatik ravishda korrupsiyani kamaytirmaydi, aksincha yangi ehtiyotkorlik choralarini talab qiladi.

Korrupsiyaning raqamli shakllarini tahlil qilishda ularning o‘zaro bog‘liqligi va bir-birini to‘ldirib turishini ham hisobga olish zarurdir. Ko‘pincha bir xil korrupsion faoliyatda bir nechta

[41] Sovacool B.K., van Zyl J. Digital Corruption: Information and Communication Technologies and Political Accountability. Telecommunications Policy, 2021, Vol. 45, Issue 6. – P. 106.

raqamli shakl birgalikda qo‘llaniladi, bu esa ularni aniqlash va bartaraf etish jarayonlarini yanada murakkablashtiradi[49]. Shuning uchun ham korrupsiyaga qarshi kurashda kompleks va ko‘p sektorli yondashuv zarur bo‘lib qolmoqda. Raqamli transformatsiya jarayonlari nafaqat imkoniyatlar yaratib qolmasdan, bir qator yangi xatarlarni ham keltirib chiqarmoqda[51]. Ushbu xatarlar korrupsiyaning rivojlanishi uchun qulay muhit yaratishi bilan birga, davlat va xususiy sektor faoliyatiga ham salbiy ta’sir ko‘rsatishi mumkin[42]. Raqamli transformatsiya jarayonlarida yuzaga kelayotgan yangi xatarlarni to‘g‘ri baholash va ularni bartaraf etish yo‘llarini aniqlash zamonaviy korrupsiyaga qarshi kurashning muhim yo‘nalishi hisoblanadi. Eng muhim xatarlardan biri ma’lumotlar xavfsizligi sohasida yuzaga kelmoqda. Davlat idoralarining raqamlilashtirish jarayonida katta hajmdagi shaxsiy va maxfiy ma’lumotlar raqamli formatga o‘tkazilmoqda. Ushbu ma’lumotlarning himoyalanmagan holda saqlanishi yoki uzatilishi korrupsion harakatlar uchun qimmatli resurs bo‘lib qolishi mumkin. Ma’lumotlar buzilishi, o‘g‘irlanishi yoki noqonuniy foydalanish uchun sotilishi korrupsiyaning yangi shakllarini keltirib chiqarmoqda. Kiberxavfsizlik xatarlari ham raqamli transformatsiya jarayonlarida muhim o‘rin tutmoqda. Davlat tizimlarining kiberhujumlar oldida zaif qolishi korrupsion harakatlar uchun yangi imkoniyatlar yaratishi mumkin. Xakerlar va korrupsion amaldorlar o‘rtasidagi hamkorlik natijasida davlat resurslari va ma’lumotlari noqonuniy maqsadlarda ishlatilishi mumkin. Bunday holatlar korrupsiyaning kiberjinoyat bilan uyg‘unlashuv jarayonlarini tezlashtirmoqda. Markaziy Osiyo va Yevropa davlatlarining raqamli transformatsiya va korrupsiyaga qarshi kurash sohasidagi tajribasi muhim amaliy ahamiyatga ega. Ushbu regionlarning har xil rivojlanish darajasiga ega bo‘lgan davlatlari raqamli texnologiyalardan foydalanishda turlicha yondashuvlarni qo‘llagan holda, o‘ziga xos natijalar va tajribalarga erishganlar. Sharqiy Yevropa va Markaziy Osiyoda keng tarqalgan demokratik orqaga chekinish va sudlov tizimlarining zaiflashuvi korrupsiya nazoratini buzmoqda.

Yevropa Ittifoqi davlatlarida raqamli transformatsiya jarayonlari nisbatan ilg‘or bosqichda amalga oshirilmoqda. Yevropa tajribasidan dalillar korrupsiyaga qarshi kurash taktikasi sifatida raqamli transformatsiyaning qanday raqamli texnologiyalar korrupsiya xatarini kamaytirishi va ba’zi hollarda uni butunlay bartaraf etishini ko‘rsatdi[43]. Estoniya davlatining e-governance tizimi bu sohadagi eng muvaffaqiyatli misollardan biri hisoblanadi. Ushbu tizim davlat xizmatlarining deyarli barcha turlarini raqamli formatda taqdim etish orqali korrupsiya uchun imkoniyatlarni sezilarli darajada kamaytirdi. Estoniya tajribasining muhim xususiyati shundaki, davlat xizmatchilar bilan fuqarolarning bevosita aloqasi minimal darajaga keltirilgan. Barcha davlat xizmatlarining raqamli formatda ko‘rsatilishi korrupsion to‘lovlar talab qilish yoki berish imkoniyatlarini deyarli yo‘q qildi. Shuningdek, tizimda barcha harakatlarning raqamli izi saqlanishi nazorat va audit jarayonlarini sezilarli darajada samaraliroq qildi. Markaziy Osiyo kontekstida korrupsiya Sharqiy Yevropa va Markaziy Osiyoni qoplayotgan holda davom etmoqda, regional o‘rtacha ko‘rsatkich 2024 yilgi Korrupsiya Idroklari Indeksida 100 baldan 35 balni tashkil etib, eng past ko‘rsatkichlardan biri bo‘lib qolmoqda. Regional tajribani umumlashtirish asosida shuni ta’kidlash mumkinki, raqamli transformatsiyaning muvaffaqiyati nafaqat texnik yechimlarning sifatiga, balki ularning joriy etilishi jarayonining to‘g‘ri tashkil etilishiga ham bog‘liqdir. Ayniqsa, o‘zgarishlarni qo‘llab-quvvatlovchi huquqiy bazaning ishlab

[42] Павлов, Е. А. Международная правовая помощь: цифровые аспекты. Правовая помощь, 2021, № 3. – С. 39.
[43] Жданов А. К. Открытые данные и обеспечение прозрачности. Открытые данные, 2020, № 8 (134). – С. 91.

chiqilishi, kadrlarni tayyorlash va jamiyatning raqamli savodxonligini oshirish kabi omillar muhim ahamiyat kasb etadi. Birlashtirgan Millatlar Tashkilotining Korrupsiyaga qarshi konvensiyasi (UNCAC) raqamli korrupsiya shakllariga qarshi kurashda asosiy xalqaro huquqiy hujjat hisoblanadi. Biroq, ushbu konvensiya 2003-yilda qabul qilingan bo‘lib, zamonaviy raqamli texnologiyalarning barcha imkoniyatlari va xatarlari hisobga olinmagan[44].

XULOSA

Xulosa qilishimiz mumkinki, raqamli transformatsiya kontekstida korrupsiyaning yangi shakllari va xatarlarining vujudga kelishi zamonaviy jamiyat oldida turgan eng murakkab muammolardan biridir. Ushbu tadqiqot natijalaridan ko‘rinadiki, raqamli texnologiyalar ikki tomonlama ta’sirga ega bo‘lib, bir tomondan ular korrupsiyaga qarshi kurash uchun kuchli vositalar yaratsa, boshqa tomondan yangi korrupsion xatarlar va imkoniyatlar ham keltirib chiqaradi. korrupsiyaning raqamli shakllarining tahlili shuni ko‘rsatadiki, kiber-korrupsiya, raqamli pul, algoritmik korrupsiya va virtual korrupsiya kabi yangi turlar an’anaviy korrupsiyadan tubdan farq qiladi. Bu shakllar geografik chegaralarni osongina kesib o‘tishi, ularni aniqlash va bartaraf etish murakkabligi hamda ko‘p yurisdiksiyani qamrab olishi bilan xarakterlanadi. Markaziy Osiyo va Yevropa davlatlarining tajribasi shuni ko‘rsatadiki, raqamli transformatsiyaning muvaffaqiyati nafaqat texnik yechimlarning sifatiga, balki ularning joriy etilishi jarayonining kompleksligiga ham bog‘liqdir. Estoniya, Danimarka, Finlandiya kabi rivojlangan davlatlarning tajribasi raqamli texnologiyalarning to‘g‘ri qo‘llanilishi orqali korrupsiya darajasini sezilarli kamaytirish mumkinligini tasdiqlaydi.

Xalqaro huquq kontekstida korrupsiyaning raqamli aspektlari yangi huquqiy muammolar va vazifalarni keltirib chiqarmoqda. UNCAC kabi mavjud xalqaro hujjatlar zamonaviy raqamli xatarlarni to‘liq qamrab ololmaydi va yangilanishga muhtoj joizdir. Yurisdiksiya masalalari, raqamli dalillarning qabul qilinishi va xalqaro huquqiy yordamning raqamli aspektlari kabi masalalar xalqaro hamjamiyatning e’tiborini talab qiladi.

Kelajakda korrupsiyaga qarshi kurashda muvaffaqiyat quyidagi omillarga bog‘liq bo‘lishi mumkin:

birinchidan, raqamli texnologiyalarning imkoniyatlaridan to‘liq foydalanish;

ikkinchidan, yangi xatarlarni o‘z vaqtida aniqlash va ularga qarshi choralar ko‘rish;

uchinchidan, xalqaro hamkorlikni kuchaytirish;

to‘rtinchidan, huquqiy bazani zamonaviy talablarga moslashtirish;

beshinchidan, kadrlar malakasini oshirishdan iboratdir.

korrupsiyaning raqamli shakllariga qarshi kurash faqat texnik choralar bilan cheklanib qolmasligi kerak. Bu jarayonda davlat, xususiy sektor, fuqaro jamiyati va xalqaro tashkilotlarning keng hamkorligi zarur. Shuningdek, preventiv choralar, ta’lim va ongni oshirish tadbirlari ham muhim ahamiyat kasb etadi. Umuman olganda, raqamli transformatsiya korrupsiya bilan kurashda yangi imkoniyatlar yaratmoqda, biroq bu jarayondagi xatarlarni ham hisobga olish va ularga qarshi samarali choralar ko‘rish zarur hisoblanadi.

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THE ROLE OF ARTIFICIAL INTELLIGENCE IN IT BUSINESS DEVELOPMENT

Abdurasulova Nilufar Sobir kizi
The second-year student of Ajou University in Tashkent,
IT business faculty
https://doi.org/10.5281/zenodo.22896960

Abstract. *This article emphasizes the concepts of artificial intelligence (AI) and the IT business, and examines the role of AI in the development of the IT business, the main AI technologies, and the AI tools widely used in business. The research findings demonstrate that artificial intelligence is a key driver of innovation, supports digital transformation, and contributes to sustainable business development. Furthermore, the widespread adoption of AI technologies across various industries is expected to play an increasingly important role in enhancing business efficiency and creating new opportunities in the future.*

Keywords: *Artificial Intelligence, IT Business, Business Development, Digital Transformation, Machine Learning, Business Innovation.*

Annotatsiya. *Ushbu maqolada sun’iy intellekt (SI) va IT biznes tushunchalariga urg‘u berilib, sun’iy intelektning IT biznesni rivojlantirishdagi o‘rni, asosiy AI texnologiyalari hamda biznesda keng qo‘llanilayotgan sun’iy intellekt vositalari tahlil qilinadi. Tadqiqot natijalari shuni ko‘rsatadiki, sun’iy intellekt innovatsiyalarni jadallashtirish, raqamli transformatsiyani qo‘llab-quvvatlash va biznesning barqaror rivojlanishini ta’minlashda muhim omil hisoblanadi. Shuningdek, kelgusida ham sun’iy intellekt texnologiyalarining turli sohalarda keng qo‘llanilishi biznes samaradorligini oshirish va yangi imkoniyatlarni yaratishda muhim ahamiyat kasb etishi kutilmoqda.*

Kalit so‘zlar: *Sun’iy intellekt, IT biznes, biznesni rivojlantirish, raqamli transformatsiya, mashinali o‘rganish, innovatsiya.*

Аннотация. *В данной статье особое внимание уделяется понятиям искусственного интеллекта (ИИ) и ИТ-бизнеса. Рассматриваются роль искусственного интеллекта в развитии ИТ-бизнеса, основные технологии ИИ, а также инструменты искусственного интеллекта, широко применяемые в бизнесе. Результаты исследования показывают, что искусственный интеллект является важным фактором ускорения инноваций, поддержки цифровой трансформации и обеспечения устойчивого развития бизнеса. Кроме того, ожидается, что дальнейшее широкое внедрение технологий ИИ в различных сферах будет способствовать повышению эффективности бизнеса и созданию новых возможностей.*

Ключевые слова: *искусственный интеллект, IT-бизнес, развитие бизнеса, цифровая трансформация, машинное обучение, инновации.*

Introduction

Artificial Intelligence (AI) has become one of the most influential technologies in the digital era. Organizations across different industries use AI to improve productivity, reduce operational costs, support decision-making, and develop innovative products and services. The IT industry is one of the leading sectors adopting AI technologies because they help automate routine tasks, process large amounts of data, improve software development, and enhance customer

experience. These technologies enable organizations to improve productivity, respond more quickly to customer needs, and develop innovative products that strengthen their competitive position [3], [4]. Researchers also emphasize that AI is no longer only a technical innovation. Today, it is considered a strategic business resource that supports digital transformation, organizational development, and long-term business success [6].

The concepts of Artificial intelligence (AI) and IT business

Artificial intelligence (AI) is a multidisciplinary concept that has been defined from different perspectives by researchers in computer science, cognitive science, and information technology. However, in the business environment, AI is also considered a branch of computer science that develops intelligent systems capable of performing tasks that normally require human intelligence. These tasks include learning from experience, understanding natural language, recognizing patterns, solving problems, making decisions, and continuously improving performance based on available data. Unlike traditional computer programs, AI systems can analyze information, adapt to changing conditions, and provide effective solutions to complex problems [2]. Unlike traditional computer programs, AI systems can analyze information, adapt to changing conditions, and provide effective solutions to complex problems. These days, AI is applied in almost every industry, including healthcare, education, finance, manufacturing, transportation, and information technology. Its growing adoption demonstrates that AI has become an essential part of modern organizations seeking higher productivity, better decision-making, and sustainable growth. Based on the reviewed definitions, Artificial Intelligence can be understood as both an advanced technology and a strategic business resource. Its ability to learn from data, support decision-making, and automate complex tasks makes it valuable for modern organizations.

A clear understanding of the concept of the IT business is essential before examining the role of artificial intelligence in its development. IT business refers to companies and organizations that develop, manage, or provide information technology products and services. These businesses include software development companies, cloud service providers, cybersecurity firms, IT consulting companies, data analytics organizations, and digital platform providers. The main objective of an IT business is to use technology to create value for customers, improve business performance, and support digital transformation. Today, IT businesses operate in a highly competitive environment where innovation, speed, and service quality are essential for success. To remain competitive, many organizations invest in Artificial Intelligence to automate business processes, improve software development, analyze customer data, and enhance decision-making. As a result, AI has become an important technology that supports both operational efficiency and long-term business growth [3], [5]. This shows that the success of modern IT businesses depends not only on technological innovation but also on the effective use of intelligent solutions that improve business performance.

The Role of Artificial Intelligence in IT Business Development.

The rapid growth of digital technologies has significantly increased the importance of Artificial Intelligence in the IT industry. Today, AI is no longer used only to automate simple tasks. It has become an important business tool that helps organizations improve efficiency, develop innovative products, and create competitive advantages. One of the greatest strengths of AI is its ability to process large amounts of data in a short time. This enables companies to identify patterns, understand customer needs, predict future market trends, and make faster

business decisions. Instead of spending time on repetitive manual work, employees can focus on creativity, problem-solving, and strategic planning.

AI also improves *software development*. Developers use intelligent tools to generate program code, identify software errors, test applications, and prepare technical documentation. As a result, software can be developed more quickly while maintaining high quality. *Customer service* is another area where AI has become highly valuable. AI-powered chatbots and virtual assistants provide instant responses, answer frequently asked questions, and support customers at any time of the day. This improves customer satisfaction while reducing the workload of support teams. In addition, AI supports *business management* by improving marketing, finance, cybersecurity, human resource management, and business analytics. According to recent business studies, organizations that successfully integrate AI into their operations often achieve higher productivity, better decision-making, and stronger competitiveness in the digital market [3], [4], [5]. Overall, the reviewed studies indicate that AI is becoming an essential part of IT business strategy because it improves operational efficiency, supports innovation, and helps organizations remain competitive.

In the area of business operations, many practical AI tools have been introduced to support organizations in improving their daily operational activities. Aziz Marvin [1], considers some AI tools for instance, *Lindy, Microsoft Copilot, ThoughtSpot, Zapier, Workstatus, Spinach, Clay, Tidio, DataRobot* as the best AI tools for business operations. He claims that these tools simplify business operations, increase productivity, and support digital transformation.

Conclusion

Artificial Intelligence has become a key driver of innovation and business development in the IT industry. It enables organizations to automate routine tasks, analyze large volumes of data, improve software development, and enhance customer experience. As a result, businesses can increase productivity, reduce operational costs, and make better strategic decisions. At the same time, AI business tools such as Microsoft Copilot, Lindy, Zapier AI, ThoughtSpot, and DataRobot help companies improve workflow efficiency and support digital transformation. Although AI offers many advantages, organizations should also focus on responsible implementation, data security, employee training, and ethical use of AI technologies. When combined with human expertise, Artificial Intelligence can become a powerful tool for sustainable business growth and long-term competitiveness.

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IJODIY FAOLIYATNING IJTIMOIY PSIXOLOGIK ASOSLAR

Botirov Zoir Nuriddin o‘g‘li
Termiz davlat universiteti o‘qituvchisi.
ORCID: 0009-0006-8632-3338
https://doi.org/10.5281/zenodo.22870725

Annotatsiya. *Ushbu maqolada o`smirlardagi ijodkorlik qobiliyatini o‘rganish va uning individual xususiyatlarini ochish va ijodkorlikni o`smir shaxslarida shakllantirish, ijodkorlikni rivojlantiruvchi strategiyalar, ijodkorlikning ijtimoiy-psixologik asoslari haqida so`z boradi.*
Kalit so‘zlar: *Ijodkorlik, intellektual taraqqiyot, neyropsikologik baholash, kognitiv, iste’dod, motivatsiya.*

Ijodkorlikning ijtimoiy psixologik asoslari ijodkorlikning rivojlanishi va namoyon bo‘lishiga ta’sir etuvchi turli-tuman omillarni o‘z ichiga oladi. Bu omillarni umumiy ma’noda individual xususiyatlar, ijtimoiy ta’sirlar va atrof-muhit sharoitlariga ajratish mumkin. Ijodkorlik turli yo‘llar ijtimoiy sharoit bilan chuqur bog‘langan:

1. Ijodkorlikka ijtimoiy ta’sirlar:

-Madaniy qadriyatlar va me'yorlar: Ijtimoiy qadriyatlar va umidlar ijodkorlik qanday qabul qilinishi va qadrlanishini shakllantirishi mumkin. Muvofiqlik va an'anaga urg‘u beradigan madaniyatlarda ijodiy ifoda to‘sqinlik qilishi mumkin, innovatsiya va tavakkalchilikni qabul qiladigan madaniyatlar esa ijodkorlikni rivojlantirishi mumkin.

-Turli nuqtai nazarlarga ta'sir qilish: Turli madaniyatlar, qarashlar va tajribalar bilan tanishish insonning dunyoqarashini kengaytirishi va ijodiy fikrlashni rag‘batlantirishi mumkin. Madaniyatlararo o‘zaro ta'sirlar va turli xil san'at shakllariga ta'sir qilish yangi g‘oyalar va yondashuvlarni keltirib chiqarishi mumkin.

2. Ijodkorlikning ijtimoiy ta'siri:

-Ijtimoiy o‘zgarishlar va innovatsiyalar: Ijodkorlik me'yorlarga qarshi chiqish, yangi yechimlarni taklif qilish va boshqalarni ilhomlantirish orqali ijtimoiy taraqqiyot va innovatsiyalarni rivojlantirishi mumkin. Ijodkor shaxslar ijtimoiy o‘zgarishlarning katalizatori bo‘lib, yangi texnologiyalar, badiiy ifodalar va ijtimoiy tuzilmalarni rivojlantirishga hissa qo‘shishi mumkin.

-Ijtimoiy uyg‘unlik va o‘ziga xoslik: Ijodiy ifoda umumiy tajribalarni taqdim etish, tushunishni rag‘batlantirish va madaniy xilma-xillikni nishonlash orqali ijtimoiy hamjihatlikni qo‘llab-quvvatlashi va jamoaviy aloqalarni mustahkamlashi mumkin. Badiiy an'analar, festivallar va jamoat san'ati loyihalari odamlarni birlashtirishi va daxldorlik tuyg‘usini kuchaytirishi mumkin.

-Ijtimoiy muammolarni hal qilish va nizolarni hal qilish: Ijodkorlik ijtimoiy muammolarni hal qilish, samarali yechimlarni ishlab chiqish va nizolarni hal qilishga yordam berish uchun qo‘llanilishi mumkin. Ta’lim, sog‘liqni saqlash, ekologik barqarorlik kabi ijtimoiy masalalarga ijodiy yondashish ijobiy ijtimoiy o‘zgarishlarga olib kelishi mumkin.

3. Ijtimoiy sharoitlar va ijodiy ifoda:

-Iqtisodiy sharoitlar: resurslar, ta'lim va imkoniyatlardan foydalanish ijodiy ifodaga sezilarli ta'sir ko‘rsatishi mumkin. Iqtisodiy nomutanosibliklar ijodiy vositalar, treninglar va

platformalardan foydalanish imkoniyatini cheklab, ijodiy salohiyatni rivojlantirishga to‘sqinlik qilishi mumkin.

-Siyosiy erkinlik va so‘z erkinligi: so‘z, fikr bildirish va yig‘ilish erkinligi ijodkorlikni rivojlantirish uchun zarur. O‘zgacha fikrni bostiradigan va ijodiy ifodani cheklaydigan siyosiy muhit innovatsiyalar va madaniy taraqqiyotni bo‘g‘ib qo‘yishi mumkin.

-Texnologik yutuqlar: Texnologik yutuqlar ijodiy ifoda uchun yangi vositalar va platformalarni taqdim etishi, ijodiy imkoniyatlarni kengaytirish va ijodiy ishlarni yanada kengroq tarqatish imkonini beradi. Biroq, texnologiya chalg‘itadigan narsalarni yaratishi, shaxsiy o‘zaro ta'sirlarni cheklashi va ijodiy natijalarni potentsial ravishda bir hillashtirishi mumkin.

Demak, ijodkorlik va ijtimoiy sharoit o‘rtasidagi bog‘liqlik murakkab va ko‘p qirrali. Ijodkorlikka ijtimoiy omillar ta'sir qiladi va u o‘z navbatida jamiyatga ta'sir qiladi. Ushbu aloqalarni tushunish shaxslarda ijodkorlikni rivojlantirish, ijtimoiy taraqqiyotga ko‘maklashish va yanada ijodiy va innovatsion jamiyat qurish uchun juda muhimdir.

Ijodkorlik va ijtimoiylikning o‘zaro ta'siri haqida ba'zi ilmiy nazariyalar mavjud:

-Ijtimoiy konstruktiv qarash: Bu qarash ijodiy g‘oyalarni shakllantirishda ijtimoiy o‘zaro ta'sir va hamkorlikning rolini ta'kidlaydi. Bu ijodkorlik shunchaki individual hodisa emas, balki ijtimoiy jarayonlar mahsuli ekanligini ko‘rsatadi, bunda odamlar o‘zaro fikr almashadilar, bir-birlarining hissalariga asoslanadilar va jamoaviy nutq orqali tushunchalarni aniqlaydilar.

-Ijtimoiy kognitiv ko‘rinish: Ushbu qarash ijtimoiy omillarning ijodkorlikka hissa qo‘shadigan kognitiv jarayonlarga qanday ta'sir qilishiga qaratilgan. Ijtimoiy o‘zaro ta'sirlar odamlarga yangi ma'lumotlar, turli nuqtai nazarlar va muammolarni hal qilish va g‘oyalarni yaratishga yordam beradigan kognitiv vositalarga kirishni ta'minlash orqali ijodkorlikni oshirishi mumkinligini ko‘rsatadi.

-Ijtimoiy identifikatsiya ko‘rinishi: Ushbu qarash ijtimoiy o‘ziga xoslik va mansublikning ijodiy ifodani rag‘batlantirishdagi rolini ta'kidlaydi. Bu shuni ko‘rsatadiki, odamlar ijodkorlikni qadrlaydigan va rag‘batlantiradigan qo‘llab-quvvatlovchi hamjamiyat bilan bog‘langanligini his qilsalar, ijodiy urinishlar bilan shug‘ullanish ehtimoli ko‘proq.

-Ijtimoiy-ekologik ko‘rinish: Bu qarash ijodiy rivojlanishni shakllantirishda individual, ijtimoiy va atrof-muhit omillarining o‘zaro ta'siriga urg‘u beradi. Bu shuni ko‘rsatadiki, ijodkorlik alohida shaxslar yoki ijtimoiy guruhlar bilan chegaralanib qolmaydi, balki individlar, ularning ijtimoiy muhiti va kengroq madaniy va ekologik kontekst o‘rtasidagi dinamik o‘zaro ta'sir natijasida paydo bo‘ladi.[45]

Bu nazariyalar ijodkorlik va ijtimoiylik o‘rtasidagi murakkab o‘zaro ta’sir haqida qimmatli tushunchalar beradi. Ular ijodiy rivojlanish va ifodani shakllantirishda ijtimoiy o‘zaro ta'sirlar, hamkorlik va madaniy kontekstlarning ahamiyatini ta'kidlaydi. Ushbu aloqalarni tushunish shaxslarda ijodkorlikni rivojlantirish va yanada ijodiy va innovatsion jamiyatni rivojlantirish uchun juda muhimdir.

Ijodkorlikda ijtimoiy psixologik omillar katta rol o‘ynaydi. Bu omillar shaxsning ijodiy salohiyatiga, motivatsiyasiga va o‘z ijodini namoyon etish qobiliyatiga ta’sir ko‘rsatishi mumkin. O‘smirlik yillari ijodkorlikni rivojlantirish uchun hal qiluvchi. davrdir Bu davrda o‘smirlar o‘z shaxsini anglash tuyg‘usini rivojlantirmoqda va tobora mustaqil bo‘lib bormoqda. Shuningdek, ular yangi munosabatlar o‘rnatadilar va yangi qiziqishlarni o‘rganadilar. Bu tajribalarning

[45] Małgorzata Wolska-Długosz, Stimulating the development of creativity and passion in children and teenagers in family and school environment–inhibitors and opportunities to overcome them, Procedia-Social and Behavioral Sciences 174, 2905-2911, 2015

barchasi ijodkorlikni rivojlantirishga yordam berishi mumkin. Ijodkorlik - bu har kim tomonidan rivojlantirilishi mumkin bo‘lgan kuchli mahorat. Ijodkorlikni rivojlantirish orqali biz o‘zimizga, jamoalarimizga va dunyoga ijobiy ta'sir ko‘rsatishimiz mumkin. Bu yangi g‘oyalarni yaratish va muammolarni innovatsion usullar bilan hal qilish qobiliyatidir. Iqtisodiy o‘sishni, ijtimoiy taraqqiyotni va madaniy boylikni ta’minlash uchun ijodkorlik zarur. Ijodkorlik zarur ko‘nikma ekanligining ba'zi sabablari:

-Ijodkorlik innovatsiyalarga turtki beradi. Ijod - bu yangi g‘oyalar va yechimlarni yoqadigan uchqun. Bu iqtisodiy o‘sish va taraqqiyot uchun zarur bo‘lgan innovatsiyalarning asosidir.

-Ijod muammolarni hal qiladi. Ijodkorlikdan kundalik muammolardan tortib murakkab global muammolargacha bo‘lgan barcha turdagi muammolarni hal qilish uchun foydalanish mumkin.

-Ijodkorlik hamkorlikni rivojlantiradi. Ijodkor odamlar ko‘pincha boshqalar sog‘inadigan yangi aloqalar va imkoniyatlarni ko‘rishlari mumkin. Bu ijodiy fikrlash qobiliyati hamkorlik va jamoaviy ishlashni rivojlantirishga yordam beradi.

-Ijodkorlik farovonlikni oshiradi. Ijodkorlik katta quvonch va mamnuniyat manbayi bo‘lishi mumkin. Bu bizga o‘zimizni ifoda etishimizga, boshqalar bilan bog‘lanishimizga va dunyoga ijobiy ta'sir ko‘rsatishimizga yordam beradi.

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KUTUBXONA MUTAXASSISLARI UCHUN SUN’IY INTELLEKT SAVODXONLIGI: XORIJIY YONDASHUVLARNING QIYOSIY TAHLILI

Ganiyeva Barno Ilhomovna[1], Rasuleva Dilafruz Erkin qizi[2]
[1]p.f.n. Professor, Toshkent axborot texnologiyalari universiteti
barnoxon1305@gmail.com
[2]Toshkent axborot texnologiyalari universiteti doktoranti
redder199726.e@gmail.com
https://doi.org/10.5281/zenodo.22875553

Annotatsiya. *Sun’iy intellekt (SI) texnologiyalari kutubxona-axborot xizmatlarini tubdan o‘zgartirmoqda, bu esa kutubxona mutaxassislaridan yangi turdagi — sun’iy intellekt savodxonligi kompetensiyalarini talab qilmoqda. Ushbu maqolada kutubxona sohasidagi SI savodxonligi bo‘yicha xalqaro tajriba — jumladan, Long va Magerko (2020), YuNESKO (2022), ACRL/ALA (2025), DigComp 2.2 (2022) hamda IFLA (2023) tomonidan ishlab chiqilgan yondashuvlar tahlil qilinadi. Shuningdek, MDH mamlakatlaridagi (Rossiya, Ukraina, Qozog‘iston) amaliyot ko‘rib chiqiladi. Tahlil natijasida xalqaro tajribaning umumiy tendensiyalari, kuchli va zaif tomonlari aniqlanadi hamda ularni O‘zbekiston kutubxona tizimiga tatbiq etish imkoniyatlari muhokama qilinadi.*

Kalit so‘zlar: *sun’iy intellekt savodxonligi, kutubxona mutaxassislari, kompetensiya modeli, xalqaro tajriba, raqamli savodxonlik.*

Abstract. *Artificial intelligence (AI) technologies are fundamentally transforming library and information services, requiring library professionals to develop a new type of competency — AI literacy. This paper analyzes international experience in AI literacy for library professionals, including the approaches developed by Long and Magerko (2020), UNESCO (2022), ACRL/ALA (2025), DigComp 2.2 (2022), and IFLA (2023). Practices in CIS countries (Russia, Ukraine, Kazakhstan) are also examined. The comparative analysis identifies common trends as well as the strengths and limitations of these international approaches, and discusses the possibilities of applying them within the library system of Uzbekistan.*

Keywords: *artificial intelligence literacy, library professionals, competency framework, international experience, digital literacy.*

1. Kirish

So‘nggi yillarda sun’iy intellekt texnologiyalari — avtomatik kataloglashtirish tizimlaridan tortib, generativ SI yordamchilarigacha — dunyo kutubxonalarining kundalik amaliyotiga chuqur kirib bormoqda. Bu jarayon kutubxona xodimlaridan nafaqat yangi vositalardan foydalana olishni, balki SI tomonidan yaratilgan ma’lumotni tanqidiy baholash, axloqiy me’yorlarga rioya qilish va foydalanuvchilarni SI bo‘yicha xabardor qilish kabi kengroq kompetensiyalarni talab qilmoqda.

Xalqaro kasbiy tashkilotlar — Amerika Kutubxonalar Assotsiatsiyasi (ALA), Kutubxona Assotsiatsiyalari va Muassasalari Xalqaro Federatsiyasi (IFLA) hamda YuNESKO — so‘nggi uch-to‘rt yil ichida SI savodxonligiga bag‘ishlangan bir qator qo‘llanma va freymvorklarni ishlab chiqdilar. Ushbu tashkilotlarning tajribasini o‘rganish O‘zbekiston kutubxona tizimida SI

savodxonligini rivojlantirish bo‘yicha ilmiy asoslangan yondashuv shakllantirish uchun muhim ahamiyat kasb etadi.

Ushbu maqolaning maqsadi — kutubxona mutaxassislari uchun SI savodxonligi sohasidagi eng dolzarb xalqaro tajribani tizimli tarzda o‘rganish, ularning yondashuvlarini qiyosiy tahlil qilish va olingan xulosalarning O‘zbekiston sharoitida qo‘llanilish imkoniyatlarini belgilashdan iborat.

2. Tadqiqot metodologiyasi

Tadqiqot uchun manbalar quyidagi mezonlar asosida tanlab olindi: (1) nashr sanasi — 2020–2025 yillar oralig‘i, ya’ni SI savodxonligi tushunchasi ilmiy muomalaga faol kiritilgan davr; (2) manbaning kutubxona-axborot sohasiga bevosita yoki bilvosita aloqadorligi; (3) manbaning kasbiy yoki ilmiy jamoatchilik tomonidan keng tan olinganligi (iqtiboslar soni, rasmiy tashkilot tomonidan e’lon qilinganlik). Ushbu mezonlarga ko‘ra beshta asosiy xalqaro freymvork — Long va Magerko (2020), YuNESKO AI Competency Framework for Educators (2022), ACRL/ALA AI Competencies for Academic Library Workers (2025), Yevropa Ittifoqining DigComp 2.2 (2022) va IFLA’ning SI bo‘yicha ko‘rsatmalari (2023) —tahlil uchun tanlab olindi. Bundan tashqari, MDH dagi (Rossiya, Ukraina, Qozog‘iston) amaliyotni aks ettiruvchi manbalar ham ko‘rib chiqildi. Tahlil taqqoslama (komparativ) usul asosida — har bir manbaning maqsadli auditoriyasi, tarkibiy komponentlari, daraja tizimi va kutubxona sohasiga tatbiqiyligi bo‘yicha olib borildi.

3. SI savodxonligi tushunchasining shakllanishi

SI savodxonligi nisbatan yangi ilmiy tushuncha bo‘lib, u 2018–2020-yillarda SI texnologiyalarining ommaga keng tarqalishi bilan alohida tadqiqot yo‘nalishi sifatida shakllana boshladi. Adabiyotlarda eng ko‘p iqtibos keltiriladigan ta’rif Long va Magerko (2020) tomonidan taklif qilingan bo‘lib, unda SI savodxonligi shaxsning SI texnologiyalarini tanqidiy baholash, SI bilan samarali muloqot va hamkorlik qilish hamda SI’dan ish joyida, uyda va onlaynda vosita sifatida foydalanish qobiliyatlarini o‘z ichiga olgan kompetensiyalar majmui sifatida talqin etiladi [1]. Ushbu freymvork 17 ta aniq kompetensiyani beshta asosiy yo‘nalish — SI nima ekanligi, SI nimalarga qodir, SI qanday ishlaydi, SI qanday qo‘llanilishi kerak va SI jamiyat hamda shaxsga qanday ta’sir ko‘rsatishi atrofida tizimlashtiradi [1]. Ushbu freymvorkning afzalligi uning nazariy chuqurligi va jamiyat darajasidagi ta’sirni ham qamrab olishida, biroq kamchiligi — kasb-hunarga xos, xususan kutubxona sohasiga tegishli qo‘llanmalarning yo‘qligidadir.

4. Xalqaro tashkilotlarning yondashuvlari

4.1. YuNESKO: pog‘onali rivojlanish modeli

YuNESKO‘ning “O‘qituvchilar uchun SI kompetensiya freymvorki” [2] uch bosqichli — tushunish, qo‘llash va loyihalashtirish — yondashuvni taklif etadi. Bu model asosiy tushunchaviy bilimdan tortib SI’ga asoslangan ta’lim muhitini mustaqil loyihalay olishgacha bo‘lgan bosqichma-bosqich rivojlanishni aks ettiradi. Ushbu yondashuvning kuchli tomoni uning aniq va o‘lchanadigan progressiya tizimida, biroq loyihalashtirish darajasidagi kompetensiyalar resurs cheklangan sharoitlardagi ko‘pchilik kutubxona xodimlari uchun real emas.

4.2. ACRL/ALA: kutubxona sohasiga eng yaqin freymvork

Amerika Kollej va Ilmiy Kutubxonalar Assotsiatsiyasi (ACRL/ALA) 2025-yilda e’lon qilgan “Akademik kutubxona xodimlari uchun SI kompetensiyalari” hujjati [5] kutubxona mutaxassislariga eng bevosita tegishli xalqaro manba hisoblanadi. U kompetensiyalarni uch toifaga — kognitiv (tushunish), xulq-atvor (qo‘llash va yaratish) va normativ (axloqiy

foydalanish) — ajratadi. Ushbu freymvorkning muhim xususiyati — kutubxonachilarning ikkiyoqlama roli, ya’ni ular ham SI foydalanuvchisi, ham SI savodxonligi bo‘yicha ta’lim beruvchi ekanligini alohida ta’kidlashidadir. Shu bilan birga, ushbu ikkiyoqlama rol umumiy tarzda tilga olinsa-da, uni alohida o‘lchanadigan kompetensiya sifatida — aniq indikatorlar va daraja tizimi bilan — ishlab chiqmagan, bu esa amaliy qo‘llash uchun ma’lum cheklovlar yaratadi.

4.3. DigComp 2.2: raqamli kompetensiyalar tizimidagi SI

Yevropa Ittifoqining Raqamli Kompetensiya Freymvorki (DigComp 2.2, 2022) [3] SI savodxonligini kengroq raqamli kompetensiya tizimi — axborot va ma’lumot savodxonligi, muloqot va hamkorlik, raqamli kontent yaratish, xavfsizlik va muammolarni hal qilish kabi beshta yo‘nalish doirasida ko‘rib chiqadi, SI’ga oid elementlar esa ushbu yo‘nalishlarga singdirilgan tarzda taqdim etiladi. Ushbu freymvorkning kuchli tomoni — amaliy raqamli ko‘nikmalarni tizimli va batafsil qamrab olishida, biroq unda kutubxona xodimlariga xos kommunikativ-pedagogik jihat (ya’ni foydalanuvchilarga SI’ni tushuntirish mahorati) alohida ajratilmagan.

4.4. IFLA: institutsional va jamiyat darajasidagi yondashuv

IFLA’ning Sun’iy Intellekt bo‘yicha Maxsus Qiziqish Guruhi [6] 2022-yildan buyon bir qator hisobot va ko‘rsatmalar tayyorlagan bo‘lib, ular kutubxonalarning javobgar SI foydalanishini targ‘ib qiluvchi muassasa sifatidagi roliga va kutubxona xodimlarining foydalanuvchilarni to‘g‘ri yo‘naltirish uchun SI savodxonligini rivojlantirish zaruratiga urg‘u beradi. Biroq ushbu hujjatlar asosan institutsional darajada bo‘lib, individual xodim uchun batafsil kompetensiya spetsifikatsiyalarini taqdim etmaydi.

5. Kutubxona-axborot sohasidagi ilmiy tadqiqotlar tajribasi

SI savodxonligi tushunchasining kutubxona-axborot sohasiga tatbiq etilishi 2023-yildan boshlab jadal sur’atlar bilan rivojlanmoqda. Kox [4] SI’ning akademik kutubxona faoliyatiga ta’sirini va bundan kelib chiqadigan kompetensiya talablarini o‘rgangan bo‘lib, SI kutubxona sohasiga yangi imkoniyatlar bilan bir qatorda yangi kasbiy mas’uliyatlarni ham olib kirishini ta’kidlaydi. Xossein va hammualliflar [7] Bangladesh, Hindiston va Pokistondagi kutubxonashunoslik talabalari orasida SI savodxonligini o‘rganib, hatto istiqbolli mutaxassislar orasida ham amaliy kompetensiyalarda sezilarli bo‘shliqlar mavjudligini aniqladilar. Lo [8] kutubxona mutaxassislari uchun texnik bilim, axloqiy xabardorlik, tanqidiy fikrlash, amaliy ko‘nikmalar va ijtimoiy ta’sirni qamrab oluvchi besh komponentli freymvorkni taklif etdi.

Ali va Richardson [9] tomonidan o‘tkazilgan sistematik sharh (scoping review) shuni ko‘rsatdiki, kasbiy tashkilotlar ko‘plab qo‘llanma va me’yoriy hujjatlar ishlab chiqqan bo‘lsa-da, xodimlarning haqiqiy kompetensiya darajasini o‘lchovchi empirik ma’lumotlar, xususan G‘arb bo‘lmagan kontekstlarda, hamon yetarli emas. Ushbu xulosa Markaziy Osiyo mintaqasi uchun alohida dolzarb ahamiyatga ega, chunki bu yerda o‘xshash empirik tadqiqotlar hozircha o‘tkazilmagan.

6. MDH mamlakatlaridagi tajriba

MDH mamlakatlarida kutubxona mutaxassislari uchun SI savodxonligi bo‘yicha tadqiqotlar juda kam sonli. Rossiyada Fyodorov [10] “Kutubxonachining SI savodxonligi: sun’iy intellektdan qo‘rqishni qanday to‘xtatish va undan foydalanishni qanday boshlash kerak” nomli amaliy qo‘llanmasini nashr etdi, biroq bu ilmiy-empirik tadqiqot emas, balki amaliyotchilar uchun mo‘ljallangan qo‘llanma hisoblanadi. 2024–2025-yillarda Rossiyada o‘tkazilgan bir qator kasbiy konferensiyalarda kutubxona jarayonlarida SI’dan foydalanish va xodimlarni o‘qitish

ehtiyojlariga bag‘ishlangan sessiyalar tashkil etilgan bo‘lib, bu mavzuga bo‘lgan qiziqishning ortib borayotganidan dalolat beradi, biroq hali tizimli tadqiqotlar darajasiga yetmagan.

Ukrainada 2024-yilda akademik kutubxonalarda SI’dan foydalanishning xorijiy va milliy tajribasini o‘rgangan konferensiya maqolasi e’lon qilingan [11], biroq unda ham SI savodxonligi freymvorklari yoki kompetensiya modellari masalasi ko‘rib chiqilmagan. Qozog‘istonning “AI Sana” dasturi (2024) va YuNESKO-ICHEI mintaqaviy raqamli transformatsiya tashabbuslari [12] SI savodxonligini oliy ta’lim sohasida keng ko‘lamda qamrab olsa-da, ular maxsus kutubxona mutaxassislariga qaratilmagan. O‘zbekistonda esa hozirgacha kutubxona xodimlari uchun SI savodxonligi freymvorki yoki o‘quv modeliga bag‘ishlangan biror ilmiy nashr mavjud emas — bu esa ushbu tadqiqotning asosiy dolzarblik omilini tashkil etadi.

7. Xalqaro freymvorklarning qiyosiy tahlili

Yuqorida ko‘rib chiqilgan beshta xalqaro freymvorkni to‘rtta asosiy kompetensiya yo‘nalishi — kognitiv, texnik-amaliy, tanqidiy-baholash va axloqiy-qadriyat — bo‘yicha qiyoslash 1-jadvalda keltirilgan.

1-jadval.

Freymvork	Kognitiv	Texnik-amaliy	Tanqidiy-baholash	Axloqiy-qadriyat
Long va Magerko (2020)	✓	✓	✓	✓
YuNESKO (2022)	✓	✓	–	✓
ACRL/ALA (2025)	✓	✓	✓	✓
DigComp 2.2 (2022)	✓	✓	✓	✓
IFLA (2023)	✓	–	✓	✓

Jadvaldan ko‘rinib turibdiki, barcha tahlil qilingan freymvorklar axloqiy-qadriyat yo‘nalishini o‘z ichiga oladi, bu SI savodxonligi sohasida axloqiy jihatlarning umumjahon miqyosida muhim deb tan olinganligini ko‘rsatadi. Shu bilan birga, tanqidiy-baholash komponenti YuNESKO freymvorkida, texnik-amaliy komponent esa IFLA hujjatlarida yetarlicha ifodalanmagan. Bundan tashqari, tahlil qilingan hech bir freymvorkda kutubxona xodimining ikkiyoqlama roli — ya’ni SI’dan shaxsan foydalanuvchi va shu bilan birga foydalanuvchilarga SI’ni tushuntiruvchi vositachi sifatidagi vazifasi — alohida, mustaqil komponent sifatida ajratilmagan. Bu holat, ehtimol, ko‘rib chiqilgan freymvorklarning aksariyati shaxsiy rivojlanishga, kutubxona xodimining pedagogik-vositachilik vazifasiga emas, balki asosan individual foydalanuvchiga yo‘naltirilganligi bilan izohlanishi mumkin.

8. Xalqaro tajribani O‘zbekiston sharoitida qo‘llash imkoniyatlari

O‘tkazilgan tahlil bir qator muhim xulosalarni chiqarish imkonini beradi. Birinchidan, xalqaro freymvorklarning aksariyati yaxshi ta’minlangan raqamli infratuzilma va yuqori texnik ma’lumotga ega professional kadrlar mavjud bo‘lgan G‘arb institutsional sharoitiga mo‘ljallab ishlab chiqilgan. O‘zbekiston kutubxona tizimida, xususan tuman darajasidagi axborot-kutubxona markazlarida, raqamli infratuzilma va xodimlarning texnik tayyorgarligi sezilarli

darajada farq qiladi, bu esa xalqaro tajribani mexanik tarzda emas, balki mahalliy sharoitga moslashtirilgan holda joriy etish zarurligini ko‘rsatadi.

Ikkinchidan, o‘rganilgan freymvorklarning barchasi bosqichma-bosqich rivojlanish (progressiv daraja) tamoyiliga asoslangan, bu yondashuv O‘zbekiston kutubxona xodimlarining bilim va tayyorgarlik darajasidagi tafovutlarni hisobga olgan holda o‘quv dasturlarini shakllantirish uchun ham amaliy ahamiyatga ega. Uchinchidan, ACRL/ALA freymvorkida umumiy tarzda tilga olingan, biroq alohida kompetensiya sifatida ishlab chiqilmagan kutubxona xodimining vositachilik-pedagogik roli — O‘zbekiston kutubxonalari, xususan qishloq hududlaridagi axborot-kutubxona markazlari aholi uchun raqamli axborotga asosiy kirish nuqtasi vazifasini bajarishini hisobga olganda — alohida e’tibor talab qiladi.

Nihoyat, MDH va Markaziy Osiyo mintaqasida kutubxona mutaxassislari uchun mo‘ljallangan hech qanday mintaqaviy SI savodxonligi freymvorki mavjud emasligi aniqlandi. Bu holat, bir tomondan, mintaqadagi tadqiqotchilar uchun mavjud bazaviy ma’lumotning yo‘qligi tufayli qiyinchilik tug‘dirsa, boshqa tomondan — xalqaro tajribani chuqur o‘rganish asosida O‘zbekiston va butun mintaqa uchun ilmiy asoslangan, mahalliy sharoitga moslashtirilgan yondashuvlarni ishlab chiqish uchun imkoniyat yaratadi.

9. Xulosa

Ushbu maqolada kutubxona mutaxassislari uchun sun’iy intellekt savodxonligi sohasidagi eng dolzarb xalqaro tajriba — Long va Magerko, YuNESKO, ACRL/ALA, DigComp 2.2 va IFLA freymvorklari, shuningdek MDH mamlakatlaridagi amaliyot — tizimli tarzda o‘rganildi va qiyosiy tahlil qilindi. Tahlil shuni ko‘rsatdiki, xalqaro freymvorklar qimmatli nazariy va metodologik asos bo‘lib xizmat qilsa-da, ularning hech biri kutubxona xodimining vositachilik-pedagogik rolini, resurs cheklangan sharoitlarni va MDH mintaqasiga xos institutsional xususiyatlarni to‘liq hisobga olmaydi. Xalqaro tajribani chuqur va tizimli o‘rganish O‘zbekiston kutubxona tizimida SI savodxonligini rivojlantirish bo‘yicha keyingi ilmiy-amaliy ishlanmalar, jumladan mahalliy sharoitga moslashtirilgan kompetensiya modellari va o‘quv dasturlarini yaratish uchun ishonchli asos yaratadi. Kelgusi tadqiqotlar ushbu xalqaro tajriba asosida O‘zbekiston kutubxona xodimlari orasida amaliy so‘rovnoma va ekspert baholash usullaridan foydalangan holda mahalliy ehtiyojlarni chuqurroq empirik o‘rganishga qaratilishi lozim.

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BIZNES MICE TURIZMI MUTAXASSISLARINI TAYYORLASHDA SUN’IY INTELLEKT RESURSLARIDAN FOYDALANISHNING ILMIY-METODIK ASOSLARI

Ilxomova Gulnoza Zayniddin qizi
Toshkent Davlat Iqtisodiyot Universiteti, “Turizm va mehmonxona biznesi” kafedrasining 2-bosqich tayanch doktoranti
gulnazalex@gmail.com
https://doi.org/10.5281/zenodo.22870867

Annotatsiya. *Sun’iy intellekt (AI) turizm va biznes-tadbirlar hozirgi kunda malakli mutaxassislarni bilim, ma’lumotlar va muvofiqlashtirish talablarini o‘zgartirmoqda. Ushbu maqolada O‘zbekiston kontekstual muhit sifatida biznes/MICE turizm mutaxassislarini tayyorlashga AI resurslarini integratsiya qilish uchun ilmiy va metodologik asos ishlab chiqilgan. Resurslarga asoslangan qarash (RBV) texnologiyalarni ularni qimmatli qiladigan tashkiliy va insoniy imkoniyatlardan ajratish uchun ishlatiladi. Turizm ta’limi, mehmondo‘stlik sohasida AI, MICE ishga joylashish, kompetensiya standartlari va raqamli transformatsiya bo‘yicha adabiyotlarning tanqidiy sintezi ma’lum bir bo‘shliqni aniqlaydi: mavjud ishlar kamdan-kam hollarda AI asosidagi oliy ta’limni MICE rejalashtirish qobiliyati bilan bog‘laydi. Maqolada MICE tadbirlarining tadqiqot natijalari unind sun’iy intelekt bilan hamohangligi tahlil qilingan. Rasmiy statistika shuni ko‘rsatadiki, yaqinda kiruvchi turizmning sezilarli darajada o‘sishi kuzatilmoqda, shu bilan birga, 2026-yilgi Vazirlar Mahkamasi qarori biznes-turizm tadbirlarini tashkil etuvchi subyektlarni maxsus qo‘llab-quvvatlaydi, bu esa ixtisoslashgan inson kapitalini rivojlantirish uchun siyosiy asos yaratadi. Maqolada sun’iy intellektning o‘zi uzoq muddatli ustunlik yaratishi ehtimoldan yiroq emasligi ta’kidlanadi. Afzallik, ehtimol, sun’iy intellekt vositalari, mulkiy yoki yaxshi boshqariladigan ma’lumotlar, MICE tajribasi, instruktorlar, institutsional qo‘llab-quvvatlash va sanoat hamkorligining qo‘shimcha to‘plami bilan yaratiladi.*

Kalit so‘zlar: *sun’iy intellekt; MICE turizmi; MICE mutaxassislari, turizm ta’limi, inson kapitali, resurslarga asoslangan nazariya, sun’iy intellekt savodxonligi.*

Abstract. *Artificial Intelligence (AI) is changing the knowledge, data and equipment requirements of tourism and business operations. To develop a scientific and methodological foundation for integrating AI resources into business/MICE tourism production in a three-dimensional contextual environment. To use resource-based business (RBV) technologies to leverage their value for organizational and human use. A critical synthesis of the literature on tourism education, hospitality AI, MICE employment, competency standards and transformation identify a specific gap: existing work rarely links AI-based higher education to the management of MICE companies. The article analyzes the coherence of MICE research with artificial intelligence in the research environment. Official statistics show that the level of development of inbound tourism has recently been increasing, while the Cabinet of Ministers' resolution of 2026 provides special support for entities that form business tourism vehicles, which is the basis for the development of specialized human capital. The article argues that artificial intelligence itself is not far from the possibility of a long-term advantage. The advantage will likely be created by*

an additional set of artificial intelligence production, proprietary or well-managed data, MICE production, instructors, institutional support and industry cooperation.

Keywords: *artificial intelligence; MICE tourism; MICE professionals, tourism education, human capital, resource-based theory, artificial intelligence literacy.*

Kirish

Biznes turizm sohasi MICE tadbirlariga qo‘yiladigan talablar, o‘tkazilish joylari, byudjetlar, ishtirokchilar, logistika, kommunikatsiya, reklama, xavf va manzilni joylashtirish bo‘yicha kelishilgan qarorlarni talab qiladigan uchrashuvlar, rag‘batlantirishlar, konferensiyalar va ko‘rgazmalarni o‘z ichiga oladi. Shuning uchun MICE mehnat bozori umumiy raqamli tanishlikdan ko‘proq narsani talab qiladi. MICE ish bilan ta’minlanish bo‘yicha tadqiqotlar shuni ko‘rsatdiki, muloqot, innovatsiya, tashkil etish va muvofiqlashtirish, bozorni ilgari surish, rejalashtirish, loyihalarni amalga oshirish, inqirozlarni boshqarish, ingliz tilini bilish va operatsiyalarni boshqarish juda muhim ko‘nikmalar sifatida aniqlangan; shuningdek, u kompetentsiyalarni umumiy, kommunikativ, amaliy va MICE-professional o‘lchovlarga guruhlagan. Ta’limdagi qiyinchilik AI yordamida bashorat qilish, kontent yaratish, ma’lumotlarni tahlil qilish, mijozlar bilan aloqa, tadbirlarni simulyatsiya qilish va qarorlarni qo‘llab-quvvatlash bilan kuchayadi. Natijada, turizm oliy ta’limidan shunchaki dasturiy ta’minotni boshqarish o‘rniga AI dan tanqidiy foydalana oladigan bitiruvchilarni tayyorlash so‘raladi. Yaqinda turizm ta’limi modellarining qiyosiy tadqiqoti o‘quv dasturlarini qayta qurish, professor-o‘qituvchilarning raqamli salohiyatini rivojlantirish, universitet-sanoat hamkorligini kuchaytirish va AI ni axloqiy jihatdan joriy etishni ta’kidlaydi. O‘zbekiston tegishli empirik sharoitlarni taqdim etadi. Milliy statistika qo‘mitasi 2025-yil yanvar-sentyabr oylarida turizm maqsadida taxminan 8,6 million xorijiy sayyoh tashrif buyurganini ma’lum qildi, bu 2024-yilning mos davriga nisbatan 49,3% ga ko‘p[46]. 2026-yil iyul oyida Vazirlar Mahkamasi biznes-turizm (MICE) tadbirlarini tashkil etuvchi tadbirkorlik subyektlarini qo‘shimcha qo‘llab-quvvatlash to‘g‘risida qaror qabul qildi. Ushbu o‘zgarishlar oliy ta’lim turizmning o‘sishi va siyosatni qo‘llab-quvvatlashni raqobatbardosh MICE rejalashtirishga aylantirish uchun zarur bo‘lgan insoniy va tashkiliy imkoniyatlarni yarata oladimi yoki yo‘qligini tekshirish uchun asos yaratadi. Mazkur ilmiy maqolada quyidagi tadqiqot muammosi ko‘rib chiqiladi: AIni joriy etish ko‘plab turizmni o‘qitish tizimlariga qaraganda tezroq rivojlanmoqda, ammo AI resurslari MICEga xos professional kompetensiyalar va rejalashtirish qobiliyatiga aylanadigan mexanizmlar yetarlicha aniqlanmagan. Maqsad AI resurslarini MICE mutaxassislarini o‘qitishga integratsiya qilish uchun RBV asosidagi asosni ishlab chiqish va amalga oshirish hamda AIga asoslangan kompetensiyalarni o‘qitish samaradorligi va MICE rejalashtirish qobiliyati bilan bog‘laydigan sinovdan o‘tkaziladigan modelni taklif qilishdir. Ularning strategik ahamiyati tashkilotning resurslarni joylashtirish, birlashtirish va ish faoliyatini yaxshilaydigan imkoniyatlarga aylantirish qobiliyatiga bog‘liq. Bu farq, ayniqsa, sun’iy intellekt uchun muhimdir. Talabalarga ChatGPT yoki boshqa AI tizimlariga kirishni ta’minlash avtomatik ravishda raqobatbardosh ustunlikni yaratmaydi. Strategik qiymat AI resurslari inson bilimlari, analitik ko‘nikmalar, soha tajribasi, institutsional qo‘llab-quvvatlash, ma’lumotlar va tashkiliy jarayonlar bilan birlashtirilganda

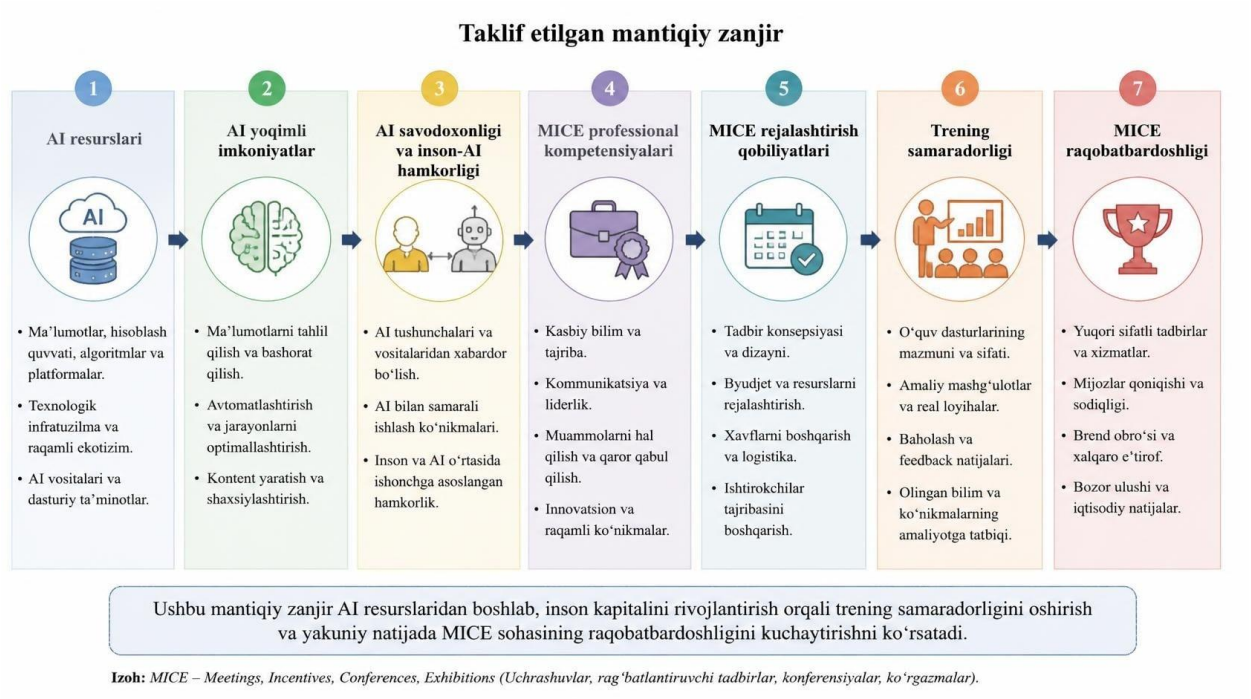
[46] Liu, X., Seevers, R., & Lin, H. (2022). Employability skills for MICE management in the context of ICTs. *Plos one*, *17*(7), e0271430.

paydo bo‘ladi[47]. RBV nazariyasi Biznes turizm (MICE) sohasida dolzarb hisoblanib, bilim va muvofiqlashtirishni talab qiladigan segmentidir. U uchrashuvlar, rag‘batlantirish, konferensiyalar, ko‘rgazmalar, joy tanlash, tadbir dizayni, ishtirokchilarni boshqarish, marketing, byudjetlashtirish, logistika, xavflarni boshqarish, raqamli texnologiyalar va manfaatdor tomonlarni muvofiqlashtirishni o‘z ichiga oladi. Shuning uchun, MICE manzilining raqobatbardoshligi nafaqat jismoniy infratuzilma bilan belgilanadi. Bu, shuningdek, biznes tadbirlarini rejalashtirish va boshqarish uchun mavjud bo‘lgan inson kapitali va tashkiliy imkoniyatlarning sifatiga bog‘liq. Masalan, MICE kompetentsiyasini rivojlantirish bo‘yicha tadqiqotlar joy tanlash, tadbirlarni ro‘yxatdan o‘tkazish, olomonni boshqarish, homiylikni boshqarish, xavfsizlik tartib-qoidalari va mijozlar va hamkasblar bilan hamkorlik kabi kompetentsiyalarni MICE professional tayyorgarligining muhim tarkibiy qismlari sifatida belgilaydi.

Tadqiqot metodologiyasi

Dunyo bo‘ylab turizm sanoati sun’iy intellekt tomonidan boshqariladigan tub o‘zgarishlarni boshdan kechirmoqda, ammo ta’lim muassasalari, ayniqsa rivojlanayotgan iqtisodiyotlardagi muassasalar, hamqadamlikka erishish uchun kurashmoqda. Ushbu tadqiqot Vyetnamdagi bakalavriat turizm dasturlari xalqaro mezonlarga moslashish uchun AI kompetentsiyalarini qanday qilib mazmunli ravishda integratsiya qilishi mumkinligini o‘rganadi. Xalqaro tajribalardan kelib chiqqan holda, Singapur, Kanada, Amerika Qo‘shma Shtatlari va Fransiyaning ta’lim modellarining sifatli qiyosiy tahliliga asoslanib, o‘ziga xos jihatlari aniqlangan. Tadqiqot o‘quv dasturlarini qayta tuzish, professor-o‘qituvchilarning raqamli salohiyatini oshirish va sanoat-akademik hamkorlikni kuchaytirishni o‘z ichiga olgan ko‘p qirrali aralashuv strategiyasini taklif qiladi. Tadqiqot natijalari shuni ko‘rsatadiki, mahalliy o‘qitishni global raqamli standartlar bilan uyg‘unlashtirish ikki maqsadga xizmat qiladi: bitiruvchilarning ish bilan ta’minlanishini oshirish va shu bilan birga muassasalarni xalqaro akkreditatsiyadan o‘tkazish. Taklif etilayotgan tizim ko‘pincha e’tibordan chetda qoladigan o‘lchovni ta’lim muassasalarida AI ning axloqiy joylashtirilishini ko‘rib chiqadi. Ushbu tushunchalar tobora avtomatlashib borayotgan dunyoda turizm kadrlarini rivojlantirishni modernizatsiya qilishga intilayotgan o‘qituvchilar, institutsional ma’murlar va siyosatchilar uchun amaliy qo‘llanma beradi. Sun’iy intellekt (AI) turizm va biznes-tadbirlar ishlarining bilim, ma’lumotlar va muvofiqlashtirish talablarini o‘zgartirmoqda. Ushbu maqolada O‘zbekiston kontekstual muhit sifatida biznes/MICE turizm mutaxassislarini tayyorlashga AI resurslarini integratsiya qilish uchun ilmiy va metodologik asos ishlab chiqilgan. Resurslarga asoslangan qarash (RBV) texnologiyalarni ularni qimmatli qiladigan tashkiliy va insoniy imkoniyatlardan ajratish uchun ishlatiladi.

[47] Cuthbertson, R. W., & Furseth, P. I. (2022). Digital services and competitive advantages: Strengthening the links between RBV, KBV, and innovation. *Journal of Business Research*, *152*, 168–176.



Rasm 1. Inson kapitali va sun'iy intelektning hamohangligi[48]

Taklif qilingan sun’iy intelekt resurslari bilan ta’minlangan imkoniyatlar tizimi mutaxassisning savodxonligi va AI hamkorligini ta’minlashda MICE professional kompetensiyalarining rejalashtirish qobiliyati, sohaning raqobatbardoshligiga ijobiy ta’sir etuvchi omillardan biri hisoblanadi. Turizm ta’limi, mehmondo‘stlik sohasida AI, MICE ishga joylashish, kompetensiya standartlari va raqamli transformatsiya bo‘yicha adabiyotlarning tanqidiy sintezi ma’lum bir bo‘shliqni aniqlaydi: mavjud ishlar kamdan-kam hollarda AI bilan ta’minlangan oliy ta’limni MICE rejalashtirish qobiliyati bilan bog‘laydi. Maqolada strukturaviy Likert so‘rovnomasi, ishonchlilik va haqiqiylikni baholash, namunaviy o‘lcham imkon beradigan joylarda tadqiqot va tasdiqlash omillari tahlili va vositachilik testlari bilan strukturaviy tenglama modellashtirishga asoslangan miqdoriy tadqiqot dizayni taklif qilingan. Hech qanday empirik natijalar yaratilmagan; natijalar bo‘limida ma’lumotlar to‘plangandan keyin qo‘llanilishi kerak bo‘lgan tahlillar va qaror qabul qilish qoidalari ko‘rsatilgan. Rasmiy statistika shuni ko‘rsatadiki, yaqinda kiruvchi turizmning sezilarli darajada o‘sishi kuzatilmoqda, shu bilan birga, 2026-yilgi Vazirlar Mahkamasi qarori biznes-turizm tadbirlarini tashkil etuvchi subyektlarni maxsus qo‘llab-quvvatlaydi, bu esa ixtisoslashgan inson kapitalini rivojlantirish uchun siyosiy asos yaratadi[49]. Maqolada sun’iy intellektning o‘zi uzoq muddatli ustunlik yaratishi ehtimoldan yiroq emasligi ta’kidlanadi. Afzallik, ehtimol, sun’iy intellekt vositalari, mulkiy yoki yaxshi boshqariladigan ma’lumotlar, MICE tajribasi, instruktorlar, institutsional qo‘llab-quvvatlash va sanoat hamkorligining qo‘shimcha to‘plami bilan yaratiladi.

Resurslarga asoslangan qarash (RBV)[50] — bu tashkilot tomonidan boshqariladigan resurslar va imkoniyatlar orqali raqobatbardosh ustunlikni tushuntiruvchi strategik boshqaruv

[48] Muallif tomonidan tadqiq qilingan adabiyotlar natijasida AI platformasi orqali chizilgan.

[49] O‘zbekiston Respublikasi Vazirlar Mahkamasining 18.08.2026 yildagi 443-sonli qarori “Turistik startaplarni — yangi turdagi turizm xizmatlarini ishlab chiqib, amaliyotga joriy etish bilan bog‘liq xarajatlarning bir qismiga subsidiya ajratish bo‘yicha davlat xizmatini ko‘rsatishning ma’muriy reglamentini tasdiqlash to‘g‘risida” https://lex.uz/uz/docs/-8415577

[50] Mailani, D., Hulu, M. Z. T., Simamora, M. R., & Kesuma, S. A. (2024). Resource-based view theory to achieve a sustainable competitive advantage of the firm: Systematic literature review. *International Journal of Entrepreneurship and Sustainability Studies*, *4*(1), 1.

nazariyasi[51]. Resurslarga asoslangan nuqtai nazar shuni ko‘rsatadiki, ta’lim hamda bisnes sohalarida raqobatbardosh ustunligi va yuqori samaradorligi raqobatchilar tomonidan nusxalash qimmatga tushadigan o‘ziga xos resurslari va imkoniyatlaridan kelib chiqadi va haqiqatan ham bunday resurslar qimmatli, noyob, mukammal taqlid qilinadigan va almashtirib bo‘lmaydigan hisoblanadi. MICE turizm sohasida malakali kadrlarni tayyorlash vazifasi davomida ish yuritish strategiyasi mavjud resurslarga bog‘liq bo‘lib,suniy intelekt resurslariga asoslangan qarashning ahamiyatiga qaramay qimmatli, noyob, nomukammal taqlid qilib bo‘lmaydigan va almashtirib bo‘lmaydigan va ular mos ravishda bilimlarni boshqarish qobiliyatlari va tashkiliy jarayonlar ko‘rinishida bo‘ladi.

Tadqiqot natijalari

Sun’iy intellekt hisoblash yordami, naqshlarni aniqlash, shaxsiylashtirish, prognozlash, matn va tasvirlarni yaratish, tarjima qilish, jadval tuzishda yordam va simulyatsiyani ta’minlashi mumkin. Biroq, ta’limda sun’iy intellektga kirish avtomatik ravishda o‘rganishni keltirib chiqarmaydi. Talabalar sun’iy intellekt savodxonligiga muhtoj: vazifalarni shakllantirish, natijalarni baholash, tarafkashlik va gallyutsinatsiyalarni aniqlash, ma’lumotlarni himoya qilish, hujjatlardan foydalanish va professional fikr yuritish qobiliyati. O‘qituvchilar AIni haqiqiy MICE muammolariga kiritish uchun pedagogik va texnik imkoniyatlarga muhtoj. Shuning uchun strategik jihatdan tegishli bo‘linma alohida holda “AI” emas, balki qo‘shimcha resurs to‘plamidir:



Rasm 2 MICE tadbirlar mexanizmida AI va inson omili[52]

Tadqiqot muhokamasi (Discussion)

O‘zbekiston Respublikasida MICE turizmini rivojlantirish va uning tashkiliy-igtisodiy mexanizmlarini takomillashtirish jarayonida sohani ragamlashtirish, axborot almashinuvi va davlat xizmatlarini avtomatlashtirish muhim institutsional omillardan biri sifatida namoyon bo‘lmoqda. Tahlil qilinayotgan Nizomda MICE turizm tadbiri, uni tashkil gilish xizmati, tadbirkorlik subyekti, mahsulotlar va xizmatlarning identifikatsiya

[51] Barney, J. B., & Arikan, A. M. (2005). The resource-based view: origins and implications. *The Blackwell handbook of strategic management*, 123–182.
[52] Muallif tomonidan tadqiq qilingan adabiyotlar natijasida AI platformasi orqali chizilgan.

kodi (MXIK), shuningdek, avtomatlashtirilgan dastur va Milliy turizm yagona platformasi kabi tushunchalarning aniq belgilanishi MICE turizmini boshqarish jarayonlarini standartlashtirish va raqamli boshqaruv mexanizmlarini shakllantirishga xizmat qiladi. Nizomda MICE turizm tadbiri uchrashuvlar, rag‘batlantiruvchi safarlar, konferensiyalar, ko‘rgazmalar va boshqa ishbilarmonlik tadbirlarini qamrab olishi MICE turizmining iqtisodiy mazmunini keng yoritadi. Mazkur yondashuv MICE turizmini faqat alohida
tadbirlarni tashkil etish faoliyati sifatida emas, balki turizm, transport, mehmonxona xo jaligi, ovqatlanish, ko‘rgazma infratuzilmasi, biznes xizmatlari va axborot texnologiyalarini birlashtiruvchi kompleks intisodiy tizim sifatida ko‘rib chiqish imkonini beradi. Shu nuqtayi nazardan, MICE tadbirlarini rejalashtirishda davlat va xususiv sektor o‘rtasidaai axborot almashinuvi hamda xizmatlar hagidagi ma’lumotlarning yagona tizimda jamlanishi boshqaruv samaradorligini oshiruvchi omil hisoblanadi. Nizomda MICE turizm tabirini tashkil qilish xizmati rejalashtirish, tashkil etish va tadbirni o‘tkazish bo‘yicha xizmatlar majmuasi sifatida belgilanadi. Ushbu ta’rif MICE turizmida xizmatlarning kompleks xarakterini ifodalaydi. Mazkur xizmatlar majmuasini samarali boshqarish uchun tadbirning turi, ishtirokchilar soni, infratuzilma talablari, transport va joylashtirish imkoniyatlari, moliyaviy xarajatlar hamda boshqa tashkiliy parametrlarni tizimli ravishda hisobga olish talab etiladi. Shuning uchun MICE turizmini rejalashtirishda ragamli texnologiyalardan foydalanish xizmatlar o‘rtasidagi muvofiqlashtirishni kuchaytirish va boshqaruv qarorlarining axborot bazasini takomillashtirish imkonini beradi. Mazkur jarayonda Milliy turizm yagona platformasining mavjudligi alohida ahamiyat kasb etadi[53]. Platformaning turizm sohasiga oid xizmatlarni ko‘rsatish va sohani boshqarishni ta’minlovchi yagona axborot tizimi sifatida belgilanishi MICE turizmi bo‘yicha ma’lumotlarni markazlashtirish uchun institutsional asos yaratadi. Bunday platforma orgali MICE tadbirlarini tashkil etuvchi tadbirkorlik subyektlari, xizmat ko‘rsatuvchi tashkilotlar va tegishli davlat organlari o‘rtasida axborot almashinuvini takomillashtirish mumkin.

Xulosa va tavsiyalar

Biznes MICE turizmi mutaxassislarini tayyorlashda sun’iy intellekt resurslaridan foydalanishning ilmiy-metodik yondashuvda, mutaxassislarini sun’iy intelekt (AI) yordamida tayyorlash uchun RBVga asoslangan ilmiy va metodologik asos ishlab chiqilgan. Uning asosiy taklifi shundaki, AI resurslari faqat inson tajribasi, MICE bilimlari, ma’lumotlar, institutsional imkoniyatlar va tashkiliy qo’llab-quvvatlash bilan birlashtirilganda ta’lim va raqobatbardosh qiymat yaratadi. Taklif etilgan model AI resurslarini AI savodxonligi, inson-AI hamkorligi, MICE professional kompetensiyalari, MICE rejalashtirish qobiliyati va o‘qitish samaradorligi bilan bog‘laydi. Natijada MICE turizm bozorining holati, xizmatlar hajmi va tadbirlar dinamikasi to‘g‘risidagi ma’lumotlarning tizimlashtirilishi kelgusidagi rejalashtirish jarayonlari uchun muhim axborot resursini shakllantiradi. Nizomda avtomatlashtirilgan dasturning davlat axborot tizimlari bilan integratsiya gilingan holda qo‘shilgan qiymat solig‘ining bir qismini qaytarish yoki qaytarishni rad etish uchun asoslarni avtomatik tekshirishi MICE turizmining tashkiliy-iqtisodiy mexanizmlarida raqamli nazorat elementlari shakllanayotganini ko‘rsatadi. Ushbu mexanizm xizmatlar aylanmasini monitoring qilish, tegishli ma’lumotlarni avtomatik

[53] Sebastian, Y., & Zuhdi, S. (2025, July). EXPLORING THE ROLE OF AI TOOLS IN STRENGTHEN-ING STRATEGIC PLANNING IN MICE INDUSTRY. In *The 5th International Joint Conference on Hospitality & Tourism 2025 (5th IJCHT-25)* (p. 355).

qayta ishlash va davlat tomonidan iqtisodiy jarayonlarni nazorat qilish imkoniyatlarini kengaytiradi. Shu bilan birga, avtomatlashtirish inson omili bilan bog‘liq xatolarni kamaytirish, ma’lumotlarni qayta ishlash tezligini oshirish va moliyaviy jarayonlarning shaffofligini kuchaytirishga xizmat gilishi mumkin. MICE turizm xizmatlari bo‘yicha mahsulotlar va xizmatlarning identifikatsiya kodi (MXIK)ning joriy etilishi ham muhim tashkiliy-iqtisodiy ahamiyatga ega[54]. Biznes turizm sohasida MICE tadbirlarini tashkil gilish xizmatlari bo‘yicha aylanmalarni yagona elektron milliy katalog asosida identifikatsiya gilish xizmatlar hajmini tizimli hisobga olish imkonini beradi. Bu, o‘z navbatida, MICE turizmining iqtisodiy ko‘rsatkichlarini shakllantirish, xizmatlar aylanmasini monitoring qilish va tarmoq rivojlanishining statistik bazasini takomillashtirish uchun asos yaratadi. MICE turizmi bo‘yicha ishonchli ma’lumotlar bazasining shakllanishi kelgusida talabni prognozlash, bozor segmentarini aniqlash va tadbirlarni rejalashtirish samaradorligini baholash uchun muhim ahamiyatga ega. Bunday yondashuv MICE xizmatlarini ko‘rsatuvchi subyektlarning faoliyatini tartibga solish, ularning xizmatlarini identifikatsiya gilish va iqtisodiy operatsiyalarini monitoring qilish uchun huquqiy asos yaratadi. Mazkur mexanizmlarni sun’iy intellekt resurslari bilan bog‘lash MICE turizmini rejalashtirish va boshqarishning keyingi bosqichi sifatida qaralishi mumkin. Xususan, Milliy turizm yagona platformasida shakllanadigan ma’lumotlar, xizmatlar aylanmasi va MICE tadbirlari to‘g‘risidagi axborotlar kelgusida sun’iy intellekt asosidagi tahliliy vositalar uchun muhim ma’lumotlar resursi bo‘lib xizmat qilishi mumkin. Bunday yondashuv talabni prognozlash, tadbirlar oqimini tahlil gilish, xizmatlarga bo‘lgan ehtiyojni baholash va resurslarni optimal taqsimlash kabi vazifalarni takomillashtirish imkoniyatini yaratadi.

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NEYROMARKETING VA SUN’IY INTELLEKT TEXNOLOGIYALARINING ISTE’MOLCHI XULQ-ATVORINI SHAKLLANTIRISHDAGI ROLI: XALQARO TAJRIBA VA O‘ZBEKISTON UCHUN ISTIQBOLLAR

Ibragimova Zilola Shuxratovna
Toshkent davvlat yuridik universiteti O‘quv-uslubiy boshqarma (Registrator ofisi)
Ta’lim shartnomalari va to‘lovlarini muvofiqlashtirish bo‘limi iqtisodchisi
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Abstract. *Mazkur maqolada neyromarketingning nazariy asoslari, iste’molchi xulq-atvorini o‘rganishdagi metodologik imkoniyatlari, undan raqamli marketing va elektron tijoratda foydalanish yo‘nalishlari, shuningdek, ushbu sohadagi etik va huquqiy masalalar tahlil qilinadi. Tadqiqotning maqsadi neyromarketing vositalarining reklama, brending, mahsulot qadoqlashi, narxlash va foydalanuvchi interfeysi dizayniga ta’sirini yoritish, xalqaro tajribani qiyoslash hamda O‘zbekiston sharoitida neyromarketingni mas’uliyatli joriy etish bo‘yicha choralarni taklif etishdan iborat. Tadqiqotda formal-mantiqiy, qiyosiy-tahliliy va tizimli usullardan, shuningdek, ikkilamchi statistik ma’lumotlarni tahlil qilish usulidan foydalanilgan. Maqolada neyromarketing an’anaviy so‘rovnomalarni to‘ldiruvchi, biroq ularning o‘rnini to‘liq bosa olmaydigan ilmiy-amaliy vosita ekanligi xulosasi ilgari suriladi. Shuningdek, anglanmagan jarayonlarni o‘rganishga qaratilgan tadqiqotlarda xabardor rozilik olish, shaxsiy va biometrik ma’lumotlarni himoya qilish, ilmiy natijalarni bo‘rttirmaslik hamda iste’molchining erkin tanlovini saqlash asosiy tamoyillar ekanligi ko‘rsatib beriladi.*

Kalit so‘zlar: *neyromarketing, iste’molchi xulq-atvori, neyroiqtisodiyot, EEG, fMRI, eye-tracking, biometrik ma’lumotlar, raqamli marketing, elektron tijorat, iste’molchi huquqlari, etik standartlar.*

Abstract. *This article examines the theoretical foundations of neuromarketing, its methodological capacity for studying consumer behaviour, its applications in digital marketing and e-commerce, and the ethical and legal issues involved. The study aims to explain the influence of neuromarketing tools on advertising, branding, product packaging, pricing and user-interface design; compare international experience; and propose measures for responsible implementation in Uzbekistan. Formal-logical, comparative-analytical and systemic methods, along with analysis of secondary statistical sources, are used. The article concludes that neuromarketing is a scientific and practical tool that complements rather than completely replaces conventional surveys. It further demonstrates that informed consent, protection of personal and biometric data, non-exaggeration of scientific findings, and preservation of consumer autonomy are core principles in research involving unconscious processes.*

Keywords: *neuromarketing, consumer behaviour, neuroeconomics, EEG, fMRI, eye-tracking, biometric data, digital marketing, e-commerce, consumer rights, ethical standards.*

Bozor iqtisodiyotida iste’molchi qarori korxona raqobatbardoshligini belgilovchi asosiy omillardan biridir. An’anaviy marketing tadqiqotlari odatda so‘rovnoma, fokus-guruh, intervyu va savdo statistikasi orqali xaridorning afzalliklarini aniqlaydi. Biroq iste’molchi har doim ham nima uchun aynan bir mahsulotni tanlaganini, reklamaning qaysi elementi uning e’tiborini

tortganini yoki qadoqlashdagi qaysi belgi qaroriga ta’sir qilganini aniq bayon qila olmaydi. Qarorlarning ma’lum qismi hissiy, tezkor va anglanmagan baholashlar asosida shakllanadi. Shu nuqtada neyromarketing marketing, psixologiya, neyrofan va iqtisodiyot kesishmasida paydo bo‘lgan fanlararo yo‘nalish sifatida muhim ahamiyat kasb etadi.

Yevropa Parlamenti nashri neyromarketingni bozor tadqiqotlarini o‘tkazishda neyrofan yutuqlaridan foydalanish sifatida izohlaydi; uning vazifasi iste’molchining muayyan tijoriy rag‘batga munosabati ortidagi neyron va fiziologik jarayonlar haqida qo‘shimcha axborot berishdan iborat. [1] Sodda qilib aytganda, neyromarketing reklama, mahsulot, veb-sayt, mobil ilova yoki savdo maydoni inson e’tibori, xotirasi, hissiyoti va qaror qabul qilishiga qanday ta’sir qilishini o‘rganadi.

Neyromarketingning dolzarbligi raqamli iqtisodiyot va elektron tijorat rivojlanishi bilan yanada ortmoqda. Onlayn savdoda iste’molchi mahsulotni jismonan ushlab ko‘rmaydi; uning qarori surat, video, reyting, sharh, narxning ko‘rsatilish usuli, yetkazib berish sharti va mobil ilova interfeysi orqali shakllanadi. Shu sababli foydalanuvchi tajribasi (UX), dizayn, vizual e’tibor va hissiy aloqa biznes samaradorligiga bevosita ta’sir qiladi. O‘zbekistonda ham raqamli marketing va neyromarketingning chakana savdo faoliyatiga integratsiyasi yuzasidan tadqiqotlar paydo bo‘lmoqda; ular shaxsiylashtirilgan takliflar, push-bildirishnomalar, vizual hamda emotsional reklama elementlari brendga nisbatan hissiy bog‘liqlik va sodiqlikni kuchaytirishi mumkinligini qayd etadi. [2]

Biroq neyromarketingni “inson ongini o‘qish” yoki xaridorni mutlaq boshqarish vositasi sifatida talqin qilish ilmiy jihatdan noto‘g‘ridir. EEG, funksional magnit-rezonans tomografiya (fMRI), ko‘z harakatini kuzatish (eye-tracking), terining galvanik reaksiyasi (GSR), yurak urishi va yuz ifodasini tahlil qilish kabi usullar faqat muayyan vaziyatdagi biologik yoki xulqiy reaksiyalar haqida ma’lumot beradi. Ular insonning ichki fikrlarini to‘liq va xatosiz “dekodlash” imkonini bermaydi. Shu bois mazkur vositalar natijalari an’anaviy tadqiqotlar, savdo ma’lumotlari va sifat tahlili bilan birgalikda talqin qilinishi lozim.

Mazkur ilmiy tadqiqotda formal-mantiqiy, qiyosiy-tahliliy, tizimli va kontent-tahlil usullaridan foydalanildi. Formal-mantiqiy usul yordamida neyromarketing, neyroiqtisodiyot, biometrik ma’lumot, xabardor rozilik va iste’molchi avtonomiyasi tushunchalari aniqlashtirildi. Qiyosiy-tahliliy usul Yevropa Ittifoqidagi ma’lumotlarni himoya qilish va adolatsiz tijorat amaliyotlariga qarshi yondashuvlar, AQShdagi bozor o‘zini o‘zi tartibga solish amaliyoti, Buyuk Britaniyadagi ma’lumotlar boshqaruvi hamda xalqaro professional standartlarni solishtirish uchun qo‘llanildi.

Ilmiy adabiyotlarda neyromarketing masalasi dastlab reklama samaradorligini o‘lchash vositasi sifatida rivojlangan bo‘lsa, keyingi bosqichda u iste’molchi qarorlarining neyrobiologik asoslari, foydalanuvchi interfeysi, brend sodiqligi, narxni idrok etish va etik chegaralar bilan bog‘liq murakkab fanlararo yo‘nalishga aylandi. 2022-yilda e’lon qilingan tizimli sharh 2016–2020-yillarda chop etilgan neyromarketing tadqiqotlarini saralab, yakunda 13 ta tegishli ilmiy ishni tahlil qilgan. Unda reklama mazmunini shaxsiylashtirish, ijobiy emotsiya, taniqli shaxs obrazi va jozibali qadoqlash e’tibor hamda eslab qolishga ijobiy ta’sir qilishi mumkinligi ko‘rsatilgan, biroq natijalarni qiyoslash va takrorlash uchun metodologik standartlashtirish zarurligi qayd etilgan. [3]

Demak, neyromarketing bo‘yicha ilmiy munozaraning asosiy yo‘nalishlari ikki guruhga ajraladi: birinchisi — metodlarning ishonchliligi va biznesdagi amaliy foydasi; ikkinchisi — insonning shaxsiy hayoti, biologik ma’lumoti va erkin tanlovini himoya qilish bilan bog‘liq etik-

huquqiy masalalar. Mazkur maqola aynan shu ikki yo‘nalishni o‘zaro bog‘liqlikda yoritishga qaratilgan.

Neyromarketingning asosiy predmeti iste’molchining tijoriy rag‘batga bergan anglangan va anglanmagan reaksiyalaridir. Masalan, xaridor reklamadagi mahsulot nomini eslab qolishi, tasvirga uzoq qarashi, video vaqtida hissiy qo‘zg‘alish bildirishi yoki sahifaning ayrim qismida diqqatini yo‘qotishi mumkin. Mazkur ko‘rsatkichlar xaridor mahsulotni albatta sotib oladi degan qat’iy xulosani bermaydi, biroq reklama yoki interfeysning qaysi elementi e’tiborni jalb qilgani, chalkashlik tug‘dirgani yoki salbiy hissiy reaksiya chaqirgani haqida muhim dalil bo‘la oladi.

Birinchi yo‘nalish — reklama kontentini sinash. Video reklamada dastlabki soniyalar iste’molchining e’tiborini ushlab turishda muhimdir. Eye-tracking va EEG yordamida brend belgisi juda kech paydo bo‘layotgani, matn haddan tashqari ko‘pligi yoki asosiy taklif vizual tartibda yo‘qolib qolayotganini tekshirish mumkin. Biroq yuqori e’tibor har doim yuqori sotuv degani emas. Masalan, qo‘rqinchli yoki bahsli reklama e’tiborni kuchli tortadi, ammo brendga nisbatan salbiy munosabat shakllantirishi ehtimoli mavjud. Shuning uchun e’tibor ko‘rsatkichi brendga munosabat va xarid niyati bilan birga baholanishi kerak.

Ikkinchi yo‘nalish — qadoqlash va vizual identifikatsiya. Savdo rastasida mahsulotlar bir-biri bilan vizual raqobat qiladi. Rang, yozuv o‘lchami, tasvir, sertifikat belgisi, narx va mahsulot tarkibi haqidagi ma’lumot xaridor diqqatiga turlicha ta’sir ko‘rsatadi. Eye-tracking yordamida, masalan, mahsulot tarkibi yoki ogohlantiruvchi ma’lumot xaridor nigohiga tushayotganini aniqlash mumkin. Bu yondashuv dizaynni faqat sotishni oshirish uchun emas, balki muhim axborotni ravshan yetkazish uchun ham ishlatishga imkon beradi.

Uchinchi yo‘nalish — narxni idrok etish va tanlov arxitekturasi. Narxni “chegirma”, “cheklangan vaqt”, “oxirgi mahsulot” yoki “eng ommabop tanlov” kabi belgilar bilan ko‘rsatish iste’molchi qaroriga ta’sir qilishi mumkin. Biroq bunday usullar sun’iy shoshiltirish, yolg‘on kamyoblik yoki manipulyativ dizayn shakliga o‘tib ketmasligi lozim. Yevropa Ittifoqi adolatsiz tijorat amaliyotlari to‘g‘risidagi direktivasi professional ehtiyotkorlik talablariga zid bo‘lgan va iste’molchining iqtisodiy xulq-atvorini sezilarli buzadigan amaliyotlarni taqiqlaydi. [4] Shu sababli neyromarketing natijalaridan foydalangan holda yaratilgan interfeyslar iste’molchining erkin, xabardor va ongli tanlovini saqlab qolishi shart.

O‘zbekistonda elektron tijorat va marketplace’lar kengayib borayotgan sharoitda neyromarketing vositalaridan foydalanishning istiqbolli sohalari sifatida foydalanuvchi interfeysini sinash, reklama maketlarini baholash, mahsulot kartochkalaridagi ma’lumotni soddalashtirish, mijozlarga xizmat ko‘rsatish jarayonini takomillashtirish va mahalliy brendlarning vizual identifikatsiyasini rivojlantirishni ko‘rsatish mumkin. Bunda amaliy maqsad iste’molchining zaifligidan foydalanish emas, balki unga tushunarli, qulay va ishonchli tanlov muhitini yaratish bo‘lishi kerak.

Neuromarketing Science and Business Association 2013-yilda neyromarketing kompaniyalari uchun birinchi etika kodeksini ishlab chiqqan. Ushbu kodeksning asosiy g‘oyalari ilmiy xulosalarni bo‘rttirib ko‘rsatmaslik, tadqiqot ishtirokchilarining huquqi va farovonligini himoya qilish, tadqiqot vositalari hamda maqsadlari haqida aniq axborot berish, istalgan vaqtda tadqiqotdan chiqish huquqini ta’minlash, yig‘iladigan ma’lumotlar va ularning himoyasi haqida xabardor rozilik olishdan iborat. [5] Ushbu yondashuvning ahamiyati shundaki, neyromarketing tadqiqoti ishtirokchisiga oddiy reklama kuzatuvchisi sifatida emas, balki huquq va manfaatlarga ega shaxs sifatida qaraladi.

Yevropa Ittifoqi neyromarketingni alohida yagona qonun bilan emas, balki umumiy ma’lumotlarni himoya qilish va iste’molchi huquqlarini himoya qilish normalari orqali tartibga soladi. GDPR ma’lumotlarni qayta ishlashda qonuniylik, adolatlilik, shaffoflik, maqsad bilan cheklanish, ma’lumotlarni minimallashtirish, aniqlik, saqlash muddatini cheklash, yaxlitlik va maxfiylik kabi tamoyillarni belgilaydi. [6] Neyromarketingda biometrik, fiziologik yoki xulqiy ma’lumotlar yig‘ilishi mumkinligi sababli ushbu tamoyillar ayniqsa muhimdir. AQShda neyromarketingga doir umumiy alohida federal kodeks mavjud emas; amaliyotda iste’molchilarni chalg‘ituvchi reklama, noqonuniy ma’lumot yig‘ish yoki asossiz da’volarga qarshi mavjud iste’molchi himoyasi qoidalari, sohaviy standartlar va kompaniyalarning ichki siyosati qo‘llaniladi. Bu modelning kuchli jihati innovatsiya uchun moslashuvchanlik bo‘lsa, kamchiligi turli tashkilotlarda etik standartlar bir xil bo‘lmasligi mumkinligidir. Shuning uchun NMSBA, ESOMAR va ICC singari professional tashkilotlarning ixtiyoriy qoidalari muhim amaliy rol o‘ynaydi. Zamonaviy ilmiy sharhlar ham neyromarketing etikasi bo‘yicha ko‘plab standartlar majburiy emas, balki ixtiyoriy tusga ega ekanini qayd etadi. [8]

Buyuk Britaniyada ma’lumotlarni himoya qilish tizimi UK GDPR va Data Protection Act 2018 bilan tartibga solinadi. Axborot komissari idorasi (ICO) ma’lumotlarni qayta ishlashda shaffoflik, qonuniy asos, ma’lumotlarni minimallashtirish va javobgarlik tamoyillarini ilgari suradi. [9] Ushbu tajriba biznes innovatsiyasi va shaxsiy hayotni himoya qilish o‘rtasidagi muvozanatni ta’minlashga qaratilgan. Neyromarketing loyihalarida tadqiqotchi va buyurtmachi ma’lumotning kimga tegishli ekani, qayerda saqlanishi, qancha muddat ushlab turilishi hamda uchinchi shaxslarga berilmasligini oldindan tushuntirishi lozim.

Neyromarketingda akademik tadqiqot talablari ham muhimdir. Inson ishtirokidagi tadqiqotlarda uning ixtiyoriy roziligi, tadqiqotdan chiqish huquqi, ehtimoliy noqulayliklar haqida xabardorligi va maxfiylik ta’minlanishi kerak. Neyroetika bo‘yicha tadqiqotlar miya faoliyatini o‘rganuvchi ilmiy yoki tijoriy tadqiqotlarda rozilik olish va ishtirokchi maxfiyligini saqlash etik hamda huquqiy mas’uliyat ekanini ta’kidlaydi. [10]

Yuqoridagilardan kelib chiqib, quyidagi takliflar ilgari suriladi:

1. O‘zbekistonda neyromarketing tadqiqotlari uchun ixtiyoriy **Milliy etik kodeks** ishlab chiqish. Kodeks NMSBA tajribasiga tayangan holda xabardor rozilik, ishtirokchining tadqiqotdan chiqish huquqi, ma’lumotlar xavfsizligi, bolalar va zaif guruhlar himoyasi hamda ilmiy da’volarning haqqoniyligi bo‘yicha normalarni belgilashi lozim.
2. Neyromarketing tadqiqotlarini mustaqil etik ekspertizadan o‘tkazish tizimini joriy etish. Ayniqsa EEG, fMRI, biometrik kuzatuv, yuzni aniqlash yoki voyaga yetmaganlar ishtirokidagi tadqiqotlar boshlanishidan oldin etik komissiya xulosasi olinishi maqsadga muvofiq.
3. Reklama va elektron savdoda “qorong‘i naqshlar” — iste’molchini aldov yo‘li bilan obuna bo‘lishga, ortiqcha xaridga yoki rad etish qiyin bo‘lgan qarorga undovchi interfeys usullarini aniqlash bo‘yicha iste’molchi huquqlarini himoya qilish mexanizmlarini kuchaytirish. Neyromarketing ma’lumotlaridan bunday amaliyotlarni yaratish uchun foydalanish cheklanishi lozim.
4. Kichik biznes va mahalliy brendlar uchun neyromarketingning arzon, ochiq va xavfsiz usullarini rivojlantirish. Bunda qimmat fMRI tadqiqotlari o‘rniga foydalanuvchi testi, etik eye-tracking, A/B sinovi, ochiq savdo ma’lumoti va sifatli intervyu uyg‘unligiga ustuvorlik berilishi kerak.

Ushbu takliflarni amalga oshirish neyromarketing texnologiyalaridan O‘zbekistonda biznes samaradorligi va iste’molchi manfaatlari o‘rtasidagi muvozanatni saqlagan holda foydalanishga,

ilmiy tadqiqotlarning sifatini oshirishga hamda raqamli bozorda ishonchli va adolatli muhitni shakllantirishga xizmat qiladi.

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STRATEGIC ANALYSIS OF ARTEL ELECTRONICS: STRENGTHENING COMPETITIVE ADVANTAGE AND SUPPORTING INTERNATIONAL EXPANSION

Isokova Aziza Alisher kizi
Master's student in Business Administration at Webster University in Tashkent
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Annotatsiya. *Mazkur tezisda O‘rta Osiyo mintaqasidagi yetakchi sanoat korxonalaridan biri bo‘lgan Artel Electronics kompaniyasining raqobatda ustunlikni kuchaytirish hamda xalqaro bozorlarga chiqishni rivojlantirish omillari bo‘yicha strategik tahlil qilinadi. Tahlil davomida korxonaning O‘zbekiston sanoat bozoridagi o‘rni, ustun va zaif tomonlari, imkoniyatlari va potensial xatarlari aniqlanib, qisqacha takliflar berib o‘tildi va raqobatbardosh ustunlikni ta’minlovchi omillar yoritildi.*

Kalit so‘zlar: *Artel Electronics, strategik tahlil, raqobatbardosh ustunlik, xalqaro kengayish, SWOT tahlili, PESTEL tahlili, EBITDA, asosiy qiymat.*

Annotation*. This thesis provides a strategic analysis of Artel Electronics, one of the leading industrial enterprises in the Central Asian region, on the factors of strengthening competitive advantage and developing access to international markets. During the analysis, the company's position in the Uzbek industrial market, its strengths and weaknesses, opportunities and potential threats are identified, brief proposals are made, and factors ensuring competitive advantage are highlighted.*

Keywords: *Artel Electronics, strategic analysis, competitive advantage, international expansion, SWOT analysis, PESTEL analysis, EBITDA, core value.*

Introduction

The home appliance and electronics industry has become increasingly competitive because of rapid technological development, changing consumer preferences and taste, and the growing existence of international brands. In Uzbek market, local manufacturers face the challenge of competing with global companies while maintaining affordability, product quality, and customer trust.

Artel Electronics LLC is one of the largest companies in Central Asia that produces home appliances and electronics. Artel has also entered several international markets by offering diverse product portfolio, affordable prices and high quality products.

This thesis aims to analyze Artel Electronics’ internal and external analysis and evaluate the factors that influence its competitive advantage.

The state policy aimed at developing the private companies and entrepreneurship in Uzbekistan creates important opportunities for increasing the competitiveness of local manufacturing enterprises. In particular, the Resolution of the President of the Republic of Uzbekistan No. PQ-306 dated September 14, 2023 established mechanisms for financial and institutional support for small businesses, provision of loans, leasing, grants and consulting services to business entities[55]. Therefore, the Artel company, taking advantage of these

[55] Resolution of the President of the Republic of Uzbekistan No. PQ-306 dated September 14, 2023 - "On measures to provide financial and institutional support for the development of small businesses."

opportunities, has become a leader not only in the Uzbek market, but also in the Central Asian industry in a short period of time, and is now trying to enter the world market.

The company was founded in 2011 by Jakhongir Ortikhujaev, one of well-known Uzbek entrepreneurs. It started its operations with the production of gas stoves and today the company produces 33 types of home appliance products, including kitchen, living room, and cleaning appliances[56]. The company also collaborates with international brands such as Samsung Electronics, Wiessmann, Royal, Shivaki, Avalon and Vesta to manufacture their products under license. Artel produces millions of items per year. Its position as a low-cost manufacturer in Uzbekistan and other CIS markets underpins its through-the-cycle EBITDA and EBIT margins of about 13.1% and 9.8%, respectively.

February 2025, Artel Electronics LLC, a leading home appliance and electronics manufacturer based in Uzbekistan, has demonstrated consistent financial growth. According to Fitch Ratings' report from August 2024, the company is projected to achieve an average annual revenue growth of approximately 10.3% between 2024 and 2027, with an expected EBITDA margin of about 13.4% during the same period.[57]

A good collaboration of price and quality is a main factor for those clients who buy Artel products. Artel’s market share is impressive in Central Asia. The company started the first export of its products in 2013. The first export markets were CIS countries, such as Kazakhstan, Tajikistan and Kyrgyzstan, where naturally they have experienced particularly strong growth. They are constantly increasing their production capacity and to date, Artel products are represented in more than 15 export markets throughout the CIS, the Middle East and even in Africa. In 2022, the volume of their foreign trade turnover increased by 50% compared to 2021[58]. More specifically, in Kazakhstan Artel’s share in the washing machine market has increased to 80.2%, in Kyrgyzistan to 30% and Tadjikistan to 42%. In the kitchen stove market its share in Kazakhstan shows 46.8%. Additionally, Artel’s products are marked with the “Made in Uzbekistan” label and are quite popular in Azerbaijan, including washing machines (31.7%), TV sets (16%) and air conditioners (22%)[59].

PESTEL Analysis

Political Factors:

1. Trade policies or government stability can impact on import export and manufacturing of Artel.
2. Uzbekistan's diplomatic relations can affect Artel's export strategies, supply chains, especially as the company expands into new markets.

Economic Factors:

1. Fluctuations in global and regional economies influence consumer spending and investment in new technology.
2. The company faces high foreign-currency risk, which could affect profitability, especially with significant import and export activities[60].

Social Factors:

1. **Regional preferences and cultural trends can shape product design, marketing strategies and overall brand perception of Artel LLC.**

[56] www.artelelectronics.com
[57] www.uzdaily.com
[58] www.beyondinvestmentsgroup.com
[59] www.kz.kursiv.media
[60] www.fitchratings.com

2. Changing lifestyles, shifts towards modern appliances and increasing urbanization in Uzbekistan may boost demand for Artel's products.

Technological Factors:

1. Artel continues to develop its product range, offering 34 new reliable and affordable solutions for various household needs in 2023[61].
2. The company's transformation of its brand positioning and communication strategy in 2022 indicates a focus on digital engagement with customers[62].

Environmental Factors:

1. Growing environmental awareness may prompt Artel to focus on energy-efficient products to meet consumer demand and regulatory standards.
2. Environmental laws and standards require the company to monitor and minimize harmful emissions.

These environmental requirements are also supported by Uzbekistan’s national “green economy” policy. According to the Resolution of the President of the Republic of Uzbekistan No. PQ-436 dated December 2, 2022, industrial enterprises are encouraged to improve energy efficiency, introduce energy-saving and environmentally friendly technologies, and reduce the environmental impact of production.[63]

Legal Factors:

1. Adherence to local and international manufacturing standards is crucial for Artel, especially as it expands its export markets.
2. Protecting its innovations and designs through patents and trademarks is essential to maintain a competitive edge.

Artel is dedicated to providing consumers with reliable and cost-effective household appliance solutions that simplify daily life. The company emphasizes innovation and customization to meet diverse customer needs. Artel aspires to be a trusted manufacturer, offering functional and technological household appliances that address everyday challenges. The company aims to deliver products with a high degree of innovation and personalization[64].

The company's core values include:

Reliability: Ensuring dependable products and services.

Innovation: Embracing new ideas to enhance user comfort and convenience.

Openness: Fostering transparency and mutually beneficial collaborations with partners.

Artel is undergoing a significant transformation in its brand positioning and communication strategy. In 2022, the company collaborated with national figures, such as actress Yulduz Rajabova and Olympic champion Bahodir Jalolov, who became official brand ambassadors. This initiative aims to strengthen Artel's connection with its customer base and reinforce its market presence[65].

Artel Electronics’ core competencies are based on strategic partnerships, research and development, quality management, and effective management. The company has established partnerships with global brands such as Samsung Electronics and Viessmann, which have helped

[61] www.artelelectronics.com
[62] www.artelelectronics.com
[63] Resolution of the President of the Republic of Uzbekistan No. PQ-436 of December 2, 2022 - "On measures to increase the effectiveness of reforms aimed at the transition of the Republic of Uzbekistan to a 'green' economy by 2030."
[64] www.artelelectronics.com
[65] www.artelelectronics.com

enhance its technological capabilities and expand its market reach. In addition, Artel established its Research and Development (R&D) center in Tashkent in 2016, focusing on product innovation and improving production capabilities. This investment in R&D allows the company to keep pace with technological developments and respond to changing consumer needs. Another important competency is quality management. Artel is committed to meeting applicable quality requirements and continuously improving its Quality Management System to ensure the production of reliable and high-quality products. Furthermore, the company’s management approach is based on the values of reliability, innovation, and openness, supporting continuous improvement and customer satisfaction. Together, these competencies strengthen Artel Electronics’ competitive position and support its development as a leading player in the home appliance and electronics industry.

Main Sources of Competitive Advantage:

Localized Approach: Artel deeply analyzes and knows the Central Asian market to offer products that suit regional conditions and preferences, which global rival companies may overlook.

Cost Efficiency: By manufacturing locally, Artel reduces production and distribution costs, making its products more affordable to its target customers. People who work for low wages also have the opportunity to buy household appliances. As a consequence, company can attract more clients.

Brand Trust: Its reputation for quality and reliability has made it a household name in Uzbekistan and neighboring countries.

Artel's core value proposition lies in delivering reliable, affordable, and regionally relevant products while fostering strong connections to its local market and contributing economic growth of the country.

Additionally, Samsung Electronics can be considered an appropriate international benchmark for Artel Electronics because both companies have developed their competitive advantage through manufacturing efficiency, product diversification, technological development, strategic partnerships, and international market expansion. According to Song and Lee, Samsung successfully transformed itself from a low-cost manufacturer into a globally recognized technology company by focusing on innovation, research and development, product quality, design, and strong brand management[66].

SWOT analysis

Strengths: well-known brand, diverse products, financially stable.

Weaknesses: not very global, depends on local suppliers, weak online, presence

Opportunities: growing demands, improving online sales, expanding exports.

Threats: tough competition, economic uncertainty, fast-changing technology.

To mitigate these potential risks Artel should strengthen its brand, improve product quality, and offer competitive prices to respond to strong international competition. The company should also focus on affordable and energy-efficient products during periods of economic uncertainty. Finally, investing in innovation, modern technology, and continuous product development will help Artel adapt to changing market trends and remain competitive.

Conclusion

[66] Song and Lee. Transformational Management Strategies from the World Leader in Innovation and Design// the Samsung Way. -2014.

In conclusion, Artel Electronics has strengthened its position in the Central Asian home appliances market through a strong product portfolio, broad production capabilities and strategic partnerships. Moving forward, embracing digital transformation, entering new markets, and investing in innovation and sustainability will be critical to maintaining and enhancing its competitive advantage. By addressing identified weaknesses and leveraging its strengths, Artel is well-positioned to adapt to global trends, respond to competitive pressures and continue its trajectory as a market leader in household appliances.

RESOURCES

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JUST IN TIME (JIT) ТИЗИМИ[67]НИ ЎЗБЕКИСТОН АМАЛИЁТИДА ҚЎЛЛАШ ЗАРУРАТИ

Мадалиев Хуршид Абдуллаевич[1]
[1]Хусусий тадбиркор
Тошкент шаҳридаги Сингапур менежментни ривожлантириш институти
мустақил изланувчиси
E-mail: abdulla_ahmad@mail.ru
https://doi.org/10.5281/zenodo.22897063

Аннотация. *Мазкур тадқиқот ишида Just In Time (JIT) тизимининг назарий асослари, унинг ишлаб чиқариш ва логистика жараёнларига таъсири ҳамда Ўзбекистон саноатида қўлланилиш имкониятлари комплекс таҳлил қилинган. Тадқиқот доирасида JIT тизимининг самарадорлигини баҳолаш учун математик моделлар таклиф этилди ва амалий кўрсаткичлар асосида таҳлил қилинди. Натижалар шуни кўрсатдики, JIT тизими захиралар ҳажмини сезиларли даражада камайтириш, ишлаб чиқариш циклини қисқартириш ва ресурслардан фойдаланиш самарадорлигини ошириш имконини беради. Шунингдек, мақолада мазкур тизимни миллий иқтисодиёт шароитида жорий этишнинг институционал ва ташкилий омиллари асослаб берилган.*

Калит сўзлар: *Just In Time, JIT, логистика, самарадорлик, таъминот занжири, Kanban, Kaizen, Lean Manufacturing.*

Аннотация. *В данной исследовательской работе комплексно проанализированы теоретические основы системы Just In Time (JIT), её влияние на производственные и логистические процессы, а также возможности её применения в промышленности Узбекистана. В рамках исследования предложены математические модели для оценки эффективности системы JIT и проведён анализ на основе практических показателей. Результаты показали, что система JIT позволяет значительно сократить объёмы запасов, уменьшить производственный цикл и повысить эффективность использования ресурсов. Также в статье обоснованы институциональные и организационные факторы внедрения данной системы в условиях национальной экономики.*

Ключевые слова: *Just In Time, JIT, логистика, эффективность, цепь поставок, Kanban, Kaizen, бережливое производство (Lean Manufacturing).*

Abstract. *This research paper provides a comprehensive analysis of the theoretical foundations of the Just In Time (JIT) system, its impact on production and logistics processes, as well as the possibilities of its application in the industrial sector of Uzbekistan. Within the framework of the study, mathematical models were proposed to assess the efficiency of the JIT system, and an analysis was conducted based on practical indicators. The results showed that the JIT system significantly reduces inventory levels, shortens the production cycle, and improves the efficiency of resource utilization. The article also substantiates the institutional and organizational factors for implementing this system in the context of the national economy.*

Keywords: *Just In Time, JIT, logistics, efficiency, supply chain, Kanban, Kaizen, Lean Manufacturing.*

[67] **Just In Time (JIT)** — бу ишлаб чиқариш ва таъминот занжирини бошқариш тизими бўлиб, унда хомашё, материаллар ва маҳсулотлар айнан керак бўлган вақтда ва керакли миқдорда етказиб берилади

1. Кириш (Introduction)

Замонавий глобал иқтисодиёт шароитида корхоналар фаолиятининг самарадорлиги ресурслардан қай даражада оқилона фойдаланилиши билан белгиланади. Айниқса, ишлаб чиқариш жараёнида ортиқча захираларнинг мавжудлиги корхонанинг молиявий барқарорлигига салбий таъсир кўрсатиб, айланма капиталнинг самарасиз банд бўлишига олиб келади. Шу нуқтаи назардан, захираларни оптимал бошқариш ва ишлаб чиқариш жараёнларини самарали ташкил этиш долзарб масалалардан бири ҳисобланади.

Just In Time (JIT) тизими айнан ушбу муаммоларни ҳал этишга қаратилган инновацион бошқарув концепцияси сифатида шаклланган. Ушбу ёндашув материаллар ва тайёр маҳсулотларнинг ҳаракатини талаб асосида синхронлаштириш орқали ишлаб чиқариш жараёнидаги барча ортиқча ҳаражатлар ва исрофларни бартараф этишга хизмат қилади.

JIT концепцияси илк бор Toyota Motor Corporation томонидан ишлаб чиқилган бўлиб, унинг амалиётдаги муваффақияти мазкур тизимнинг универсал бошқарув воситаси сифатида жаҳон саноатида кенг тарқалишига сабаб бўлди. Бугунги кунда JIT нафақат автомобиль саноатида, балки электроника, озиқ-овқат, фармацевтика ва хизмат кўрсатиш соҳаларида ҳам самарали қўлланилмоқда[68].

Мазкур тадқиқотнинг асосий мақсади — JIT тизимининг назарий асосларини чуқур ўрганиш, унинг иқтисодий самарадорлигини таҳлил қилиш ва Ўзбекистон корхоналарида жорий этиш имкониятларини илмий жиҳатдан асослашдан иборат.

Адабиётлар шарҳи (Literature Review). Just In Time (JIT) тизими бўйича илмий адабиётларда турли ёндашувлар ва назарий қарашлар мавжуд бўлиб, улар асосан ишлаб чиқариш жараёнларини оптималлаштириш, захираларни минималлаштириш ва самарадорликни ошириш масалаларига қаратилган.

JIT концепциясининг илк назарий ва амалий асослари Taiichi Ohno томонидан шакллантирилган бўлиб, у Toyota Production System доирасида ишлаб чиқаришда ортиқча захираларни йўқотиш ва “фақат керакли нарсани, керакли вақтда, керакли миқдорда” тамойилини илгари сурган. Унинг ишлари JIT тизимининг фундаментал асоси сифатида эътироф этилади.

The Machine That Changed the World асарида James P. Womack ва ҳаммуаллифлар Lean ишлаб чиқариш модели доирасида JIT тизимини глобал миқёсда таҳлил қилиб, уни анъанавий оммавий ишлаб чиқариш тизимидан устун жиҳатларини кўрсатиб берганлар. Ушбу асар JITнинг самарадорликка таъсирини эмпирик далиллар асосида асослаган муҳим манбалардан бири ҳисобланади.

The Toyota Way китобида Jeffrey Liker Toyota бошқарув фалсафасини 14 принцип орқали изоҳлаб, JIT тизимини фақат техник усул эмас, балки маданий ва ташкилий тизим сифатида талқин қилади. Унда узлуксиз такомиллашув (Kaizen) ва исрофларни бартараф этиш JITнинг асосий устун йўналишлари сифатида кўрсатилади.

Замонавий операцияларни бошқариш бўйича адабиётларда Operations Management муаллифи Nigel Slack JIT тизимини ишлаб чиқариш жараёнларида мослашувчанликни ошириш ва талаб ўзгаришларига тез жавоб бериш воситаси сифатида баҳолайди. Ушбу ёндашувда JIT логистика ва таъминот занжири бошқарувининг муҳим қисми сифатида қаралади.

[68] Ohno, T. (1988). *Toyota Production System: Beyond Large-Scale Production*. Productivity Press.

Шунингдек, Supply Chain Management асарида Martin Christopher JIT тизимининг таъминот занжиридаги ролига алоҳида эътибор қаратиб, унинг захира харажатларини камайтириш ва мижоз қониқишини оширишдаги аҳамиятини таъкидлайди.

Умуман олганда, илмий адабиётлар таҳлили шуни кўрсатадики, JIT тизими:

- ишлаб чиқариш харажатларини қисқартириш;
- ортиқча захираларни камайтириш;
- жараёнлар самарадорлигини ошириш;
- ва рақобатбардошликни кучайтиришга хизмат қилади.

Шу билан бирга, айрим тадқиқотларда JIT тизимининг ташқи таъсирларга (таъминот узилиши, логистик муаммолар) нисбатан сезгирлиги ҳам таъкидланади, бу эса уни жорий этишда эҳтиёткорликни талаб қилади.

2. Методология. Тадқиқотда комплекс ёндашув қўлланилиб, бир нечта илмий методлар уйғун ҳолда ишлатилди.

Биринчидан, таҳлил ва синтез усули орқали JIT тизимининг назарий жиҳатлари ва унинг таркибий элементлари ўрганилди. Иккинчидан, қиёсий таҳлил усули ёрдамида хорижий тажриба, хусусан ривожланган мамлакатлардаги ишлаб чиқариш тизимлари билан Ўзбекистон шароити таққосланди.

Учинчидан, тизимли ёндашув асосида JIT концепцияси бир бутун логистик ва ишлаб чиқариш тизими сифатида кўриб чиқилди. Шу билан бирга, математик моделлаштириш усули ёрдамида JIT тизимининг самарадорлигини баҳолашга қаратилган формулалар ишлаб чиқилди.

Тадқиқотнинг эмпирик қисмида амалиётда кузатилган ҳолатлар ва статистик маълумотлардан фойдаланилди, бу эса назарий хулосаларни амалий жиҳатдан тасдиқлаш имконини берди.

3. Натижалар.

3.1. JIT тизимининг иқтисодий моҳияти ва таъсири[69]

Тадқиқот натижалари шуни кўрсатадики, JIT тизими ишлаб чиқариш жараёнидаги барча турдаги исрофларни (ортиқча захиралар, ортиқча ҳаракатлар, вақт йўқотишлари) бартараф этишга қаратилган. Бу эса корхонанинг умумий самарадорлигини оширишга хизмат қилади.

3.2. Самарадорлик модели (математик асослаш) (1-формула).

$$EJIT=\frac{Q+S+F}{I+W+C} \quad (1)$$

EJIT — JIT тизимининг умумий самарадорлик кўрсаткичи → тизимнинг комплекс натижадорлигини ифодалайди.

Сурат: самарадорликни оширувчи омиллар;

Q — маҳсулот сифати→ нуқсонлар даражасининг пастлиги, стандартларга мувофиқлик;

S — хизмат ва ишлаб чиқариш тезлиги → буюртмани бажариш ва етказиб бериш вақти;

F — мослашувчанлик → талаб ўзгаришларига тез жавоб бериш қобилияти.

[69] Womack, J. P., Jones, D. T., & Roos, D. (1990). *The Machine That Changed the World*. Free Press.

Махраж: самарадорликни пасайтирувчи омиллар

I — захиралар ҳажми → омбордаги хом ашё ва тайёр маҳсулотлар;

W — исроф → ортиқча ҳаракатлар, вақт йўқотишлари, брак маҳсулотлар

C — умумий харажатлар → ишлаб чиқариш, логистика ва бошқарув харажатлари.

Ушбу модель JIT тизимининг самарадорлигини комплекс баҳолаш имконини беради. Моделга кўра, самарадорлик маҳсулот сифати, ишлаб чиқариш тезлиги ва тизимнинг мослашувчанлиги каби ижобий омилларга тўғри пропорционал, захиралар ҳажми, исроф ва харажатлар каби салбий омилларга эса тескари пропорционалдир.

JIT тизими жорий этилганда махраждаги кўрсаткичлар (захиралар, исроф ва харажатлар) камайиб, суратдаги кўрсаткичлар (сифат, тезлик ва мослашувчанлик) ошади. Бу эса умумий самарадорликнинг сезиларли даражада ошишига олиб келади.

Қисқа хулоса:

- самарадорлик ↑ → (Q, S, F) ошса;
- самарадорлик ↑ → (I, W, C) камайса;
- JIT мақсади → **“максимум натижа / минимум ресурс”.**

3.3. Захиралар динамикаси ва оптималлаштириш (2-формула).

$$I(t) = I_0 e^{-ki} \quad (2)$$

- **I(t)** — вақтга боғлиқ ҳолдаги қиймат (масалан, захира миқдори, талаб, интенсивлик)
- **I0** — бошланғич қиймат (t = 0 даги ҳолат)
- **e** — табиий логарифм асоси (тахминан 2.718)
- **k** — камайиш коэффициенти (қанчалик тез камайишини кўрсатади)
- **t** — вақт (time)

Экспоненциал модель JIT тизими жорий этилганда захиралар қисқариш жараёнини аниқ ифодалайди. Амалиёт шуни кўрсатадики, тўғри ташкил этилган таъминот занжири шароитида захиралар 30–60% гача камайиши мумкин.

3.4. Ишлаб чиқариш самарадорлиги таҳлили[70](3-формула).

$$P = \frac{Tv}{Tt} \quad (3)$$

P — ишлаб чиқариш жараёни самарадорлиги (Production Efficiency) → қиймат қўшувчи вақтнинг умумий вақтга нисбати

Tv — қиймат қўшувчи вақт (Value-added time) → маҳсулотга реал қиймат қўшадиган жараёнлар вақти (масалан: ишлаб чиқариш, йиғиш, қайта ишлаш)

Tt — умумий ишлаб чиқариш вақти (Total time) → барча жараёнлар вақти (қиймат қўшувчи + қўшмайдиган вақтлар) (масалан: кутиш, ташиш, ортиқча ҳаракатлар, тўхтовлар)

Бу ерда асосий эътибор қиймат қўшмайдиган жараёнларни қисқартиришга қаратилади. JIT тизими орқали “йўқотилган вақт” минималлаштирилади ва ишлаб чиқариш цикли оптималлаштирилади.

3.5. Kanban орқали бошқарув модели (4-формула).

1. [70] Womack, J. P., Jones, D. T., & Roos, D. (1990). *The Machine That Changed the World*. Free Press.

$$N = \frac{D * L * (I + S)}{C} \quad (4)$$

N — Kanban карточкалар (ёки контейнерлар) сони → ишлаб чиқариш жараёнида материаллар ҳаракатини бошқариш учун зарур бирликлар сони

Сурат (юқори қисми): талаб ва вақт омиллари

D (Demand) — талаб даражаси → маълум вақт бирлигида керак бўладиган маҳсулот ёки материал миқдори

L (Lead Time) — етказиб бериш вақти → буюртма берилгандан маҳсулот келгунигача бўлган вақт

(I) (Inventory factor) — жорий захира коэффициенти → тизимда мавжуд захира даражасини ҳисобга олувчи кўрсаткич

S (Safety stock) — хавф (захира) коэффициенти → ноаниқликлар (талаб ўзгариши, кечикишлар) учун қўшимча захира

Махраж (қуйи қисми): ресурс бирлиги

(C) — контейнер ҳажми (ёки бир партия ҳажми) → бир Kanban бирлигида ташиладиган маҳсулот миқдори

Ушбу формула JIT тизими доирасида Kanban усули орқали материаллар ҳаракатини оптимал бошқаришга хизмат қилади. Моделга кўра, Kanban карточкалар сони талаб ҳажми, етказиб бериш вақти ва хавф захира коэффициентига тўғри пропорционал, контейнер ҳажмига эса тескари пропорционалдир.

Бу эса шундан далолат берадики, талаб ва етказиб бериш вақти ошган сари тизимда кўпроқ Kanban бирликлари талаб қилинади. Аксинча, контейнер ҳажми катта бўлса, зарур Kanban карточкалар сони камаяди.

Қисқа хулоса:

- (N ↑) агар: (D, L, S) ошса
- (N ↓) агар: (C) ошса
- JIT мақсади → **N ни оптимал даражада ушлаш (Жадвал).**

Жадвал.

3.6. Таҳлилий жадвал (самарадорлик)

Кўрсаткичлар	Анъанавий тизим	JIT тизими	Ўзгариш
Захиралар	Юқори	Кам	↓ 30–60%
Цикл вақти	Узун	Қисқа	↓ 20–50%
Сифат	Ўртача	Юқори	↑ 20%
Исроф	Юқори	Минимал	↓ 50%

4. Муҳокама. Олинган натижалар JIT тизимининг юқори самарадорлигини тасдиқлайди. Бироқ, уни жорий этишда институционал ва инфратузилмавий омиллар муҳим аҳамиятга эга.

Ўзбекистон шароитида JITни татбиқ этиш учун қуйидаги омиллар ҳал қилувчи ҳисобланади:

- логистика инфратузилмасини ривожлантириш;
- таъминот занжири барқарорлигини таъминлаш;

- рақамли технологиялар ва ERP тизимларини жорий қилиш;
- инсон капитали ва бошқарув маданиятини ривожлантириш.

Шунингдек, JIT тизимини босқичма-босқич жорий этиш, пилот лойиҳалар орқали синовдан ўтказиш ва хавф-хатарларни минималлаштириш муҳим ҳисобланади[71].

5. Хулоса. Тадқиқот натижалари шуни кўрсатадики, Just In Time (JIT) тизими замонавий ишлаб чиқаришни ташкил этишда муҳим стратегик инструмент ҳисобланади. Ушбу тизимни жорий этиш орқали корхоналар захираларни оптималлаштириш, харажатларни камайтириш ва рақобатбардошликни ошириш имкониятига эга бўлади[72] Ўзбекистон иқтисодиёти шароитида JIT тизимини жорий этиш саноат тармоқларининг самарадорлигини оширишга хизмат қилади ва миллий иқтисодиётнинг барқарор ривожланишига ҳисса қўшади.

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ЛОГИСТИКАНИ РИВОЖЛАНТИРИШДА СУНЪИЙ ИНТЕЛЛЕКТ ТЕХНОЛОГИЯЛАРИДАН ФОЙДАЛАНИШ

Мадалиев Хуршид Абдуллаевич[1]
Тошкент шаҳридаги Сингапур менежментни ривожлантириш институти
мустақил изланувчиси
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Аннотация. *Ушбу мақолада логистика тизимларини ривожлантиришда сунъий интеллект (SI) технологияларидан фойдаланишнинг назарий ва амалий жиҳатлари тадқиқ этилган. Логистикада сунъий интеллектдан фойдаланишнинг транспорт маршрутларини оптималлаштириш, талабни прогнозлаш, омбор захираларини бошқариш, етказиб бериш муддатларини аниқлаш, хавфларни олдиндан баҳолаш ва транспорт воситаларидан фойдаланиш самарадорлигини оширишдаги имкониятлари таҳлил қилинган. Шунингдек, логистика тизимида сунъий интеллектни қўллашнинг ташкилий, технологик ва институционал шартлари ҳамда уни жорий этишда юзага келадиган маълумотлар сифати, киберхавфсизлик, кадрлар ва ҳуқуқий масъулият билан боғлиқ муаммолар кўриб чиқилган.*

Калит сўзлар: *сунъий интеллект, логистика, рақамли логистика, транспорт, логистик занжир, прогнозлаш, маршрутларни оптималлаштириш, омбор логистикаси, рақамли трансформация.*

Аннотация. *В данной статье исследованы теоретические и практические аспекты использования технологий искусственного интеллекта (ИИ) в развитии логистических систем. Проанализированы возможности применения искусственного интеллекта в логистике при оптимизации транспортных маршрутов, прогнозировании спроса, управлении складскими запасами, определении сроков доставки, предварительной оценке рисков и повышении эффективности использования транспортных средств. Также рассмотрены организационные, технологические и институциональные условия применения искусственного интеллекта в логистической системе, а также проблемы, возникающие при его внедрении, связанные с качеством данных, кибербезопасностью, кадрами и правовой ответственностью.*

Ключевые слова: *искусственный интеллект, логистика, цифровая логистика, транспорт, логистическая цепь, прогнозирование, оптимизация маршрутов, складская логистика, цифровая трансформация.*

Abstract. *This article investigates the theoretical and practical aspects of utilizing artificial intelligence (AI) technologies in the development of logistics systems. It analyzes the potential of AI applications in logistics for optimizing transport routes, forecasting demand, managing warehouse inventories, determining delivery times, proactively assessing risks, and enhancing vehicle fleet efficiency. Furthermore, the organizational, technological, and institutional conditions for applying AI in logistics systems are examined, alongside the challenges arising during implementation related to data quality, cybersecurity, human resources, and legal liability.*

Keywords: *artificial intelligence, logistics, digital logistics, transport, supply chain, forecasting, route optimization, warehouse logistics, digital transformation.*

Кириш. Жаҳон иқтисодиётида товарлар, хомашё ва ресурсларнинг ҳудудлар ва мамлакатлар ўртасида ҳаракати тобора мураккаблашиб бормоқда. Бозор талабининг тез ўзгариши, транспорт харажатларининг ортиши, етказиб бериш муддатларига қўйилаётган талабларнинг кучайиши ва глобал таъминот занжирларидаги узилишлар логистика тизимларини янги технологиялар асосида такомиллаштиришни тақозо этмоқда.

Шу нуқтаи назардан сунъий интеллект логистикани рақамли трансформация қилишнинг энг истиқболли воситаларидан бирига айланмоқда. Замонавий AI тизимлари катта ҳажмдаги маълумотларни таҳлил қилиш, талабни прогнозлаш, транспорт маршрутларини оптималлаштириш, омбор захираларини бошқариш ва логистик хавфларни олдиндан аниқлаш имконини беради. OECD маълумотларида ҳам сунъий интеллект логистика оптималлашуви, прогнозли таҳлил ва реал вақтда кўринишни таъминлаш орқали таъминот занжирларининг самарадорлиги ва барқарорлигини оширишда муҳим восита сифатида баҳоланган[73].

2024 йилда чоп этилган тизимли адабиётлар таҳлили ҳам сунъий интеллектнинг таъминот занжири бошқарувида қўлланилиши бўйича тадқиқотлар жадал ривожланаётганини кўрсатади. Тадқиқотларда AI асосида прогнозлаш, оптималлаштириш, қарор қабул қилиш ва логистик жараёнларни автоматлаштириш асосий йўналишлар сифатида намоён бўлмоқда[74].

Бироқ сунъий интеллектни логистикага жорий этиш фақат дастурий таъминот сотиб олиш билан чекланмайди. Бу жараён маълумотлар базаси, рақамли инфратузилма, ахборот тизимларининг интеграцияси, малакали кадрлар ва бошқарув механизмларини ҳам қамраб олувчи комплекс трансформацияни талаб қилади.

Шундан келиб чиқиб, мазкур тадқиқотнинг асосий мақсади логистика тизимини ривожлантиришда сунъий интеллектнинг функционал имкониятларини аниқлаш ва уни логистик жараёнларга интеграция қилишнинг концептуал моделини ишлаб чиқишдан иборат.

Тадқиқот методологияси

Тадқиқотда тизимли таҳлил, қиёсий таҳлил, эксперт баҳолаш, функционал таҳлил ва моделлаштириш усулларидан фойдаланилди.

Тадқиқотнинг назарий базасини сунъий интеллект, рақамли логистика, таъминот занжири бошқаруви ва интеллектуал транспорт тизимларига бағишланган илмий тадқиқотлар ташкил этади.

Тадқиқот жараёнида сунъий интеллектнинг логистиканинг қуйидаги асосий функцияларига таъсири таҳлил қилинди:

-талабни прогнозлаш;

-транспорт маршрутларини оптималлаштириш;

-транспорт воситаларини бошқариш;

-омбор захираларини оптималлаштириш;

-етказиб бериш муддатларини прогнозлаш;

-логистик хавфларни аниқлаш;

-мижозларга хизмат кўрсатиш;

[73] OECD. *Strengthening Supply Chains through Efficiency, Resilience, AI and Environmental Performance*. OECD Publishing, 2026. (OECD)

[74] Artificial intelligence in supply chain management: A systematic literature review of empirical studies and research directions. Computers in Industry, 162, 2024, 104132. (ScienceDirect)

-логистик харажатларни камайтириш.

Сунъий интеллектнинг логистикада қўлланилиш йўналишлари

Сунъий интеллект логистикада бир нечта ўзаро боғлиқ жараёнларни интеллектуаллаштириш имконини беради.

1. Талабни прогнозлаш.

Анъанавий логистикада талаб асосан ўтган давр статистикасига асосланиб прогноз қилинади. Сунъий интеллект эса тарихий маълумотлар билан бир қаторда мавсумийлик, нархлар, об-ҳаво, бозор тенденциялари, истеъмолчилар хулқ-атвори ва бошқа ташқи омилларни ҳам таҳлил қилиши мумкин.

Бунда машинали ўқитиш алгоритмлари қуйидаги умумий кўринишдаги прогноз моделини шакллантириши мумкин (1):

$$D_{t+1} = f(D_t, P_t, S_t, W_t, M_t, T_t) \quad (1)$$

Бу ерда:

- **D** – талаб ҳажми;
- **P** – нарх;
- **S** – мавсумийлик;
- **W** – об-ҳаво шароити;
- **M** – бозор кўрсаткичлари;
- **T** – вақт омили.

Натижада корхона қанча маҳсулотни қайси даврда ва қайси ҳудудга етказиб бериш зарурлигини олдиндан аниқлаши мумкин.

2. Транспорт маршрутларини оптималлаштириш

Логистикада харажатларнинг муҳим қисми транспорт билан боғлиқ. Сунъий интеллект транспорт ҳаракати, йўл ҳолати, тирбандлик, масофа, ёқилғи сарфи, етказиб бериш муддати ва транспорт воситасининг юкланиш даражаси ҳақидаги маълумотларни бир вақтда таҳлил қилиб, оптимал маршрутни танлаши мумкин.

Бу ҳолатда мақсад функцияси қуйидагича ифодаланиши мумкин:

$$\text{Min } Z = \alpha C + \beta T + \gamma R + \delta E \quad (2)$$

Бу ерда:

- **C** – транспорт харажати;
- **T** – етказиб бериш вақти;
- **R** – логистик хавф даражаси;
- **E** – экологик таъсир;
- **α, β, γ, δ** – ҳар бир мезоннинг аҳамият коэффициентлари.

Шундай қилиб, сунъий интеллект фақат энг қисқа маршрутни эмас, балки **харажат, вақт, хавф ва экологик таъсирни биргаликда ҳисобга олган оптимал маршрутни** танлаш имконини беради.

OECD таҳлилларида ҳам AI ва машинали ўқитиш алгоритмларининг транспорт маршрутларини оптималлаштиришда ҳаракат, ёқилғи нархи, етказиб бериш ойнаси ва йўл мавжудлиги каби турли маълумотларни қайта ишлаш имконияти қайд этилган[75].

3. Омбор логистикасини интеллектуал бошқариш

Сунъий интеллект омборларда маҳсулотларни жойлаштириш, захира миқдорини белгилаш, маҳсулот ҳаракатини кузатиш ва буюртмаларни шакллантириш жараёнларини автоматлаштириши мумкин.

AI-WMS тизими:

маълумот → таҳлил → прогноз → қарор → автоматик бошқарув

занжири асосида ишлаши мумкин.

Масалан, маҳсулотга талаб ортиши прогноз қилинса, тизим захирани олдиндан ошириш бўйича тавсия беради. Бу эса маҳсулот танқислиги ёки ортиқча захира шаклланишининг олдини олади.

4. Логистик хавфларни прогнозлаш

Замонавий логистика тизимларининг муҳим вазифаларидан бири хавфларни воқеа содир бўлгандан кейин эмас, балки **ундан олдин аниқлаш** ҳисобланади.

Сунъий интеллект:

- транспорт кечикиши;
- йўл ёпилиши;
- талабнинг кескин ўзгариши;
- ёқилғи нархининг ошиши;
- омборда маҳсулот танқислиги;
- етказиб берувчида узилиш;
- об-ҳаво хавфлари

каби омилларни таҳлил қилиб, хавф эҳтимолини баҳолайди.

Бу логистика тизимини реактив бошқарувдан **прогнозли ва адаптив бошқарувга** ўтказади. OECDнинг сўнгги таҳлилларида ҳам AI таъминот занжирларида юзага келиши мумкин бўлган узилишларни олдиндан аниқлаш ва уларга мослашувчан қарорлар ишлаб чиқиш воситаси сифатида кўрсатилган[76].

Логистикада сунъий интеллектни қўллашнинг интеграциялашган модели

Тадқиқот натижасида логистикада сунъий интеллектдан фойдаланишнинг қуйидаги интеграциялашган модели таклиф этилади:

Маълумотлар мажмуи → AI таҳлил қатлами → Прогнозлаш → Оптималлаштириш → Қарор қабул қилиш → Автоматик ижро → Мониторинг → Қайта алоқа

Ушбу моделда биринчи босқичда логистик маълумотлар йиғилади. Уларга GPS, IoT сенсорлари, ERP, WMS, TMS, электрон ҳужжатлар, савдо маълумотлари ва ташқи ахборот манбалари киради.

Иккинчи босқичда сунъий интеллект мазкур маълумотларни қайта ишлайди.

[75] OECD. *Strengthening Supply Chains through Efficiency, Resilience, AI and Environmental Performance*. OECD Publishing, 2026. (OECD).

[76] OECD. *Progress in Implementing the European Union Coordinated Plan on Artificial Intelligence – AI in Mobility*. OECD, 2025. (OECD)

Учинчи босқичда талаб, транспорт оқими, захира ва хавфлар прогноз қилинади.

Тўртинчи босқичда энг мақбул логистик қарор аниқланади.

Бешинчи босқичда қарор инсон томонидан тасдиқланиши ёки белгиланган ҳолатларда автоматик ижро этилиши мумкин.

Охирги босқичда натижалар мониторинг қилиниб, тизим янги маълумотлар асосида ўз моделларини такомиллаштиради.

Бундай ёндашув логистикани оддий рақамлаштиришдан **интеллектуал логистика тизимига** айлантириш имконини беради.

Сунъий интеллектнинг логистика самарадорлигига таъсири

AI технологияларини логистикага жорий этиш натижасида қуйидаги самарадорлик кўрсаткичларини яхшилаш мумкин (жадвал):

Жадвал

Sининг логистика логистика самарадорлигига таъсири[77]

Кўрсаткич	**Анъанавий бошқарув**	**AI асосида бошқарув**
Талаб прогнози	Тарихий маълумотлар	Кўп омилли прогноз
Маршрут танлаш	Статик	Динамик
Захира бошқаруви	Меъёр асосида	Прогноз асосида
Хавф бошқаруви	Реактив	Прогнозли
Транспорт назорати	Даврий	Реал вақтда
Қарор қабул қилиш	Инсон марказида	AI + инсон
Маълумот таҳлили	Чекланган	Катта ҳажмда
Логистик тизим	Реактив	Адаптив

Логистика самарадорлигини баҳолаш учун интеграл кўрсаткичдан ҳам фойдаланиш мумкин (3):

$$ILS_AI = w_1C + w_2T + w_3S + w_4R + w_5Q \quad (3)$$

Бу ерда:

- **C** – харажат самарадорлиги;
- **T** – вақт самарадорлиги;
- **S** – хизмат кўрсатиш сифати;
- **R** – хавфларни бошқариш самарадорлиги;
- **Q** – маълумотлар ва қарорлар сифати;
- w_i – тегишли вазн коэффициентлари.

Ушбу индексни корхона, логистик марказ, ҳудуд ёки тармоқ даражасида ҳисоблаш мумкин.

Логистикада AI жорий этишнинг асосий муаммолари.

[77] Муаллифнинг тадқиқотлари асосидаги ишланмаси.

Сунъий интеллектнинг имкониятлари юқори бўлишига қарамасдан, уни логистикага жорий этишда қатор муаммолар мавжуд.

Биринчидан, **маълумотлар сифати** муҳим аҳамиятга эга. Нотўлиқ ёки нотўғри маълумот асосида ишлайдиган AI модели нотўғри қарор қабул қилиши мумкин.

Иккинчидан, **рақамли тизимларни интеграциялаш** зарур. ERP, WMS, TMS, GPS ва бошқа ахборот тизимлари ўзаро маълумот алмашмаса, сунъий интеллектнинг имкониятлари чекланади. OECD ҳам AI самарадорлиги рақамли етуклик, машина ўқий оладиган маълумотлар ва ўзаро интеграциялашган платформалар мавжудлигига боғлиқлигини таъкидлайди[78].

Учинчидан, **киберхавфсизлик** масаласи долзарб. Логистик тизимларда катта ҳажмдаги тижорат, транспорт ва мижоз маълумотлари тўпланади.

Тўртинчидан, **малакали кадрлар** талаб этилади. Логистика мутахассиси энди фақат транспорт ва омбор жараёнларини эмас, балки маълумотлар таҳлили ва рақамли технологияларни ҳам тушуниши керак.

Бешинчидан, AI қарорларининг ҳуқуқий масъулиятини белгилаш зарур. Айниқса, автоматлаштирилган транспорт, хавфли юклар ва халқаро ташувларда инсон ва алгоритм ўртасидаги масъулият чегаралари аниқ белгиланиши лозим.

Ўзбекистон логистика тизими учун имкониятлар

Ўзбекистонда сунъий интеллектдан логистика соҳасида фойдаланишнинг муҳим йўналишларидан бири транспорт оқимларини интеллектуал бошқариш ҳисобланади.

Айниқса:

- автомобиль ташувларида маршрутларни оптималлаштириш;
- қишлоқ хўжалиги маҳсулотларини ташишни прогнозлаш;
- агрологистика марказларида захираларни бошқариш;
- совутиш омборларида маҳсулот ҳаракатини назорат қилиш;
- транспорт воситалари юкланишини оптималлаштириш;
- экспорт-импорт юкларининг ҳаракатини мониторинг қилиш;
- божхона жараёнларида ҳужжатларни интеллектуал қайта ишлаш;
- логистик хавфларни олдиндан аниқлаш каби йўналишларда AI технологияларидан фойдаланиш мумкин.

Айниқса қишлоқ хўжалиги маҳсулотлари логистикасида сунъий интеллектнинг аҳамияти юқори. Чунки аграр маҳсулотлар мавсумийлик, тез бузилиш, об-ҳаво ва талаб ўзгаришига кучли боғлиқ. AI ушбу омилларни биргаликда таҳлил қилиб, маҳсулотни қайси вақтда, қанча ҳажмда ва қайси йўналишда ташиш мақсадга мувофиқлигини аниқлаш имконини беради.

Муҳокама. Тадқиқот натижалари шуни кўрсатадики, сунъий интеллект логистикада алоҳида бир технология эмас, балки маълумотлар, IoT, GPS, ERP, WMS ва TMS тизимларини ягона интеллектуал бошқарув муҳитига бирлаштирувчи восита сифатида қаралиши керак.

[78] OECD. Progress in Implementing the European Union Coordinated Plan on Artificial Intelligence – AI in Mobility. OECD, 2025. (OECD)

2024–2025 йиллардаги илмий адабиётлар таҳлили AIнинг логистика ва таъминот занжирларида прогнозлаш, оптималлаштириш, автоматлаштириш ва барқарорликни оширишга қаратилган қўлланишлари кенгаяётганини кўрсатмоқда.[79]

Шу билан бирга, AI жорий этилиши автоматик равишда самарадорлик кафолатини бермайди. 2025 йилги тадқиқотларда ҳам AIнинг логистикадаги афзалликлари билан бир қаторда киберхавфсизлик, тарихий маълумотларга ҳаддан ташқари боғлиқлик, юқори ресурс талаблари ва меҳнат бозорига таъсир каби муаммолар қайд этилган[80].

Шу сабабли логистикани AI асосида ривожлантиришнинг энг мақбул ёндашуви **«AI инсонни тўлиқ алмаштиради»** эмас, балки **«AI инсон қарорини маълумотлар асосида кучайтиради»** тамойилига асосланиши лозим.

Хулоса. Тадқиқот натижасида қуйидаги хулосаларга келинди.

Биринчидан, сунъий интеллект логистика тизимини анъанавий реактив бошқарувдан прогнозли ва адаптив бошқарувга ўтказиш имконини беради.

Иккинчидан, AI транспорт маршрутларини оптималлаштириш, талабни прогнозлаш, омбор захираларини бошқариш, логистик хавфларни баҳолаш ва етказиб бериш сифатини оширишда муҳим восита ҳисобланади.

Учинчидан, сунъий интеллектнинг логистикадаги самараси маълумотлар сифати, рақамли инфратузилма, ахборот тизимларининг интеграцияси ва малакали кадрлар мавжудлигига бевосита боғлиқ.

Тўртинчидан, логистикани интеллектуаллаштириш жараёнида AI, IoT, GPS, ERP, WMS ва TMS технологияларини ягона рақамли экотизимга интеграция қилиш мақсадга мувофиқ.

Бешинчидан, Ўзбекистон шароитида AIдан фойдаланишнинг истиқболли йўналишларидан бири агрологистика ҳисобланади. Хусусан, қишлоқ хўжалиги маҳсулотларини прогнозлаш, ташиш, сақлаш ва тақсимлаш жараёнларини интеллектуал бошқариш маҳсулот йўқотишларини камайтириш ва логистик харажатларни оптималлаштиришга хизмат қилиши мумкин.

Умуман олганда, сунъий интеллектни логистика соҳасига жорий этиш рақамлаштиришнинг кейинги босқичи бўлиб, унинг асосий натижаси нафақат операцияларни автоматлаштириш, балки логистик тизимнинг ўзгарувчан муҳитга мустақил мослашиш ва олдиндан қарор қабул қилиш қобилиятини шакллантириш билан белгиланади.

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BUXGALTERIYA HISOBI TA’LIMIDA AKSIYADORLIK JAMIYATLARI MOLIYAVIY NATIJALARINI MHXS ASOSIDA TALQIN QILISH: INSON VA SUN’IY INTELLEKT HAMKORLIGIGA ASOSLANGAN KEYS MODELI

Marupov Abdushukurbek Alijonovich
Andijon qishloq xo‘jaligi va agrotexnologiyalari instituti,
08.00.08 — “Buxgalteriya hisobi, iqtisodiy tahlil va audit” ixtisosligi tayanch doktoranti
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Annotatsiya. *Maqolada aksiyadorlik jamiyatlarining moliyaviy natijalarini moliyaviy hisobotning xalqaro standartlari asosida o‘qitishda inson va sun’iy intellekt hamkorligiga tayangan amaliy keys modeli taklif etiladi. Model hujjatli ma’lumotni aniqlash, ko‘rsatkichlarni hisoblash, natijani standartlar asosida talqin qilish va yakuniy professional mulohazani inson tomonidan tasdiqlash bosqichlarini birlashtiradi. “UzAuto Motors” AJning 2023–2024-yillardagi auditlangan konsolidatsiyalangan hisobotlari misolida mexanik hisob-kitob bilan iqtisodiy mazmunni ajratish zarurati ko‘rsatiladi. Tadqiqot pedagogik samaradorlik bo‘yicha eksperiment o‘tkazilganini da’vo qilmaydi; u buxgalteriya ta’limida tekshiriladigan, inson markazidagi SI yordamchi modelini asoslaydigan konseptual-amaliy ishlanmadir.*

Kalit so‘zlar: *buxgalteriya hisobi ta’limi, moliyaviy natijalar, MHXS, sun’iy intellekt, professional mulohaza, keys-stadi, inson nazorati.*

Kirish

Moliyaviy natijalarni talqin qilish buxgalteriya hisobi ta’limining eng murakkab yo‘nalishlaridan biridir. Talaba yoki tadqiqotchi tushum, sotish tannarxi, yalpi foyda, operatsion foyda va sof foydani faqat formulalar yordamida hisoblash bilan cheklanmasligi, ularning tan olinishi, tasniflanishi va taqdim etilishi ortidagi iqtisodiy mazmunni ham tushunishi kerak. Bir xil raqamli natija turli hisob siyosati, shartnoma shartlari yoki hisobot perimetri sababli turlicha izohlanishi mumkin. Shu bois moliyaviy natijalar bo‘yicha professional mulohaza tayyor javobni yodlashdan ko‘ra, dalilni topish, hisobni qayta bajarish va xulosaning chegarasini belgilash ko‘nikmasiga tayanadi.

Generativ va tahliliy sun’iy intellekt katta hajmdagi hisobotlarni tez ko‘rib chiqish, jadval satrlarini ajratish, nisbatlarni hisoblash va muqobil izohlarni taklif etish imkonini beradi. Biroq SI hisobotning auditlangan yoki auditlanmaganligini, “operatsion foyda” atamasining aynan qaysi hisob siyosatiga tayanganini hamda bir ko‘rsatkichdagi o‘zgarishning sababini o‘z-o‘zidan ishonchli aniqlay olmaydi. UNESCO generativ SIdan ta’lim va tadqiqotda foydalanish inson markazidagi, axloqiy va tekshiriladigan yondashuvga asoslanishi lozimligini ta’kidlaydi (UNESCO, 2023). Shuning uchun buxgalteriya ta’limida SI insonning professional hukmini almashtiruvchi emas, balki tekshiriladigan yordamchi sifatida loyihalanishi zarur.

O‘zbekistonda 2030-yilgacha sun’iy intellekt texnologiyalarini rivojlantirish strategiyasi iqtisodiyot va ijtimoiy sohalarda SI yechimlarini kengaytirish hamda kadrlar salohiyatini oshirishni nazarda tutadi (O‘zbekiston Respublikasi Prezidenti, 2024). Bu vazifa oliy ta’limda faqat texnik vositani o‘rgatish emas, balki uning natijasini tanqidiy baholash va javobgarlikni

insonda saqlash kompetensiyasini shakllantirishni talab etadi. Mazkur tadqiqotning maqsadi aksiyadorlik jamiyatlari moliyaviy natijalarini MHXS doirasida o‘rganishga mos, inson va SI vazifalari aniq ajratilgan keys modelini ishlab chiqishdir.

Nazariy va metodik asos

UNESCOning o‘quvchilar uchun SI kompetensiyalari doirasi inson markazidagi fikrlash, SI etikasi, SI texnikasi va qo‘llanilishi hamda SI tizimini loyihalash kabi yo‘nalishlarni “tushunish — qo‘llash — yaratish” rivojlanish darajalari bilan bog‘laydi (UNESCO, 2024a). O‘qituvchilar uchun doirada esa insonning agentligi, mas’uliyatli foydalanish, SI pedagogikasi va kasbiy rivojlanish alohida ko‘rsatilgan (UNESCO, 2024b). Mazkur tamoyillar buxgalteriya hisobi ta’limiga moslashtirilsa, talaba avval hisobot satrining mazmunini tushunadi, keyin hisob-kitobni bajaradi va nihoyat dalil bilan cheklangan professional xulosa yaratadi.

MHXS bo‘yicha o‘qitishda ma’lumotning ishonchliligi birlamchi hisobotga qaytish orqali ta’minlanadi. Masalan, 18-sonli MHXS 2027-yildan foyda yoki zarar hisobotida operatsion foyda hamda moliyalashtirish va daromad solig‘igacha bo‘lgan foyda kabi aniqlangan oraliq ko‘rsatkichlarni joriy etadi; u agregatsiya va dezagregatsiya tamoyillarini ham kuchaytiradi (IFRS Foundation, 2024). Biroq mazkur standartni o‘rganishdagi asosiy kompetensiya yangi atamalarni yodlash emas, balki hisobot satrini uning iqtisodiy manbasi va hisob siyosati bilan bog‘lab talqin qilishdir.

Tadqiqot hujjatli keys-stadi va konseptual modellashtirish usullariga asoslandi. Empirik misol uchun “UzAuto Motors” AJning 2023–2024-yillardagi auditlangan konsolidatsiyalangan moliyaviy hisobotlari olindi. Tushum, sotish tannarxi, yalpi foyda, operatsion foyda va sof foyda ko‘rsatkichlari qayta hisoblandi; gorizontal o‘zgarishlar va rentabellik koeffitsientlari aniqlandi. Natijalar pedagogik keysning tarkibini ko‘rsatish uchun ishlatildi. Talabalar ishtirokidagi tajriba o‘tkazilmagani sababli model o‘zlashtirish darajasi yoki vaqt tejalishi haqida empirik da’vo qilmaydi.

Inson–SI hamkorligiga asoslangan keys modeli

Taklif etilayotgan model “tushunish — qo‘llash — yaratish” o‘quv zanjirini SI va insonning ikki xil mas’uliyat qatlamiga ajratadi. SI ma’lumotni topish, dastlabki hisobni bajarish va tahliliy savollar yaratishda yordam beradi. Inson esa manba maqomini, atama mazmunini, hisoblash bazasini, standartga moslikni va yakuniy xulosani tasdiqlaydi. Bunda “inson tasdig‘isiz yakuniy xulosa yo‘q” qoidasi modelning markaziy nazorat tamoyili hisoblanadi.

O‘quv darajasi	SI yordamchi vazifasi	Insonning majburiy vazifasi
1. Tushunish	Hisobot satrlari va atamalarini ajratish; savollar taklif qilish	Birlamchi manba, davr, birlik, audit maqomi va atama mazmunini tekshirish
2. Qo‘llash	Gorizontal o‘zgarish va marjalarni hisoblash; arifmetik nomuvofiqlikni belgilash	Formulani qayta bajarish, belgi va maxrajni tasdiqlash, taqqoslanuvchanlik chegarasini aniqlash
3. Yaratish	Muqobil talqin va ehtimoliy omillarni taklif qilish	Sababni dalilsiz tasdiqlamaslik, standart va izohlarga tayangan yakuniy professional mulohazani yozish

Manba: muallif tomonidan UNESCO (2023; 2024a; 2024b) tamoyillarini buxgalteriya hisobi ta’limiga moslashtirish asosida ishlab chiqilgan.

Keysning birinchi bosqichida o‘quvchiga faqat tayyor jadval emas, moliyaviy hisobotning nomi, davri, o‘lchov birligi va tegishli sahifasi beriladi. Ikkinchi bosqichda SI yoki elektron jadval yordamida o‘zgarish sur’ati hamda yalpi, operatsion va sof foyda marjalari hisoblanadi. Uchinchi bosqichda hisob-kitob inson tomonidan mustaqil qayta bajariladi. To‘rtinchi bosqichda “nima o‘zgardi?” va “nima sabab bo‘ldi?” savollari ajratiladi: birinchisiga jadval javob berishi mumkin, ikkinchisi uchun esa izohlar, hisob siyosati va tashqi iqtisodiy sharoit bo‘yicha qo‘shimcha dalil kerak bo‘ladi. Beshinchi bosqichda xulosa tasdiqlangan fakt, hisoblangan natija va ehtimoliy izoh chegaralarini saqlagan holda yoziladi.

“UzAuto Motors” AJ misolida keysning qo‘llanishi

Auditlangan hisobotga ko‘ra, 2023-yildan 2024-yilga “UzAuto Motors” AJ tushumi 8,03 foiz, yalpi foydasi 7,69 foiz, operatsion foydasi 18,31 foiz va sof foydasi 5,64 foiz kamaygan. Operatsion foydaning tushum va yalpi foydaga nisbatan tezroq pasayishi davr xarajatlari va boshqa operatsion moddalarni alohida ko‘rish zarurligini bildiradi. Shu bilan birga, bunday nisbatning o‘zi qaysi xarajat yoki hodisa asosiy sabab bo‘lganini isbotlamaydi. Aynan shu nuqta keysda SI taklif qilgan izohni inson qanday tekshirishi kerakligini ko‘rsatadi.

Ko‘rsatkich	2023-yil	2024-yil	O‘zgarish
Tushum, ming AQSh dollari	4 609 608	4 239 586	−8,03 %
Sotish tannarxi, ming AQSh dollari	3 978 952	3 657 419	−8,08 %
Yalpi foyda, ming AQSh dollari	630 656	582 167	−7,69 %
Operatsion foyda, ming AQSh dollari	469 169	383 267	−18,31 %
Sof foyda, ming AQSh dollari	333 765	314 948	−5,64 %
Yalpi rentabellik	13,68 %	13,73 %	+0,05 f.p.
Operatsion rentabellik	10,18 %	9,04 %	−1,14 f.p.
Sof foyda rentabelligi	7,24 %	7,43 %	+0,19 f.p.

Manba: “UzAuto Motors” AJning 2024-yil uchun auditlangan konsolidatsiyalangan moliyaviy hisoboti, foyda yoki zarar va boshqa umumlashgan daromad to‘g‘risidagi hisobot, 7-bet; foizlar muallif hisob-kitobi.

Jadval keys uchun uchta didaktik vaziyat yaratadi. Birinchidan, tushum va sotish tannarxi deyarli bir xil sur’atda kamaygani sababli yalpi rentabellik 0,05 foiz punktga yaxshilangan; shuning uchun faqat mutlaq yalpi foyda pasayishiga qarab samaradorlik yomonlashdi, deb qat’iy xulosa qilish noto‘g‘ri. Ikkinchidan, operatsion rentabellik 1,14 foiz punktga qisqargan va bu yalpi foydadan keyingi moddalarni tekshirish vazifasini yuzaga keltiradi. Uchinchidan, sof foyda rentabelligi 0,19 foiz punktga oshgan; demak, operatsion natija bilan yakuniy natija bir xil yo‘nalishda o‘zgarmagan. SI bu nomutanosibliklarni tez belgilashi mumkin, biroq moliyaviy daromadlar, kurs farqlari va soliq ta’sirini izohlarsiz sabab sifatida ko‘rsatmasligi kerak.

Model bo‘yicha o‘quvchining yakuniy javobi uch qismdan tuziladi: hisobot bilan tasdiqlangan fakt; ochiq formula orqali qayta hisoblangan ko‘rsatkich; qo‘shimcha dalil talab qiladigan talqin. Bunday tuzilma SI tomonidan ravon, ammo dalilsiz matn yaratilishi xavfini kamaytiradi. Shuningdek, NISTning SI risklarini boshqarish doirasi ilgari surgan ishonchlilik, baholash va boshqaruv tamoyillari bilan mos ravishda, o‘qituvchi keysning har bir bosqichida tekshiruv mezonini oldindan belgilashi mumkin (NIST, 2023).

Ilmiy-amaliy takliflar

Birinchidan, moliyaviy hisobot fanlaridagi har bir SI-topshiriq “manba — hisob — talqin — inson tasdig‘i” ketma-ketligida tuzilishi lozim. Topshiriqda kompaniya nomi, hisobot davri, valyuta va o‘lchov birligi ko‘rsatilmasa, SI javobi baholash uchun yetarli dalil hisoblanmasligi kerak.

Ikkinchidan, baholash mezonida yakuniy raqamning to‘g‘riligi bilan birga formula, manba, taqqoslanuvchanlik va xulosa chegarasi alohida ballanishi zarur. Bu yondashuv o‘quvchini SI javobini ko‘chiruvchi emas, uni tekshiruvchi va asosli qaror chiqaruvchi mutaxassis sifatida tayyorlaydi.

Uchinchidan, o‘qituvchi bir xil keys uchun ataylab bitta noto‘g‘ri birlik, noto‘g‘ri maxraj yoki dalilsiz sababiy izoh kiritilgan SI javobini ham taqdim etishi mumkin. Talabadan xatoni topish va tuzatish talab etilishi professional skeptitsizmni shakllantiradi. Bunda maxfiy shartnomalar yoki korxonaning yopiq ma’lumotlari ommaviy SI tizimiga yuklanmasligi shart.

Xulosa

Buxgalteriya hisobi ta’limida inson va sun’iy intellekt hamkorligining qiymati tayyor javob olishda emas, balki professional mulohazani dalil bilan qurish jarayonini yaxshiroq tashkil etishda namoyon bo‘ladi. Taklif etilgan keys modeli SIga ma’lumotni ajratish, hisoblash va savol yaratish vazifasini, insonga esa manbani tekshirish, MHXS mazmunini qo‘llash va yakuniy xulosa uchun javobgarlikni yuklaydi. “UzAuto Motors” AJ misoli mutlaq foyda, rentabellik va sababiy talqin bir xil tushuncha emasligini ko‘rsatdi. Modelning keyingi bosqichi uni buxgalteriya hisobi fanida tajriba-sinovdan o‘tkazish va talabalarning manba tekshiruvi, hisob aniqligi hamda professional mulohaza sifati bo‘yicha natijalarini o‘lchashdan iborat bo‘lishi mumkin.

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AVTOMOBIL SANOATI AKSIYADORLIK JAMIYATLARIDA MOLIYAVIY NATIJALARNI QIYOSIY TAHLIL QILISHDA INSON VA SUN’IY INTELLEKT HAMKORLIGI: “UZAUTO MOTORS” AJ VA “O‘Z-SEMYUNG KO” AJ QK MISOLIDA

Marupov Abdushukurbek Alijonovich
Andijon qishloq xo‘jaligi va agrotexnologiyalari instituti,
08.00.08 — “Buxgalteriya hisobi, iqtisodiy tahlil va audit” ixtisosligi tayanch doktoranti
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Annotatsiya. *Ushbu maqolada avtomobil sanoati aksiyadorlik jamiyatlarining moliyaviy natijalarini qiyosiy tahlil qilishda inson va sun’iy intellekt vazifalarini birlashtiruvchi “hisobla — qiyosla — izohla — tasdiqla” protokoli taklif etiladi. “UzAuto Motors” AJ hamda “O‘z-SeMyung Ko” AJ QKning 2024-yilga oid rasmiy moliyaviy hisobotlari asosida sotish tannarxi ulushi, yalpi, operatsion/asosiy faoliyat va sof foyda rentabelligi qiyoslandi. Natijalar yetkazib beruvchi korxonada yalpi rentabellik yuqoriroq bo‘lsa-da, yalpi foydadan asosiy faoliyat va sof foydagacha bo‘lgan marja yo‘qotilishi kattaroq ekanini ko‘rsatdi. SI nisbatlarni hisoblash va nomutanosibliklarni aniqlashda yordam beradi, inson esa hisobot bazasi, atamalar taqqoslanuvchanligi va sababiy xulosalarning asoslanganligini tekshiradi.*

Kalit so‘zlar: *moliyaviy natijalar, qiyosiy tahlil, sun’iy intellekt, inson nazorati, marja kaskadi, aksiyadorlik jamiyati, avtomobil sanoati.*

Kirish

Aksiyadorlik jamiyatlarining moliyaviy natijalarini qiyoslash investorlar, boshqaruv organlari va tadqiqotchilar uchun korxonaning daromad yaratish qobiliyati hamda xarajatlar yukini baholashga xizmat qiladi. Biroq qiyosiy tahlil faqat ko‘rsatkichlarni yonma-yon joylashtirishdan iborat emas. Korxonalar turli valyutada hisobot berishi, konsolidatsiya perimetri farqlanishi va foyda subtotallari bir xil nom bilan berilmasligi mumkin. Shuning uchun avtomatik hisoblangan farq professional tahliliy xulosaga aylanishidan oldin inson tomonidan tekshirilishi lozim.

Sun’iy intellekt moliyaviy hisobotlardan satrlarni ajratish, koeffitsientlarni hisoblash, davrlar va korxonalar o‘rtasidagi keskin farqlarni aniqlashda tahlilchiga yordam berishi mumkin. Ammo SI “operatsion foyda” va milliy hisobotdagi “asosiy faoliyat foydasi” mazmunan to‘liq tengmi, ikki hisobotning auditi va konsolidatsiya doirasi bir xilmi yoki farqning sababi qaysi xarajat moddasiga bog‘liqmi, degan savollarga qo‘shimcha dalilsiz qat’iy javob bera olmaydi. Shu sababli inson–SI hamkorligi mexanik tezlik bilan professional ehtiyotkorlikni birlashtirishi kerak.

Tadqiqotning maqsadi “UzAuto Motors” AJ va “O‘z-SeMyung Ko” AJ QK misolida moliyaviy natijalarni qiyosiy tahlil qilish uchun inson tasdig‘iga asoslangan SI yordamchi protokolini ishlab chiqish va 2024-yil marja ko‘rsatkichlarida uning analitik imkoniyatini namoyish etishdir. Tadqiqot vazifalari hisobot bazasini normallashtirish, nisbiy ko‘rsatkichlarni hisoblash, marja kaskadini qiyoslash, taqqoslanuvchanlik cheklovlarini aniqlash va dalil bilan chegaralangan xulosalarni shakllantirishdan iborat.

Tadqiqot metodikasi

Tadqiqot hujjatli qiyosiy tahlil usuliga asoslandi. “UzAuto Motors” AJning 2024-yil auditlangan konsolidatsiyalangan MHXS hisoboti hamda “O‘z-SeMyung Ko” AJ QKning 2024-yil yakunlari bo‘yicha rasmiy yillik va konsolidatsiyalangan hisobot ma’lumotlari olindi. Mutlaq summalar turli valyutada ifodalanganligi sababli ular bevosita qiyoslanmadi. Tahlil yagona maxraj — tushumga nisbatan hisoblangan foiz ko‘rsatkichlari orqali bajarildi.

Asosiy formulalar quyidagicha belgilandi: sotish tannarxi ulushi = sotish tannarxi / tushum × 100; yalpi rentabellik = yalpi foyda / tushum × 100; operatsion yoki asosiy faoliyat rentabelligi = tegishli foyda subtotali / tushum × 100; sof foyda rentabelligi = sof foyda / tushum × 100. Marja yo‘qotilishi yalpi rentabellikdan operatsion/asosiy faoliyat rentabelligini, keyin esa operatsion/asosiy faoliyat rentabelligidan sof foyda rentabelligini ayirish orqali aniqlandi.

Metodik cheklov sifatida “UzAuto Motors” AJning MHXS hisobotidagi operatsion foyda bilan “O‘z-SeMyung Ko” AJ QK yillik hisobotidagi asosiy faoliyat foydasi mutlaq bir xil standartlashtirilgan subtotal emasligi qayd etildi. Ular asosiy biznes faoliyati natijasining yaqin analitik ko‘rsatkichi sifatida qiyoslanadi, biroq to‘liq MHXS taqqoslanuvchanligi da’vo qilinmaydi. Mazkur farq inson tekshiruvining SI hisob-kitobiga qo‘shadigan eng muhim qiymatini ko‘rsatadi.

“Hisobla — qiyosla — izohla — tasdiqla” protokoli

Taklif etilgan protokol to‘rt izchil bosqichdan iborat. “Hisobla” bosqichida SI hisobot satrlarini jadvalga ajratadi va oldindan belgilangan formulalar bo‘yicha koeffitsientlarni hisoblaydi. “Qiyosla” bosqichida bir xil davr va maxraj asosidagi farqlar, marja bosqichlari va g‘ayrioddiy nomutanosibliklar belgilanadi. “Izohla” bosqichida SI bir nechta ehtimoliy savol yoki gipoteza taklif qiladi, lekin ularni fakt sifatida tasdiqlamaydi. “Tasdiqla” bosqichida mutaxassis birlamchi hisobot, hisob siyosati, izohlar, valyuta, davr va subtotal mazmunini tekshiradi hamda yakuniy xulosaga ruxsat beradi yoki uni qo‘shimcha ma’lumot olinmaguncha kechiktiradi.

Bosqich	SI bajarishi mumkin bo‘lgan ish	Insonning hal qiluvchi qarori
Hisobla	Satrlarni ajratish, formulani qo‘llash, qayta hisoblash	Manba, birlik, belgi, davr va maxrajni tasdiqlash
Qiyosla	Farq va marja yo‘qotishlarini aniqlash	Ko‘rsatkichlarning iqtisodiy va hisobiy taqqoslanuvchanligini baholash
Izohla	Muqobil savol va ehtimoliy omillar ro‘yxatini berish	Dalilsiz sababiy da’voni rad etish; zarur izohlarni tanlash
Tasdiqla	Hisobot loyihasi va xulosa matnini tartiblash	Yakuniy professional mulohaza, cheklov va tavsiyalar uchun javobgarlikni olish

Manba: muallif ishlanmasi; UNESCO (2023) va NIST AI RMF (2023)dagi inson markazidagi hamda ishonchlilikka yo‘naltirilgan tamoyillar moslashtirilgan.

Qiyosiy tahlil natijalari

Ko‘rsatkich, 2024-yil	“UzAuto Motors” AJ	“O‘z-SeMyung Ko” AJ QK	Farq (O‘SMK − UAM)
Sotish tannarxi ulushi	86,27 %	83,98 %	−2,29 f.p.

Ko‘rsatkich, 2024-yil	“UzAuto Motors” AJ	“O‘z-SeMyung Ko” AJ QK	Farq (O‘SMK − UAM)
Yalpi rentabellik	13,73 %	16,02 %	+2,29 f.p.
Operatsion/asosiy faoliyat rentabelligi	9,04 %	7,48 %	−1,56 f.p.
Sof foyda rentabelligi	7,43 %	4,85 %	−2,58 f.p.
Yalpi foydadan operatsion/asosiy foydagacha marja yo‘qotilishi	4,69 f.p.	8,54 f.p.	+3,85 f.p.
Operatsion/asosiy foydadan sof foydagacha marja yo‘qotilishi	1,61 f.p.	2,62 f.p.*	+1,01 f.p.

*Manba: “UzAuto Motors” AJning 2024-yil auditlangan konsolidatsiyalangan MHXS hisoboti; “O‘z-SeMyung Ko” AJ QKning 2024-yil yakunlari bo‘yicha rasmiy yillik va konsolidatsiyalangan hisobotlari; muallif hisob-kitobi. *Yaxlitlanmagan boshlang‘ich ko‘rsatkichlar bo‘yicha.*

2024-yilda “O‘z-SeMyung Ko” AJ QKning sotish tannarxi ulushi “UzAuto Motors” AJga nisbatan 2,29 foiz punktga past, yalpi rentabelligi esa shuncha miqdorda yuqori bo‘lgan. Dastlabki avtomatik signal yetkazib beruvchi korxonaning ishlab chiqarish bosqichidagi marjasi nisbatan qulayligini ko‘rsatadi. Biroq bu signal yakuniy samaradorlik xulosasi emas: korxonaning asosiy faoliyat rentabelligi 7,48 foiz va sof foyda rentabelligi 4,85 foizni tashkil etib, “UzAuto Motors” AJ ko‘rsatkichlaridan mos ravishda 1,56 va 2,58 foiz punktga past bo‘lgan.

Marja kaskadi ushbu nomutanosiblikni aniqroq ko‘rsatadi. “UzAuto Motors” AJda yalpi foydadan operatsion foydagacha 4,69 foiz punkt yo‘qotilgan bo‘lsa, “O‘z-SeMyung Ko” AJ QKda yalpi foydadan asosiy faoliyat foydasigacha yo‘qotish 8,54 foiz punktni tashkil etgan. Farq 3,85 foiz punkt. Demak, “O‘z-SeMyung Ko” AJ QKning tannarx bosqichidagi nisbiy ustunligi davr xarajatlari va boshqa asosiy faoliyat moddalari bosqichida kamaygan. Bu xulosa ko‘rsatkichlarning mexanik harakatini tasvirlaydi; aniq sababiy ulushni belgilash uchun sotish, ma’muriy va boshqa operatsion xarajatlar hamda asosiy faoliyatning boshqa daromadlari batafsil dekompozitsiya qilinishi kerak.

Ikkinchi marja bosqichida “UzAuto Motors” AJning operatsion foydadan sof foydagacha yo‘qotishi 1,61 foiz punktni, “O‘z-SeMyung Ko” AJ QKning tegishli yo‘qotishi yaxlitlanmagan bazada 2,62 foiz punktni tashkil etgan. SI ushbu farqni moliyaviy daromadlar, moliyaviy xarajatlar, valyuta kursi ta’siri yoki soliq omillarini tekshirish uchun signal sifatida belgilashi mumkin. Inson esa ularning qaysi biri haqiqiy sabab ekanini tegishli izohlarsiz tasdiqlamasligi lozim.

Muhokama

Qiyosiy tahlil natijalari sun’iy intellektning kuchli va zaif tomonlarini bir vaqtning o‘zida namoyon etadi. Uning kuchli tomoni standart formulalarni ko‘p marta xatosiz qo‘llash, ko‘rsatkichlar orasidagi qarama-qarshi yo‘nalishlarni aniqlash va tahlilchiga tekshirilishi kerak bo‘lgan savollarni tez taqdim etishdir. Zaif tomoni esa hisobot semantikasidir: konsolidatsiyalangan MHXS subtotalini milliy hisobot shaklidagi asosiy faoliyat foydasi bilan aynan teng deb qabul qilish noto‘g‘ri taqqoslanuvchanlik yaratishi mumkin.

Shu sababli tushuntiriladigan tahlil deganda faqat SI qanday formula ishlatganini ko‘rsatish emas, balki nima uchun aynan shu ikki ko‘rsatkich qiyoslanayotgani va qaysi cheklovlar saqlanib qolganini ochib berish tushunilishi kerak. Mazkur yondashuv NIST AI RMF doirasidagi ishonchlilik va riskni boshqarish tamoyillari hamda UNESCOning inson agentligini saqlash talabiga mos keladi. Korporativ tahlil amaliyotida SI chiqargan har bir keskin farq “tasdiqlangan xulosa” emas, “inson tekshirishi kerak bo‘lgan signal” sifatida belgilanishi maqsadga muvofiq.

Tadqiqotning ilmiy-amaliy yangiligi turli valyuta va hisobot shakllaridagi avtomobil sanoati korxonalarini mutlaq summalar emas, marja kaskadi orqali qiyoslash hamda SI tahlilini insonning professional taqqoslanuvchanlik hukmi bilan yakunlash protokolida ifodalanadi. Mazkur protokol dissertatsiyadagi moliyaviy natijalarni xalqaro standartlar asosida takomillashtirish yo‘nalishini inson–SI hamkorligi mavzusi bilan bog‘laydi, biroq u MHXS 15 bo‘yicha tushumni tan olish nazorat modeli yoki BHMS–MHXS transformatsiya jarayonini takrorlamaydi.

Amaliy tavsiyalar

Birinchidan, aksiyadorlik jamiyatlarining moliyaviy natijalarini SI yordamida qiyoslashdan oldin “davr — valyuta — o‘lchov birligi — konsolidatsiya perimetri — standart — subtotal ta’rifi” mezonlari inson tomonidan tekshirilishi kerak. Ushbu mezonlardan bittasi noma’lum bo‘lsa, natija yakuniy reyting sifatida taqdim etilmasligi lozim.

Ikkinchidan, turli valyutadagi korxonalar uchun valyutani sun’iy ravishda konvertatsiya qilishdan ko‘ra, tushumga nisbatan marja va xarajatlar ulushidan foydalanish maqsadga muvofiq. Bu usul valyuta kursi ta’sirini to‘liq bartaraf etmaydi, ammo korxonalar hajmidagi farqning tahlilni buzishini kamaytiradi.

Uchinchidan, SI tavsiya qilgan sabablar uch toifaga ajratilishi kerak: hisobot bilan tasdiqlangan; formula orqali hisoblangan; qo‘shimcha izoh talab qiladigan. Faqat birinchi ikki toifa bevosita natija sifatida, uchinchi toifa esa tadqiqot savoli sifatida yozilishi kerak.

Xulosa

“UzAuto Motors” AJ va “O‘z-SeMyung Ko” AJ QKning 2024-yil ko‘rsatkichlari qiyosi yalpi marja ustunligi operatsion va sof foyda ustunligini avtomatik ravishda anglatmasligini ko‘rsatdi. “O‘z-SeMyung Ko” AJ QKning yalpi rentabelligi yuqori bo‘lsa-da, yalpi foydadan asosiy faoliyat va sof foydagacha bo‘lgan marja yo‘qotishi kattaroq bo‘lgan. SI ushbu nomutanosiblikni tez aniqlab, tekshirish yo‘nalishini ko‘rsatishi mumkin; uning sababini tasdiqlash, hisobotlar taqqoslanuvchanligini baholash va yakuniy xulosani cheklash esa insonning professional vazifasidir. Taklif etilgan “hisobla — qiyosla — izohla — tasdiqla” protokoli sun’iy intellektni moliyaviy tahlilda inson hukmini kuchaytiruvchi, lekin uning o‘rnini egallamaydigan yordamchi vosita sifatida qo‘llash imkonini beradi.

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TALABALARDA IQTISODIY TAFAKKURNI RIVOJLANTIRISHNING PEDAGOGIK-PSIXOLOGIK ASOSLARI VA RAQAMLI TA’LIM MUHITIDA SHARQ MEROSINI INTEGRATSIYALASH IMKONIYATLARI

Ruziyeva Gulinoz Fatilloyevna
BDU, “Pedagogika” kafedrasi doktoranti, i.f.f.d, dotsent
gulinozfattiloyevna@gmail.com
https://doi.org/10.5281/zenodo.22895961

Annotatsiya. *Maqolada talabalarda iqtisodiy tafakkurni rivojlantirishning pedagogik-psixologik qonuniyatlari tahlil qilinadi. Talabalik davri (17–22 yosh) iqtisodiy tafakkurni maqsadli shakllantirish uchun sensitiv davr sifatida asoslanadi. Madaniy-tarixiy, kognitiv rivojlanish va tajribaviy o‘rganish nazariyalariga tayangan holda iqtisodiy tafakkurning to‘rt komponentli tuzilishi – kognitiv, operatsional-faoliyatli, aksiologik va refleksiv-prognostik komponentlar – ajratiladi, ularning diagnostik ko‘rsatkichlari va rivojlanganlik darajalari tavsiflanadi. Har bir komponentni rivojlantirishda Sharq mutafakkirlari ilmiy merosini integratsiyalash yo‘llari va raqamli hamda sun’iy intellektga asoslangan ta’lim vositalarining qo‘llash imkoniyatlari ko‘rsatib beriladi. Tadqiqot natijasida iqtisodiy tafakkurni rivojlantirishning besh bosqichli modeli va pedagogik shart-sharoitlari majmui taklif etiladi.*

Kalit so‘zlar: iqtisodiy tafakkur, talaba, Sharq mutafakkirlari merosi, aksiologik komponent, tajribaviy o‘rganish, eng yaqin rivojlanish zonasi, raqamli ta’lim muhiti, sun’iy intellekt, tabaqalashtirilgan yondashuv, pedagogik tashxis.

Abstract. The article analyses the pedagogical and psychological patterns underlying the development of economic thinking in university students. The student age (17–22) is substantiated as a sensitive period for the purposeful formation of economic thinking. Drawing on cultural-historical theory, cognitive development theory and experiential learning theory, the author distinguishes a four-component structure of economic thinking – cognitive, operational-activity, axiological and reflexive-prognostic – and describes their diagnostic indicators and levels of development. The paper shows how the scholarly heritage of Eastern thinkers can be integrated into the development of each component, and how digital and AI-based educational tools can support this process. As a result, a five-stage model and a set of pedagogical conditions for developing economic thinking are proposed.

Keywords: economic thinking, student, heritage of Eastern thinkers, axiological component, experiential learning, zone of proximal development, digital learning environment, artificial intelligence, differentiated approach, pedagogical diagnostics.

Kirish

Zamonaviy oliy ta’lim oldida turgan muhim vazifalardan biri – talabada nafaqat iqtisodiy bilim, balki iqtisodiy voqelikni mustaqil tahlil qila oladigan, oqilona va mas’uliyatli qaror qabul qila oladigan tafakkur tarzini shakllantirishdir. Bu vazifa raqamli transformatsiya va sun’iy intellekt texnologiyalarining ta’lim jarayoniga kirib kelishi sharoitida yanada dolzarblashmoqda: axborotga erishish osonlashgan bir vaqtda, uni tanqidiy baholash va qadriyat o‘lchovida idrok etish qobiliyati muhim ahamiyat kasb etmoqda.

Iqtisodiy tafakkurni rivojlantirish texnologiyasini ishlab chiqishdan avval uning psixologik-pedagogik mexanizmlarini aniqlash zarur. Mazkur maqolaning maqsadi – talabalarda iqtisodiy tafakkurni rivojlantirishning pedagogik-psixologik qonuniyatlarini asoslash, uning strukturaviy komponentlari va tashxis mezonlarini aniqlash hamda Sharq mutafakkirlari ilmiy merosini zamonaviy raqamli ta’lim muhitida integratsiyalash imkoniyatlarini ko‘rsatishdan iborat. Tadqiqotda nazariy tahlil, qiyosiy tahlil, tizimlashtirish va pedagogik modellashtirish usullaridan foydalanildi.

Asosiy qism

1. Talabalik davri – iqtisodiy tafakkurni shakllantirishning sensitiv bosqichi. Talabalik davri shaxsning kasbiy, intellektual va qadriyatlar tizimi shakllanishining hal qiluvchi bosqichidir. Psixologiyada bu davr «kech o‘smirlik – erta yetuklik» bosqichi sifatida tavsiflanadi. Aynan 17–22 yoshda mavhum-nazariy, gipotetik-deduktiv, refleksiv va tanqidiy tafakkur jadal rivojlanadi, masalani turli nuqtai nazardan ko‘rib chiqish va mavhum tushunchalar bilan ishlash qobiliyati shakllanadi. Shu bilan birga shaxsiy o‘zlikni anglash, dunyoqarashning shakllanishi va qadriyatlar tizimining barqarorlashuvi ham shu davrga to‘g‘ri keladi. Talaba ijtimoiy va iqtisodiy munosabatlarga faol kirib boradi, mustaqil hayotga tayyorlanadi. Bularning barchasi talabalik davrini iqtisodiy tafakkurni maqsadli rivojlantirish uchun sensitiv – eng qulay – davr sifatida belgilash imkonini beradi.

Iqtisodiy tafakkurning rivojlanishi keng ma’nodagi iqtisodiy sotsializatsiya jarayonining tarkibiy qismidir. A.Berti va A.Bombining tadqiqotlari iqtisodiy tushunchalar (pul, narx, foyda, bank) tasodifan emas, balki sodda kundalik tasavvurlardan murakkab tizimli bilimga qarab muayyan izchillikda shakllanishini empirik asoslagan [3]. Talabalik bosqichida bu jarayon ilmiy-nazariy darajaga ko‘tariladi: talaba iqtisodiy hodisalarni endi nafaqat hayotiy tajriba, balki ilmiy nazariya asosida tushuna boshlaydi. Aynan shu bosqichda Sharq mutafakkirlari merosining jalb etilishi iqtisodiy sotsializatsiyani milliy-madaniy qadriyatlar bilan boyitadi.

2. Tadqiqotning psixologik-nazariy negizi. Tadqiqotning psixologik negizini bir necha fundamental nazariya tashkil etadi. L.S.Vigotskiyning madaniy-tarixiy nazariyasi markaziy o‘rin egallaydi: «eng yaqin rivojlanish zonasi» konsepsiyasiga ko‘ra, talaba o‘qituvchi yoki tengdoshlari ko‘magida mustaqil bajara olmaydigan vazifalarni hal qila boradi va bu jarayonda yangi aqliy harakatlar tashqi, birgalikdagi faoliyatdan ichki, individual tafakkurga aylanadi (interiorizatsiya) [1]. Ushbu nazariya iqtisodiy tafakkurni rivojlantirishda hamkorlikdagi ta’lim, munozara va guruhli ishning ahamiyatini asoslaydi.

J.Piajening kognitiv rivojlanish nazariyasi iqtisodiy tushunchalarni egallash assimilyatsiya va akkomodatsiya mexanizmlari orqali, oddiydan murakkabga qarab bosqichma-bosqich kechishini ko‘rsatadi [2]. Bu shuni anglatadiki, yangi iqtisodiy tushuncha talabaning mavjud tasavvurlari bilan bog‘lanmasa, chuqur o‘zlashtirilmaydi. D.Kolbning tajribaviy o‘rganish nazariyasi bilimning to‘rt bosqichli yopiq sikl – konkret tajriba, refleksiv kuzatish, mavhum kontseptuallashtirish va faol eksperimentlash – orqali o‘zlashtirilishini asoslaydi [4]. Sharq mutafakkirlari merosidan olingan ibratli misollar, hikmatlar va tarixiy iqtisodiy vaziyatlar bu siklning «konkret tajriba» va «refleksiv kuzatish» bosqichlarini boyituvchi samarali didaktik vosita bo‘la oladi.

J.Dyuining «ish orqali o‘rganish» g‘oyasi faol metodlarning yetakchi rolini ko‘rsatsa [8], B.Blumning ta’lim maqsadlari taksonomiyasi iqtisodiy tafakkurning bilish darajalarini tabaqalashtirish imkonini beradi [7]: yuqori darajadagi iqtisodiy tafakkur aynan tahlil, sintez va baholash operatsiyalarida namoyon bo‘ladi.

3. Iqtisodiy tafakkurning strukturaviy komponentlari. Iqtisodiy tafakkurning psixologik tuzilishini tahlil qilish uni o‘zaro uzviy bog‘liq to‘rt komponentga ajratish imkonini beradi (1-jadval).

1-jadval

Iqtisodiy tafakkurning strukturaviy komponentlari va diagnostik ko‘rsatkichlari

Komponent	Mazmuni	Nazariy-metodologik asosi	Diagnostik ko‘rsatkichlar
Kognitiv (bilim)	Iqtisodiy tushuncha, qonuniyat va kategoriyalarni bilish va tushunish	Iqtisodiy savodxonlik nazariyasi; B.Blum taksonomiyasi [6; 7]	Iqtisodiy savodxonlik testi; tushunchalarni ta’riflash
Operatsional-faoliyatli	Bilimni tahlil, taqqoslash va qaror qabul qilishda qo‘llash	Faoliyatli yondashuv; D.Kolb modeli [4]	Keys-topshiriqlar; foyda-xarajat tahlili
Aksiologik (qadriyatli)	Halol mehnat, adolat, tejamkorlik va mas’uliyatga munosabat	Aksiologik yondashuv; Sharq merosi [9; 10]	Qadriyatli vaziyatdagi tanlov; munosabat so‘rovnomasi
Refleksiv-prognostik	O‘z iqtisodiy xulqini baholash va oqibatlarni bashorat qilish	Refleksiv ta’lim; tanqidiy fikrlash konsepsiyasi	Refleksiv hisobot; oqibatni bashoratlash topshirig‘i

To‘rt komponentli tuzilma tadqiqotning tashxislash apparati uchun nazariy asos bo‘lib xizmat qiladi. E’tiborli jihati shundaki, aksiologik komponent boshqa komponentlar bilan teng huquqli o‘rin egallaydi – bu Sharq mutafakkirlari merosiga tayangan tadqiqotning prinsipial uslubiy pozitsiyasidir. An’anaviy iqtisodiy ta’limda asosiy e’tibor ko‘pincha faqat kognitiv komponentga qaratiladi, natijada talaba iqtisodiy bilimga ega bo‘lsa-da, uni axloqiy-qadriyat o‘lchovida idrok etmaydi. Aynan aksiologik komponent iqtisodiy bilimning yo‘nalishini belgilaydi: bir xil iqtisodiy bilim ham ezgu, ham yovuz maqsadga xizmat qilishi mumkin – uni qaysi tomonga yo‘naltirishni shaxsning qadriyatlari hal qiladi.

4. Rivojlanganlik mezonlari va darajalari. Har bir komponent bo‘yicha uch daraja – past (reproduktiv), o‘rta (rekonstruktiv) va yuqori (ijodiy-produktiv) daraja farqlanadi. Kognitiv mezon bo‘yicha past darajadagi talaba tushunchalarni yuzaki, yodlangan tarzda bilsa, yuqori darajadagi talaba ularni tizimli biladi va yangi vaziyatga erkin ko‘chiradi. Operatsional mezon bo‘yicha past daraja namuna va ko‘mak bilan ishlash, yuqori daraja esa nostandart vaziyatda mustaqil va asosli qaror qabul qilish bilan tavsiflanadi. Aksiologik mezonda past daraja axloqiy-iqtisodiy me’yorlarni rasman qabul qilish, yuqori daraja esa qadriyatlarning barqaror e’tiqodga aylanib, xulqda namoyon bo‘lishi bilan; refleksiv mezonda esa past daraja o‘z xatosini tahlil qilmaslik, yuqori daraja mustaqil refleksiya va oqibatlarni bashorat eta olish bilan belgilanadi.

Mezonlarni operatsionallashtirish tashxis natijalarining ishonchliligini ta’minlaydi: kognitiv mezon iqtisodiy savodxonlik testidagi to‘g‘ri javoblar ulushi orqali [6], operatsional mezon keys-topshiriqlarni mustaqil hal qilish darajasi orqali, aksiologik mezon qadriyatli

vaziyatlardagi tanlov yo‘nalishi orqali, refleksiv mezon esa o‘z faoliyatini tahlil qilish chuqurligi orqali o‘lchanadi. Tashxisning kompleks xususiyati va metodlar triangulyatsiyasi natijalarning obyektivligini oshiradi.

5. Pedagogik metodlar, Sharq merosi va raqamli vositalarning uyg‘unligi. Psixologik qonuniyatlardan kelib chiqib, iqtisodiy tafakkurni rivojlantirishda faol va interaktiv metodlar yetakchi ahamiyat kasb etadi. 2-jadvalda har bir komponent uchun maqbul metodlar, Sharq merosini integratsiyalash yo‘nalishlari hamda raqamli va sun’iy intellektga asoslangan vositalarning qo‘llash imkoniyatlari tizimlashtirilgan.

2-jadval

Iqtisodiy tafakkur komponentlarini rivojlantirish metodlari va raqamli ta’lim muhitidagi imkoniyatlar

Komponent	Yetakchi metodlar	Sharq merosini integratsiyalash	Raqamli va SI vositalari imkoniyati
Kognitiv	Interaktiv ma’ruza, tushunchaviy xarita, evristik suhbat	Mutafakkirlar g‘oyalarini zamonaviy tushunchalar bilan qiyoslash	Adaptiv testlar; elektron xrestomatiya; tushunchalar bo‘yicha individual qayta aloqa
Operatsional-faoliyatli	Keys-stadi, ishbilarmonlik o‘yini, loyiha metodi	Tarixiy iqtisodiy vaziyatlar asosida keyslar tuzish	Iqtisodiy simulyatsiyalar; “nima bo‘ladi, agar…” stsenariylarini modellashtirish
Aksiologik	Munozara, axloqiy dilemma tahlili, qadriyatli vaziyat	G‘azzoliy, Navoiy g‘oyalari asosida axloqiy-iqtisodiy dilemmalar	Interaktiv dilemma-keyslar; munozara uchun muqobil nuqtai nazarlarni taqdim etish
Refleksiv-prognostik	Refleksiv kundalik, esse, prognostik topshiriq	Mutafakkirlar hikmatlari yuzasidan refleksiv esse yozish	Formativ qayta aloqa; o‘quv analitikasi asosida rivojlanish traektoriyasini kuzatish

Jadval Sharq merosini nazariy bayon darajasida emas, balki konkret didaktik vositalar – keys, dilemma, esse, loyiha – shaklida ta’lim jarayoniga kiritish yo‘llarini ko‘rsatadi. Raqamli texnologiyalar esa D.Kolbning tajribaviy o‘rganish siklini to‘liq amalga oshirishga xizmat qiladi: interaktiv simulyatsiyalar talabaga real iqtisodiy jarayonlarni modellashtirilgan muhitda xavf-xatarsiz «boshdan kechirish» imkonini beradi, meros manbalarining raqamli formatda taqdim etilishi esa ularni zamonaviy talabaga yaqinlashtiradi.

Ayni vaqtda sun’iy intellekt vositalarini qo‘llashda ikki cheklovni hisobga olish zarur. Birinchidan, SI o‘qituvchining pedagogik qarorini almashtirmaydi, balki uni ma’lumot bilan ta’minlaydi: baholash va qadriyatli yo‘naltirish mas’uliyati o‘qituvchida qoladi. Ikkinchidan, aksiologik komponentni shakllantirish tirik dialog, munozara va shaxsiy namunani talab qiladi –

bu sohada texnologiya faqat yordamchi vosita bo‘la oladi. Xalqaro tavsiyalarda ham SI dan foydalanishning pedagogik nazorat va shaffoflik tamoyillariga bo‘ysundirilishi ta’kidlanadi [11].

6. Rivojlantirish bosqichlari va pedagogik shart-sharoitlar. Talabalarda iqtisodiy tafakkurni rivojlantirish jarayoni izchil bosqichlardan iborat: motivatsion-yo‘naltiruvchi bosqich (iqtisodiy bilimga qiziqish uyg‘otish – mutafakkirlar hikmatlari orqali ma’naviy yaqinlik hosil qilish); bilim-mazmuniy bosqich (tushuncha va qonuniyatlarni o‘zlashtirish); operatsional-amaliy bosqich (bilimni tahlil va qaror qabul qilishda qo‘llash); aksiologik-tarbiyaviy bosqich (iqtisodiy qadriyat va e’tiqodlarni shakllantirish); refleksiv-baholovchi bosqich (o‘z iqtisodiy tafakkuri va xulqini baholash). Sharq merosi har bir bosqichda o‘ziga xos vazifa bajaradi: motivatsion bosqichda qiziqish uyg‘otuvchi, bilim bosqichida chuqurlashtiruvchi, amaliy bosqichda misol-material beruvchi, aksiologik bosqichda tarbiyalovchi va refleksiv bosqichda mulohaza uyg‘otuvchi vosita sifatida.

Jarayonning samaradorligi bir qator pedagogik shart-sharoitlarga bog‘liq: o‘quv jarayonini faol va interaktiv metodlar asosida tashkil etish; Sharq merosini tizimli va maqsadli integratsiyalash; tabaqalashtirilgan yondashuvni qo‘llash – topshiriqlarning murakkabligi, ko‘rsatiladigan ko‘mak miqdori va o‘quv sur’atini talabaning individual imkoniyatlariga moslashtirish, bu esa har bir talabaning «eng yaqin rivojlanish zonasi»da ishlashini ta’minlaydi [1]; o‘qituvchining kasbiy tayyorgarligi – predmet bilimi va pedagogik mahoratning uyg‘unligi (L.Shulman ta’biri bilan «pedagogik mazmuniy bilim») [5]; talabaning ichki motivatsiyasini rivojlantiruvchi muhit; hamda to‘rtala komponentning muvozanatli rivojlanishi.

Alohida ta’kidlash joizki, iqtisodiy tafakkurning yakuniy maqsadi – uning real iqtisodiy xulq-atvorda namoyon bo‘lishidir. Biroq tafakkur va xulq o‘rtasida avtomatik bog‘liqlik yo‘q: talaba to‘g‘ri iqtisodiy bilimga ega bo‘lsa-da, amalda boshqacha yo‘l tutishi mumkin. Bu «bilim – xulq» tafovutini bartaraf etishda barqaror qadriyat va e’tiqodlarning shakllanishi hal qiluvchi ahamiyatga ega – aynan shu nuqtada Sharq merosining tarbiyaviy salohiyati yaqqol namoyon bo‘ladi.

Xulosa

Olib borilgan tahlil quyidagi xulosalarni asoslash imkonini berdi. Birinchidan, talabalik davri iqtisodiy tafakkurni rivojlantirish uchun sensitiv davr bo‘lib, bu jarayon madaniy-tarixiy, kognitiv rivojlanish va tajribaviy o‘rganish nazariyalarida ochib berilgan qonuniyatlarga bo‘ysunadi. Ikkinchidan, iqtisodiy tafakkur kognitiv, operatsional-faoliyatli, aksiologik va refleksiv-prognostik komponentlarning yaxlitligi sifatida namoyon bo‘ladi; ularning muvozanatli rivojlanishi ta’limning bosh vazifasidir. Uchinchidan, Sharq mutafakkirlari ilmiy merosi ayniqsa aksiologik komponentni boyitib, iqtisodiy bilimni halollik, adolat, mehnatsevarlik va ijtimoiy mas’uliyat qadriyatlari bilan uzviy bog‘laydi. To‘rtinchidan, raqamli va sun’iy intellektga asoslangan vositalar bu jarayonni sezilarli darajada kuchaytirishi mumkin – lekin faqat pedagogik maqsadga bo‘ysundirilgan, o‘qituvchi nazoratidagi yordamchi vosita sifatida. Taklif etilayotgan besh bosqichli model va pedagogik shart-sharoitlar majmui oliy ta’lim muassasalarida iqtisodiy tafakkurni rivojlantirishning didaktik tizimini loyihalash uchun asos bo‘lib xizmat qilishi mumkin.

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QISHLOQ XO‘JALIGI XIZMATLARI BOZORIDA IQTISODIY MUNOSABATLARNI TAKOMILLASHTIRISH MEXANIZMLARI

Saidaxmedova Nodira Ilxomovna[1], Eshqulova Xilola Shoyimqul qizi[2]
[1]Iqtisodiyot fanlari doktori, DSc., professor
[2]Iqtisodiyot fanlari bo‘yicha falsafa doktori, PhD.
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Annotatsiya. *Ushbu maqolada qishloq xo‘jaligi xizmatlari bozorida shakllanadigan iqtisodiy munosabatlarning mazmuni, rivojlanish xususiyatlari va mavjud muammolari tadqiq etilgan. Qishloq xo‘jaligi ishlab chiqaruvchilari bilan xizmat ko‘rsatuvchi subyektlar o‘rtasidagi iqtisodiy aloqalarning samaradorligiga ta’sir etuvchi omillar, xizmatlarning narxi va sifati, shartnomaviy munosabatlar, moliyaviy ta’minot hamda agroservis infratuzilmasining rivojlanganlik darajasi tahlil qilingan. Tadqiqot natijasida qishloq xo‘jaligi xizmatlari bozorida iqtisodiy manfaatlarni muvofiqlashtirish, xizmatlar sifati va ulardan foydalanish imkoniyatlarini oshirishga qaratilgan tashkiliy-iqtisodiy mexanizm taklif etilgan. Mazkur mexanizmda raqamli xizmatlardan foydalanish, shartnomaviy munosabatlarni takomillashtirish, xizmatlar narxini iqtisodiy asoslash, moliyaviy qo‘llab-quvvatlash va xizmat ko‘rsatuvchi subyektlar o‘rtasidagi raqobat muhitini rivojlantirishga alohida e’tibor qaratilgan. Tadqiqot natijalari qishloq xo‘jaligi xizmatlari bozorining samaradorligini oshirish va ishlab chiqaruvchilarning xizmatlardan foydalanish imkoniyatlarini kengaytirishga xizmat qiladi.*

Kalit so‘zlar: *qishloq xo‘jaligi, qishloq xo‘jaligi xizmatlari, agroservis, xizmatlar bozori, iqtisodiy munosabatlar, xizmat ko‘rsatuvchi subyektlar, fermer xo‘jaliklari, tashkiliy-iqtisodiy mexanizm, xizmatlar sifati, raqobat muhiti, raqamli xizmatlar, moliyaviy ta’minot.*

Kirish. Qishloq xo‘jaligining samarali rivojlanishida ishlab chiqaruvchilarni zamonaviy agrotexnik, texnik, moliyaviy, maslahat va innovatsion xizmatlar bilan ta’minlash muhim ahamiyatga ega. Bugungi kunda O‘zbekistonda agroservis xizmatlarini rivojlantirish, fermerlarning bilim va innovatsiyalardan foydalanish imkoniyatlarini kengaytirish hamda raqamli xizmatlarni joriy etishga alohida e’tibor qaratilmoqda. Shu bilan birga, qishloq xo‘jaligi xizmatlari bozorida xizmatlarning narxi va sifati, ulardan foydalanish imkoniyati, xizmat ko‘rsatuvchi subyektlar bilan ishlab chiqaruvchilar o‘rtasidagi shartnomaviy munosabatlar hamda iqtisodiy manfaatlarning muvofiqligi bilan bog‘liq masalalar mavjud. Bu esa xizmatlar bozorida iqtisodiy munosabatlarni takomillashtirishning samarali mexanizmlarini ishlab chiqishni talab etadi.

Shundan kelib chiqib, mazkur tadqiqotning maqsadi qishloq xo‘jaligi xizmatlari bozoridagi iqtisodiy munosabatlarning xususiyatlarini o‘rganish va ularni takomillashtirish bo‘yicha ilmiy-amaliy takliflar ishlab chiqishdan iborat.

Adabiyotlar sharhi. Xorijiy olimlar tomonidan qishloq xo‘jaligi xizmatlari bozoridagi iqtisodiy munosabatlar asosan xizmat ko‘rsatish tizimining samaradorligi, fermerlarning bozorga kirish imkoniyatlari va tranzaksiya xarajatlarini kamaytirish nuqtayi nazaridan tadqiq etilgan. R. Birner, K. Davis, J. Pender, E. Nkonya va boshqalar qishloq xo‘jaligi maslahat xizmatlarini boshqaruv, moliyalashtirish, xizmat ko‘rsatuvchilar salohiyati va xizmat ko‘rsatish usullari

asosida takomillashtirish zarurligini asoslagan. P. Pingali, Y. Khwaja va M. Meijer esa fermerlarning bozor munosabatlariga kirishida tranzaksiya xarajatlari va shartnomaviy talablarning muhimligini ko‘rsatgan. C. Poulton, A. Dorward kichik fermer xo‘jaliklarini rivojlantirishda xizmatlar, institutlar va vositachilik tizimining ahamiyatini yoritgan. Shuningdek, M.L. Cook qishloq xo‘jaligi kooperatsiyalarining iqtisodiy munosabatlarni muvofiqlashtirishdagi rolini tadqiq etgan. Mazkur tadqiqotlar xizmatlar bozorida raqobat, kooperatsiya, shartnomaviy munosabatlar va tranzaksiya xarajatlarini boshqarish muhimligini ko‘rsatadi.

Mahalliy olimlardan Q.J. Mirzayev agroservis xizmatlari samaradorligini oshirishning metodologik asoslarini, S.N. Xamrayeva qishloq xo‘jaligiga xizmat ko‘rsatuvchi infratuzilmani innovatsion rivojlantirish masalalarini, Z.M. Muqimov fermer xo‘jaliklariga xizmat ko‘rsatish va moddiy-texnik ta’minot tizimini takomillashtirish yo‘nalishlarini tadqiq etgan. R.X. Ergashev va S.N. Xamrayeva qishloq xo‘jaligi infratuzilmasining iqtisodiy jihatlarini yoritgan bo‘lsa, Q.A. Choriyev fermer va dehqon xo‘jaliklarini kooperatsiya jarayonlariga jalb etish masalalarini o‘rgangan. So‘nggi tadqiqotlarda I. Kudratova agroservis xizmatlarida shaffoflik, raqobat, qiymat yaratish zanjiri va raqamli texnologiyalardan foydalanish masalalariga e’tibor qaratgan. Shunga qaramay, xizmat ko‘rsatuvchi subyektlar va qishloq xo‘jaligi ishlab chiqaruvchilari o‘rtasidagi iqtisodiy manfaatlarni muvofiqlashtirish, xizmatlar narxi va sifati hamda shartnomaviy munosabatlarni yagona mexanizm asosida takomillashtirish masalalari yetarlicha kompleks tadqiq etilmagan.

Tadqiqot metodologiyasi. Tadqiqotda qishloq xo‘jaligi xizmatlari bozoridagi iqtisodiy munosabatlarni o‘rganishda tizimli va kompleks yondashuvdan foydalanildi. Tadqiqot jarayonida tahlil va sintez, taqqoslash, guruhlash, induksiya va deduksiya usullari qo‘llanildi. Shuningdek, qishloq xo‘jaligi ishlab chiqaruvchilari va xizmat ko‘rsatuvchi subyektlar o‘rtasidagi iqtisodiy munosabatlarning shakllanishiga ta’sir etuvchi omillar o‘rganildi. Tadqiqotning metodologik asosini qishloq xo‘jaligi xizmatlari bozorida talab va taklifning o‘zaro ta’siri, xizmatlar narxi va sifati, shartnomaviy munosabatlar, raqobat muhiti hamda iqtisodiy manfaatlarni muvofiqlashtirish tamoyillari tashkil etadi. Olingan natijalar asosida xizmatlar bozorining samaradorligini oshirishga yo‘naltirilgan taklif va tavsiyalar ishlab chiqildi.

Tahlil va natijalar. Qishloq xo‘jaligi xizmatlari bozori ishlab chiqarish jarayonining uzluksizligini ta’minlovchi o‘ziga xos iqtisodiy tizim bo‘lib, unda xizmat ko‘rsatuvchi subyektlar va qishloq xo‘jaligi ishlab chiqaruvchilari o‘rtasidagi munosabatlar talab, taklif, narx, sifat va manfaatdorlik omillari asosida shakllanadi. Bunda xizmatga bo‘lgan talab oddiy iste’mol talabidan farqli ravishda mavsumiylik, ishlab chiqarish texnologiyasi va tabiiy-iqlim sharoitlariga bevosita bog‘liq. Masalan, agrotexnik, texnik, sug‘orish, o‘simliklarni himoya qilish yoki veterinariya xizmatlarining kechiktirilishi keyingi ishlab chiqarish jarayonlariga salbiy ta’sir qilishi mumkin. Shu sababli xizmatning nafaqat mavjudligi, balki kerakli vaqtda, kerakli joyda va maqbul narxda ko‘rsatilishi uning iqtisodiy qiymatini belgilaydi.

Tahlil natijalari qishloq xo‘jaligi xizmatlari bozoridagi asosiy iqtisodiy muammolardan biri talab va taklifning hududiy hamda mavsumiy jihatdan nomutanosib shakllanishi ekanligini ko‘rsatadi. Ishlab chiqaruvchilar uchun xizmatga ehtiyoj ko‘pincha qisqa muddatda keskin ortadi, xizmat ko‘rsatuvchi subyektlar esa bunday talabni to‘liq qondirish uchun yetarli texnika, mutaxassis yoki moliyaviy imkoniyatga ega bo‘lmasligi mumkin. Natijada xizmat narxining oshishi, xizmatni kutish muddati uzayishi yoki ishlab chiqaruvchining o‘z imkoniyatlari hisobidan qo‘shimcha xarajat qilishi yuzaga keladi. Demak, xizmatlar bozorida samaradorlikni

oshirish uchun xizmat ko‘rsatuvchi subyektlarning faqat sonini ko‘paytirish emas, balki ularning hududiy joylashuvi va xizmat quvvatlarini talab tarkibiga moslashtirish zarur.

Ikkinchi muhim masala xizmat narxi va uning iqtisodiy qiymati o‘rtasidagi nisbat bilan bog‘liq. Xizmat narxining shakllanishida texnika va yoqilg‘i xarajatlari, mehnat haqi, ehtiyot qismlar, logistika va boshqa xarajatlar hisobga olinadi. Biroq ishlab chiqaruvchi uchun xizmatning haqiqiy qiymati uning ishlab chiqarish natijasiga ta’siri bilan belgilanadi. Shu nuqtayi nazardan xizmat narxini faqat xarajatlarni qoplash tamoyili asosida belgilash yetarli emas. Narx shakllanishida xizmatning sifati, tezkorligi, ishlab chiqaruvchiga keltiradigan iqtisodiy samarasi va bozor sharoitidagi raqobat darajasi ham hisobga olinishi lozim.

Xizmatlar bozoridagi yana bir muhim jihat — xizmat ko‘rsatuvchi va xizmatdan foydalanuvchi o‘rtasidagi axborot nomutanosibligidir. Ishlab chiqaruvchi ayrim hollarda xizmatning texnologik sifati yoki uning natijadorligini oldindan to‘liq baholay olmaydi. Xizmat ko‘rsatuvchi subyekt esa o‘z xizmatining imkoniyatlari va xarajatlari haqida ko‘proq ma’lumotga ega bo‘ladi. Bunday vaziyat shartnoma shartlarining noaniqligi, xizmat sifatini nazorat qilishning murakkabligi va manfaatlar to‘qnashuviga olib kelishi mumkin. Shuning uchun iqtisodiy munosabatlarni takomillashtirishda xizmat turi, hajmi, muddati, narxi, sifat ko‘rsatkichlari va tomonlarning javobgarligini aniq belgilovchi standartlashtirilgan shartnomaviy mexanizmlar muhim ahamiyat kasb etadi.

Shuningdek, xizmatlar bozorida raqobatning yetarli darajada shakllanmaganligi iqtisodiy munosabatlarning samaradorligiga ta’sir qiluvchi omillardan biridir. Muayyan hududda xizmat ko‘rsatuvchi subyektlar sonining cheklanganligi ishlab chiqaruvchining tanlov imkoniyatini kamaytiradi. Tanlovning cheklanishi esa xizmat narxi, sifati va ko‘rsatish shartlari bo‘yicha raqobatni susaytirishi mumkin. Shu sababli xususiy agroservis subyektlarini rivojlantirish, kichik xizmat ko‘rsatuvchi korxonalarni bozorga jalb qilish, kooperativ xizmat shakllarini kengaytirish va raqamli platformalar orqali xizmat ko‘rsatuvchilarni ishlab chiqaruvchilar bilan bevosita bog‘lash bozor mexanizmining samaradorligini oshiradi.

Tadqiqot natijalariga ko‘ra, qishloq xo‘jaligi xizmatlari bozoridagi iqtisodiy munosabatlarni faqat xizmat ko‘rsatish jarayoni bilan cheklab bo‘lmaydi. Ular talabni aniqlash, xizmatni tanlash, narxni shakllantirish, shartnoma tuzish, moliyalashtirish, xizmat sifatini nazorat qilish va yakuniy iqtisodiy natijani baholash bosqichlarini qamrab olishi kerak. Shu asosda xizmatlar bozorining samarali mexanizmi

“talabni aniqlash → xizmatni tanlash → shartnomalashtirish → narxni belgilash → moliyalashtirish → xizmat ko‘rsatish → sifat nazorati → natijani baholash”

ketma-ketligi asosida tashkil etilishi taklif etiladi.

Mazkur yondashuvning asosiy afzalligi shundaki, unda xizmat ko‘rsatuvchi subyektning daromadliligi bilan qishloq xo‘jaligi ishlab chiqaruvchisining iqtisodiy manfaatlari o‘zaro bog‘lanadi. Ya’ni xizmat ko‘rsatuvchining manfaatdorligi faqat xizmat hajmiga emas, balki xizmatning sifati va yakuniy natijasiga ham bog‘lanadi. Natijada qishloq xo‘jaligi xizmatlari bozori oddiy “xizmat ko‘rsatish” tizimidan ishlab chiqarish samaradorligini oshirishga yo‘naltirilgan iqtisodiy hamkorlik tizimiga aylanadi.

1-jadval

Qishloq xo‘jaligi xizmatlari bozorida iqtisodiy munosabatlarni takomillashtirish mexanizmi

№	*Mexanizm elementi*	*Amalga oshirish mazmuni*	*Asosiy ko‘rsatkich / formula*	*Istiqbolli natija*
1	**Talabni aniqlash**	Fermer va xo‘jaliklarning xizmatlarga bo‘lgan mavsumiy, hududiy va texnologik ehtiyojlarini aniqlash	**$DT = \Sigma D_i$**, bu yerda DT – jami xizmat talabi, D_i – i-xizmatga talab	Xizmatlar taklifi real talabga moslashadi
2	**Xizmatlarni diversifikatsiya qilish**	Agrotexnik, texnik, veterinariya, logistika, maslahat, raqamli va moliyaviy xizmatlarni kengaytirish	**$DS = S_i / S_t \times 100$**, bu yerda S_i – i-xizmat ulushi	Ishlab chiqaruvchilarning xizmat tanlovi kengayadi
3	**Narxni iqtisodiy asoslash**	Xarajat, talab, raqobat va xizmatning iqtisodiy samarasi asosida narx shakllantirish	**$P = C + M$**, bu yerda P – xizmat narxi, C – xarajat, M – marja	Asossiz narx oshishining oldi olinadi
4	**Shartnomaviy munosabatlar**	Xizmat turi, muddati, narxi, sifati va tomonlarning javobgarligini shartnomada aniq belgilash	**$KS = BS / TS \times 100$**, bu yerda KS – shartnoma bajarilishi darajasi	Tomonlar manfaatlari muvofiqlashadi
5	**Xizmat sifatini baholash**	Xizmatning o‘z vaqtida, to‘liq va belgilangan standart asosida bajarilishini baholash	**$QS = \Sigma w_i q_i$**, $\Sigma w_i = 1$	Xizmat sifati va mijozlar qoniqishi oshadi
6	**Raqobat mexanizmi**	Bir hududda bir nechta xizmat ko‘rsatuvchi subyektlarning faoliyatini rag‘batlantirish	**$CI = N_i / N_t \times 100$**	Tanlov imkoniyati va raqobat kuchayadi
7	**Moliyaviy mexanizm**	Kredit, lizing, subsidiyalash va	**$FA = MF / MJ \times 100$**, bu yerda FA –	Fermerlarning xizmatlardan

		xizmatni bo‘lib to‘lash imkoniyatlarini kengaytirish	moliyaviy foydalanish imkoniyati	foydalanish imkoniyati ortadi
8	**Raqamlashtirish**	Xizmat buyurtmasi, narxlarni taqqoslash, shartnoma va to‘lovlarni raqamli platformaga o‘tkazish	**DR = RD / JT × 100**	Vaqt va tranzaksiya xarajatlari kamayadi
9	**Iqtisodiy manfaatlarni muvofiqlashtirish**	Xizmat ko‘rsatuvchi daromadi va ishlab chiqaruvchi iqtisodiy samaradorligini bir mexanizmda bog‘lash	**EM = ΔY − ΔX**, bu yerda ΔY – qo‘shimcha daromad, ΔX – qo‘shimcha xarajat	“Xizmat hajmi”dan “natijador xizmat” modeliga o‘tiladi
10	**Monitoring va nazorat**	Xizmat narxi, sifati, muddati va yakuniy natijasini muntazam baholash	**SI = R_a / R_r × 100**, bu yerda R_a – amaldagi natija, R_r – rejalashtirilgan natija	Xizmat ko‘rsatishdagi kamchiliklar tez aniqlanadi
11	**Yakuniy samaradorlik**	Mexanizmning ishlab chiqarish va xizmatlar bozoriga umumiy ta’sirini baholash	**ES = ΔD / ΔX**	Xizmat xarajatlari va ishlab chiqarish samaradorligi o‘rtasidagi nisbat yaxshilanadi
12	**Integral natija**	Xizmatlar bozori samaradorligini kompleks baholash	**IQXM = $\Sigma w_i Z_i$,** $\Sigma w_i = 1$	Qishloq xo‘jaligi xizmatlari bozorining barqaror va samarali rivojlanishi ta’minlanadi

Jadvalda qishloq xo‘jaligi xizmatlari bozorida iqtisodiy munosabatlarni takomillashtirishning mualliflik mexanizmi tizimli ravishda ifodalangan. Mazkur mexanizmning asosiy jihati shundan iboratki, qishloq xo‘jaligi xizmatlarini rivojlantirish faqat xizmatlar hajmini oshirish bilan emas, balki talabni aniqlash, xizmatlarni diversifikatsiya qilish, narx va sifatni muvofiqlashtirish, shartnomaviy munosabatlarni takomillashtirish hamda yakuniy iqtisodiy samaradorlikni baholash bilan bog‘liq yagona tizim sifatida qaraladi. Mexanizmning dastlabki bosqichi xizmatlarga bo‘lgan talabni aniqlashdan boshlanadi. Qishloq xo‘jaligida talabning mavsumiy va hududiy xususiyatga ega ekanligi sababli xizmatlar taklifini real ehtiyojga moslashtirish muhim hisoblanadi. Bu yondashuv xizmat ko‘rsatuvchi subyektlarning mavjud resurslaridan samarali foydalanishiga, ishlab chiqaruvchilarning esa zarur xizmatni o‘z vaqtida

olishiga imkon yaratadi. Shu bilan birga, xizmat turlarini diversifikatsiya qilish ishlab chiqaruvchilarning birgina xizmat turiga bog‘liqligini kamaytirib, kompleks agroservis tizimini shakllantirishga xizmat qiladi.

Mexanizmning muhim elementlaridan biri narx va sifatning o‘zaro bog‘liqligini ta’minlash hisoblanadi. Xizmat narxining faqat xarajatlar asosida shakllanishi yetarli emas. Unda xizmatning sifati, tezkorligi, ishlab chiqaruvchiga keltiradigan iqtisodiy samarasi va bozordagi raqobat darajasi ham hisobga olinishi lozim. Shu sababli xizmatning iqtisodiy qiymatini baholashda $\mathbf{ES = \Delta D / \Delta X}$ ko‘rsatkichidan foydalanish xizmatga sarflangan xarajat bilan undan olinadigan qo‘shimcha daromad o‘rtasidagi nisbatni aniqlash imkonini beradi.

Shartnomaviy munosabatlarni takomillashtirish esa xizmat ko‘rsatuvchi va ishlab chiqaruvchi o‘rtasidagi iqtisodiy manfaatlarni muvofiqlashtiruvchi asosiy vosita sifatida namoyon bo‘ladi. Shartnomada xizmat turi, muddati, narxi, sifati, tomonlarning huquq va majburiyatlari hamda javobgarligining aniq belgilanishi iqtisodiy noaniqlikni kamaytiradi. Natijada xizmat ko‘rsatish jarayonida yuzaga kelishi mumkin bo‘lgan manfaatlar to‘qnashuvi va nizolarni kamaytirish imkoniyati paydo bo‘ladi.

Jadvalda raqobat, moliyalashtirish va raqamlashtirish alohida mexanizm elementlari sifatida ajratilganligi ham muhimdir. Xizmat ko‘rsatuvchi subyektlar o‘rtasidagi raqobat ishlab chiqaruvchiga tanlov imkoniyatini oshirsa, kredit, lizing va boshqa moliyaviy vositalar xizmatlardan foydalanish imkoniyatini kengaytiradi. Raqamli platformalar orqali xizmatni izlash, narxlarni taqqoslash, buyurtma berish, shartnoma tuzish va to‘lovlarni amalga oshirish esa tranzaksiya xarajatlari hamda vaqt sarfini qisqartirishga yordam beradi.

Mexanizmning yakuniy bosqichida monitoring, nazorat va integral baholash amalga oshiriladi. Bunda xizmatning faqat ko‘rsatilganligi emas, balki uning ishlab chiqarish natijasiga ta’siri ham baholanadi. $\mathbf{IQXM = \Sigma w_i Z_i}$ integral ko‘rsatkichi orqali xizmatlar bozorining narx, sifat, foydalanish imkoniyati, raqobat va iqtisodiy samaradorlik kabi turli jihatlarini yagona baholash tizimiga birlashtirish mumkin.

Umuman olganda, taklif etilayotgan mexanizm **“talab → xizmat → narx → shartnoma → moliyalashtirish → sifat → raqamlashtirish → monitoring → iqtisodiy natija”** ketma-ketligi asosida ishlaydi. Uning asosiy natijasi xizmatlar bozorida xizmat ko‘rsatuvchi subyektlarning manfaatdorligini saqlagan holda, qishloq xo‘jaligi ishlab chiqaruvchilarining sifatli, o‘z vaqtida va iqtisodiy jihatdan maqbul xizmatlardan foydalanish imkoniyatlarini kengaytirishdan iborat. Bu esa qishloq xo‘jaligi xizmatlari bozorini oddiy xizmat ko‘rsatish tizimidan ishlab chiqarish samaradorligini oshiruvchi integratsiyalashgan iqtisodiy hamkorlik tizimiga aylantirish imkonini beradi.

Xulosa va takliflar. Tadqiqot natijalari shuni ko‘rsatadiki, qishloq xo‘jaligi xizmatlari bozorining samarali rivojlanishi xizmatlar hajmini kengaytirish bilangina emas, balki xizmat ko‘rsatuvchi subyektlar va qishloq xo‘jaligi ishlab chiqaruvchilari o‘rtasidagi iqtisodiy munosabatlarni samarali tashkil etish bilan belgilanadi. Ayniqsa, xizmatlarning o‘z vaqtida ko‘rsatilishi, maqbul narx va sifatning ta’minlanishi, shartnomaviy munosabatlarning aniqligi hamda ishlab chiqaruvchilarning moliyaviy imkoniyatlarini hisobga olish muhim ahamiyatga ega. Tadqiqot davomida qishloq xo‘jaligi xizmatlari bozoridagi iqtisodiy munosabatlarni takomillashtirishning asosiy sharti sifatida talab va taklifni muvofiqlashtirish, raqobat muhitini kuchaytirish, xizmatlarni diversifikatsiya qilish, raqamli xizmatlardan foydalanishni kengaytirish va xizmat sifatini natijadorlik asosida baholash zarurligi asoslandi. Taklif etilgan mualliflik mexanizmi xizmat ko‘rsatuvchi subyektlar manfaatdorligi bilan qishloq xo‘jaligi ishlab

chiqaruvchilarining iqtisodiy manfaatlarini uyg‘unlashtirishga yo‘naltirilgan. Shu asosda qishloq xo‘jaligi xizmatlari bozorida iqtisodiy munosabatlarni takomillashtirish ishlab chiqarish xarajatlarini maqbullashtirish, xizmatlardan foydalanish imkoniyatlarini kengaytirish va pirovardida qishloq xo‘jaligi ishlab chiqarishining iqtisodiy samaradorligini oshirish uchun muhim omil bo‘lib xizmat qiladi.

2-jadval

Qishloq xo‘jaligi xizmatlari bozorida iqtisodiy munosabatlarni takomillashtirish bo‘yicha takliflar

№	Muammo	Taklif etilayotgan mexanizm	Amalga oshirish vositasi	Kutilayotgan natija
1	Xizmatlarga talabning mavsumiy va hududiy nomutanosibligi	Talabni oldindan aniqlash va xizmatlarni rejalashtirish	Elektron talab bazasi va hududiy xizmat xaritasi	Xizmatlardan foydalanish imkoniyati oshadi
2	Xizmat narxlarining iqtisodiy jihatdan har doim ham maqbul emasligi	Xarajat, raqobat va xizmat samaradorligiga asoslangan narx shakllantirish	Xizmatlar narxini monitoring qilish tizimi	Narxlarning shaffofligi va maqbulligi ta’minlanadi
3	Xizmat sifati bo‘yicha aniq mezonlarning yetarli emasligi	Xizmat sifatini natijadorlik asosida baholash	Sifat indikatorlari va reyting tizimi	Xizmat sifati va ishlab chiqaruvchi qoniqishi oshadi
4	Shartnomaviy munosabatlardagi noaniqlik	Standartlashtirilgan xizmat shartnomalarini joriy etish	Xizmat turi, muddati, narxi va javobgarlikni aniq belgilash	Iqtisodiy nizolar va noaniqlik kamayadi
5	Xizmat ko‘rsatuvchi subyektlar o‘rtasida raqobatning cheklanganligi	Xususiy va kooperativ agroservis subyektlarini rivojlantirish	Imtiyozli moliyalashtirish va xizmat bozoriga kirishni yengillashtirish	Tanlov imkoniyati va raqobat kuchayadi
6	Moliyaviy imkoniyatlarning cheklanganligi	Xizmatlarni kredit, lizing va bo‘lib to‘lash asosida moliyalashtirish	Bank va agroservis subyektlari hamkorligi	Xizmatlardan foydalanish doirasi kengayadi
7	Raqamli xizmatlardan foydalanishning yetarli darajada rivojlanmaganligi	Yagona raqamli agroservis platformasini shakllantirish	Buyurtma, narx, shartnoma, to‘lov va monitoringni raqamlashtirish	Vaqt va tranzaksiya xarajatlari qisqaradi
8	Xizmat samaradorligini yakuniy natija bilan bog‘lashning zaifligi	Natijaga yo‘naltirilgan xizmat modeli	**ES = ΔD / ΔX** ko‘rsatkichi asosida baholash	Xizmatning real iqtisodiy samarasi aniqlanadi

Jadvaldan ko‘rinadiki, qishloq xo‘jaligi xizmatlari bozoridagi mavjud muammolarni alohida-alohida hal qilishdan ko‘ra, ularni yagona iqtisodiy mexanizm doirasida o‘zaro bog‘lash samaraliroq hisoblanadi. Bunda birinchi navbatda xizmatlarga bo‘lgan talabni oldindan aniqlash va uni xizmat ko‘rsatuvchi subyektlarning taklifi bilan muvofiqlashtirish zarur. Bu xizmatlarning yetishmasligi yoki ortiqcha taklif qilinishi bilan bog‘liq nomutanosibliklarni kamaytiradi. Narx va sifat masalasida xizmatning qiymatini faqat ko‘rsatilgan xizmat hajmi bilan emas, balki uning ishlab chiqaruvchiga keltirgan iqtisodiy natijasi bilan baholash taklif etiladi. Ayniqsa, **ES = ΔD / ΔX** ko‘rsatkichi xizmatga sarflangan xarajatning qo‘shimcha daromad bilan qoplanish darajasini baholash imkonini beradi. Bu xizmat ko‘rsatuvchi subyektlarni sifatli va samarali xizmat ko‘rsatishga rag‘batlantiradi.

Shartnomaviy munosabatlarni standartlashtirish, o‘z navbatida, xizmat turi, muddati, narxi va sifatiga oid talablarni oldindan belgilash orqali tomonlarning iqtisodiy manfaatlarini himoya qiladi. Raqobatni kuchaytirish va xususiy agroservis subyektlarini bozorga faol jalb etish esa ishlab chiqaruvchilarga xizmat ko‘rsatuvchini tanlash imkoniyatini oshiradi. Takliflarning yana bir muhim yo‘nalishi raqamlashtirishdir. Yagona raqamli agroservis platformasi orqali ishlab chiqaruvchi zarur xizmatni izlash, xizmat ko‘rsatuvchilarni taqqoslash, buyurtma berish, shartnoma tuzish va to‘lovni amalga oshirish imkoniyatiga ega bo‘ladi. Natijada axborot nomutanosibligi va tranzaksiya xarajatlari kamayadi.

Umuman, taklif etilayotgan chora-tadbirlar **“talabni aniqlash → xizmatni tanlash → narxni belgilash → shartnomalashtirish → moliyalashtirish → xizmat ko‘rsatish → sifat nazorati → iqtisodiy natijani baholash”** yagona zanjirini shakllantirishga qaratilgan. Mazkur yondashuv qishloq xo‘jaligi xizmatlari bozorida iqtisodiy manfaatlarni muvofiqlashtirish va xizmatlarning yakuniy samaradorligini oshirish uchun institutsional asos yaratadi.

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ARTIFICIAL INTELLIGENCE AND DIGITAL DIPLOMACY: NEW OPPORTUNITIES IN DEVELOPING UZBEKISTAN’S NATIONAL BRAND

Saidova Nigina Sirodjiddin kizi
Doctoral student of the University of World Economy and Diplomacy
Email: saidnigina.phd2025@gmail.com
https://doi.org/10.5281/zenodo.22897354

Annotation. *The article analyzes the impact of artificial intelligence technologies on the transformation of digital diplomacy and the possibilities of their use for the development of the national brand of Uzbekistan. In addition, examines the evolution of digital diplomacy from the use of web platforms and social media to the application of generative artificial intelligence, big data analysis, automated translation, sentiment analysis, and personalized communication.*
Keywords: *Artificial intelligence, digital diplomacy, national branding, international image, Uzbekistan, digital transformation, AI diplomacy.*

Digital technologies and the Internet play the same role in modern international relations as nuclear technology did in the 20th century – as a key strategic tool, important for military leadership, economic growth, and foreign policy prestige. Artificial intelligence (AI) technologies play a particularly significant role today. Experts estimate that the transformative impact of AI in the 21st century will be comparable to the information revolution of the late 20th century, when the internet spread.

Three main areas of digital technology use in diplomacy can be identified, which define the subject area of this report:

• Digital technology as a tool of diplomacy;

• Digital technology as an object of international negotiations and diplomacy;

• Digital technology as a new environment in which diplomatic practice is implemented [1].

Research shows that digital technologies are influencing the institutional structures of diplomacy, the professional practices of diplomats, the nature of public engagement, and the ways in which international influence is generated [2].

Modern AI systems enable automated analysis of information flows, the creation of texts and visual content in multiple languages, the identification of public opinion trends, the classification of large data sets, and the adaptation of communications messages to different audiences. However, the impact of AI on diplomacy should not be interpreted solely in terms of technological progress. As I. Manor notes in her study 2026, the prospects for AI-driven diplomacy depend on institutional, social, and economic factors, and the development of artificial intelligence in diplomacy could lead to various scenarios from the expansion of diplomatic capabilities to the excessive automation of diplomatic activities [3].

These processes are particularly important in the area of national branding. In a competitive environment, states must not only pursue effective foreign policy but also ensure its clear and appealing presentation to international audiences. The concept of national branding, developed by S. Anholt, suggests that a state's international reputation is shaped by a

combination of political, economic, cultural, social, and communication factors [4]. A national brand, therefore, cannot be reduced to an advertising campaign: it is a reflection of a state's broader identity and reputation.

For Uzbekistan, this issue is particularly relevant given its active foreign policy and digital transformation. The Strategy for the Development of Artificial Intelligence Technologies until 2030, approved by Presidential Resolution No. PQ-358 of October 14, 2024, provides for the development of infrastructure, human resources, and the regulatory framework, as well as the expansion of AI applications across various fields [5]. The strategy's targets include increasing the volume of AI-based software products and services, developing research laboratories, and improving the country's position in international AI readiness rankings.

Uzbekistan possesses a significant set of resources capable of forming an attractive national brand: historical and cultural heritage, geographical location, tourism potential, human capital, educational development, economic reforms, and expanding international cooperation.

AI can be used to promote Uzbekistan's tourism potential by analyzing the interests of different traveler groups and creating personalized content. For example, potential tourists from Europe could be promoted to the historic cities of Samarkand, Bukhara, and Khiva, the cultural heritage of the Great Silk Road, and gastronomic tourism. For audiences from East Asia, the focus could be on cultural heritage, architecture, and unique travel experiences.

Culture is one of the most enduring components of a national brand. Uzbekistan has a rich historical heritage that can be presented to an international audience through digital technologies. AI can facilitate the creation of multilingual virtual guides, interactive digital archives, educational content, and personalized cultural routes.

The development of international educational cooperation is also becoming part of the national brand. AI can be used to promote Uzbek universities among international students, create multilingual educational platforms, and analyze international demand for educational programs.

Digital diplomacy allows the state to explain its foreign policy directly to foreign audiences. For Uzbekistan, this is especially important given the intensification of regional cooperation in Central Asia and the expansion of international ties.

Artificial intelligence is becoming a key factor in the transformation of modern digital diplomacy. Its importance lies not only in its ability to automate individual operations, but above all in its ability to transform the way diplomatic information is collected, analyzed, interpreted, and disseminated.

This creates fundamentally new opportunities for national branding. AI can enable states to more accurately understand foreign audiences, create multilingual and personalized content, track international public opinion, and quickly adjust communications strategies.

Uzbekistan's current digital transformation is creating the institutional preconditions for the further development of AI-assisted diplomacy. Official government documents highlight artificial intelligence as a priority area for technological development. The AI Strategy 2030 envisages the creation of a regulatory, technological, and personnel framework for the widespread implementation of artificial intelligence [6].

Official data also indicate the expansion of the country's digital infrastructure. The state digital government portal points to high internet coverage, an increase in the number of users of electronic government services, and Uzbekistan's improved position in international digital government and AI readiness rankings.

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GENERATIV SUN’IY INTELLEKT ASRIDA LIBOS DIZAYNI TA’LIMI: KREATIV GOMOGENIZATSIYADAN MUVOZANATLI “HUMAN-AI COLLABORATION” MODELIGA O‘TISH

Toshtemirova Mohichehra G‘olibjon qizi, **tadqiqotchi**
ORCID: 0009-0001-9834-659X
https://doi.org/10.5281/zenodo.22896042

Annotatsiya. *Ushbu maqolada oliy dizayn ta’limida generativ sun’iy intellekt (GenAI) modellarining joriy etilishi natijasida yuzaga kelayotgan huquqiy va kognitiv masalalar tahlil qilinadi. Tadqiqotda kreativ unifikatsiyalashuv muammolari ko‘rib chiqilib, inson ijodiy salohiyatini saqlashga qaratilgan muqobil baholash tizimi ishlab chiqishga harakat qilindi.*
Kalit so‘zlar: *Oliy ta’lim, Human-AI Collaboration, libos dizayni, kreativ gomogenizatsiya, data scraping, mualliflik huquqi.*
Abstract. *This article analyzes the legal and cognitive issues arising from the integration of generative artificial intelligence (GenAI) models in higher fashion design education. The study addresses the problems of creative unification, and an attempt was made to develop an alternative evaluation system aimed at preserving human creative potential.*
Keywords: *Higher education, Human-AI Collaboration, fashion design, creative homogenization, data scraping, copyright.*

Kirish. XXI asrning uchinchi o‘n yilligiga kelib, raqamli texnologiyalarning, xususan, neyrotarmoq va generativ sun’iy intellekt (GenAI) tizimlarining rivojlanishi barcha kreativ sohalar qatori libos dizayni nazariyasi va amaliyotini ham ma'lum ma'noda transformatsiya qilmoqda. Matn va vizual ma’lumotlarni gibrid ko‘rinishda qayta ishlovchi multimodal algoritmlar bugungi kunda dizaynerlik faoliyatining yordamchi qismiga aylanib bormoqda. O‘zbekiston Respublikasida ham raqamlashtirish va innovatsion texnologiyalarni amaliyotga joriy etish masalalari davlat siyosatining ustuvor yo‘nalishlaridan biri sifatida belgilangan.

Xususan, O‘zbekiston Respublikasi Prezidentining 2024-yil 14-oktabrdagi “Sun’iy intellekt texnologiyalarini 2030-yilga qadar rivojlantirish strategiyasini tasdiqlash to‘g‘risida”gi PQ-358-son qarori mamlakatimizda raqamli tarmoq mahsulotlari va sun'iy intellekt infratuzilmasini tizimli ravishda kengaytirishga xizmat qilmoqda[1]. Mazkur huquqiy-strategik hujjatlar nafaqat iqtisodiyot tarmoqlarini, balki oliy ta'lim tizimi va kreativ industriyani raqamlashtirish sharoitida sun'iy intellekt imkoniyatlaridan etik hamda xavfsiz foydalanish zaruriyatini ilmiy jihatdan asoslaydi. Biroq, texnologik integratsiyaning ushbu sur’ati oliy ta’lim va modalar industriyasida yangi akademik va huquqiy masalalarni kun tartibiga qo‘ymoqda. Ilgari dizaynerlik mehnatining asosi hisoblangan konseptual g‘oya yaratish va vizualizatsiya jarayoni endilikda dasturiy algoritmlar tomonidan qisqa vaqt ichida generatsiya qilinishi kuzatilmoqda. Ushbu tendensiya ikki asosiy masalani: intellektual mulk ob’ektlarining parametrik o‘zlashtirilishi *Data Scraping* [2;3] va bo‘lajak mutaxassislar kreativligining algoritmik *gomogenizatsiyalashuv*i xavfini [5; 7] yuzaga keltirishi mumkin. Mazkur tadqiqot ushbu muammolarning ilmiy-nazariy jihatlarini o‘rganish hamda oliy ta’lim tizimi uchun korreksion pedagogik yondashuvlarni *Human-AI Collaboration* [4; 6] tavsiya qilishga qaratilgan.

Asosiy qism. Multimodal neyrotarmoqlarning o‘qitilish jarayoni mustaqil mualliflar va xalqaro brendlarning raqamli vizual ma’lumotlar bazasiga asoslanadi. Mashina algoritmlari tomonidan amalga oshiriladigan *data scraping* (ruxsatsiz ma’lumot yig‘ish) jarayoni bugungi kunda mualliflik huquqi to‘g‘risidagi normalar doirasida muayyan huquqiy noaniqliklarni keltirib chiqarmoqda. AI tizimlari moda uylarining o‘ziga xos estetik yo‘nalishlarini tahlil qilib, gibrid dizaynlarni yaratganda, yakuniy tasvir qonunan yangi mahsulot sifatida baholansa-da, semantik jihatdan original ishning parametrik shakli bo‘lib qoladi [2; 3].

Oliy ta’lim va amaliyot jarayonida ushbu texnologiyalardan tizimsiz foydalanish talabalarda algoritmik qaramlikni keltirib chiqarishi mumkin. Talabalar vizual tasvirni neyrotarmoq so‘rovlari (prompt) orqali soniyalarda olishga o‘rganishi natijasida dizayn nazariyasida "*algoritmik bir xillik*" (algorithmic bias) fenomeni yuzaga kelmoqda. Neyrotarmoqlar statistik o‘rtacha qiymatlar bazasida ishlagani sababli, milliy madaniy meros unsurlari va individual mualliflik uslublari o‘rnini unifikatsiyalashgan gibrid dizaynlar egallashi hamda talabalarda amaliy muammolarni mustaqil yechish qobiliyatini cheklashi kuzatiladi [5; 7].

Ushbu masalalarni tizimli ko‘rib chiqish oliy ta’lim tizimining o‘quv metodologiyasini takomillashtirishni taqozo etadi. Mazkur yo‘nalishda O‘zbekiston Respublikasi Prezidentining 2024-yil 14-oktabrdagi “Sun’iy intellekt texnologiyalarini 2030-yilga qadar rivojlantirish strategiyasini tasdiqlash to‘g‘risida”gi PQ-358-son qarori talablaridan kelib chiqib, ta’lim tizimida sun’iy intellekt vositalarini taqiqlash emas, balki inson kreativligi va texnologiya imkoniyatlari o‘rtasidagi muvozanatli hamkorlikni ("Human-AI Collaboration") shakllantirish samarali yo‘nalish sifatida ko‘riladi [4; 6].

Shu munosabat bilan, dizayn yo‘nalishi talabalarining algoritmik qaramligini yumshatish maqsadida loyihalash bosqichlarini qamrab oluvchi integratsiyalashgan muqobil baholash mezonini taklif etish mumkin: *20% yoki ball* muammoning qo‘yilishi va konseptual tadqiqot (sketchbook, qoralama izlanishlar); *30% ball* inson omili (individual mualliflik eskizlari va milliy kontekst integratsiyasi); *20% ball* prompt-muhandislik bosqichi (GenAI vositalaridan uslubiy foydalanish); *30% ball* esa konstruktiv-texnologik yechim (tasvirni real lekalo va material xossalariga moslashtirish) uchun taqsimlanishini maqsadga muvofiq deb hisoblash mumkin.

Tadqiqot natijalarining umumiy xulosasi sifatida shuni ta’kidlash joizki, generativ sun’iy intellekt libos dizayni sohasiga yuqori tezkorlik va resurslarni tejash imkoniyatlarini olib kelgan bo‘lsa-da, u mualliflik huquqi tizimi hamda madaniy unifikatsiya masalalarini ham yuzaga keltirmoqda. Shu munosabat bilan, oliy ta’lim muassasalari tizimida raqamli texnologiyalar sharoitida yosh dizaynerlarning individual ijodiy tafakkurini, milliy identligini va tanqidiy fikrlash qobiliyatini qo‘llab-quvvatlash hamda ularda algoritmik yechimlarga qaramlik shakllanishining oldini olishga doir ko‘nikmalarni rivojlantirishni maqsadga muvofiq yo‘nalishlardan biri sifatida baholash mumkin.

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O‘SMIRLARNING MANTIQIY FIKRLASHI VA INTELLEKTUAL QOBILIYATLARINING RIVOJLANISHIDA OILA-MAKTAB HAMKORLIGINING PSIXOLOGIK XUSUSIYATLARI

Ummatkulova Nigora Umarqulovna
Oila va gender ilmiy tadqiqot instituti tayanch doktoranti
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Annotatsiya. *Tezisda o‘smirlarning mantiqiy fikrlashi va intellektual qobiliyatlarining rivojlanish xususiyatlari, mazkur jarayonga oila va maktab hamkorligining psixologik ta’siri empirik natijalar asosida tahlil qilinadi. Ota-ona va o‘smir munosabatlari, hamkorlik darajasi, ijtimoiy-psixologik moslashuv hamda intellektual rivojlanish ko‘rsatkichlari o‘rtasidagi bog‘liqlik yoritiladi.*
Kalit so‘zlar: *o‘smirlik, mantiqiy fikrlash, intellektual qobiliyat, oila-maktab hamkorligi, ota-ona munosabati, ijtimoiy moslashuv, qadriyat, psixologik rivojlanish.*
Abstract. *The thesis analyzes, based on empirical findings, the developmental characteristics of adolescents’ logical thinking and intellectual abilities, as well as the psychological influence of family–school cooperation on this process. Particular attention is given to the relationship between parent–adolescent interactions, the level of cooperation, socio-psychological adaptation, and indicators of intellectual development.*
Keywords: *adolescence, logical thinking, intellectual ability, family–school cooperation, parent–adolescent relationship, social adaptation, values, psychological development.*

KIRISH. Mamlakatimizda o‘smir avlodning intellektual salohiyatini rivojlantirish, mustaqil va mantiqiy fikrlash ko‘nikmalarini shakllantirish ta’lim-tarbiya jarayonining muhim yo‘nalishlaridan biri hisoblanadi. O‘smirlik davrida bilish jarayonlari qayta tashkil topib, abstrakt va mantiqiy operatsiyalar imkoniyati kengayadi, o‘z fikrini dalillash hamda muqobil yechimlarni qiyoslash qobiliyati kuchayadi. Mazkur rivojlanish faqat yoshga bog‘liq tabiiy yetilish bilan cheklanmaydi. Ta’lim mazmuni, oiladagi intellektual muloqot, kattalarning talab va qo‘llab-quvvatlashi, mustaqil qaror qabul qilish uchun yaratilgan sharoit o‘smirning aqliy faolligiga bevosita ta’sir ko‘rsatadi. E.G‘. G‘oziyev tafakkurni voqelikdagi sababiy bog‘lanishlarni umumlashtirib anglashga, yangilikni aniqlashga va bashorat qilishga yo‘naltirilgan aqliy faoliyat sifatida izohlaydi.[81]

Rivojlanish psixologiyasida o‘smirning kognitiv imkoniyatlari ijtimoiy vaziyatdan ajratilgan holda o‘rganilmaydi. Maktabdagi o‘quv talablari, oiladagi munosabat uslubi, tengdoshlar bilan muloqot va shaxsiy motivatsiya yagona rivojlanish maydonini hosil qiladi. O‘smir fan mazmunini o‘zlashtirish jarayonida tahlil, umumlashtirish, taqqoslash va xulosa chiqarish usullarini egallaydi, oiladagi muloqot esa fikr bildirishga, dalillashga, xatoni tan olishga va mas’uliyatni qabul qilishga imkon beradigan psixologik sharoitni yaratishi mumkin.

81G‘oziyev E.G‘. Ontogenez psixologiyasi. Toshkent: Noshir, 2010. 111-135-b.

Z.T. Nishanova va hammualliflar rivojlanish hamda pedagogik psixologiyani ta’lim, tarbiya va shaxs kamolotining o‘zaro bog‘langan psixologik mexanizmlari doirasida yoritadi.[82]

L.S. Vigotskiyning madaniy-tarixiy yondashuvida yuqori psixik funksiyalar ijtimoiy munosabatlar va hamkorlikda shakllanib, keyinchalik ichki aqliy vositalarga aylanadi.[83] O‘smirning murakkab masalani mustaqil yechishi, o‘qituvchi izohi bilan yangi usulni egallashi yoki ota-ona bilan muhokamada sabab va oqibatni ajratishi bir-biridan uzilgan jarayonlar emas. Mazkur jarayonlarning uyg‘unligi intellektual rivojlanish uchun barqaror talablar, tushunarli qayta aloqa va psixologik xavfsizlikni talab etadi. Oila va maktabning tarbiyaviy talablari keskin farqlansa, o‘smirda faoliyat mezonlari noaniqlashishi, nazorat tashqi bosim sifatida qabul qilinishi va bilish faolligi pasayishi ehtimoli ortadi.

ASOSIY QISM. Oila va maktab o‘smir rivojlanishining ikki asosiy mikromuhiti sifatida bir xil shaxsga ta’sir ko‘rsatadi. U. Bronfenbrenner ekologik modelida uy va maktab alohida mikrotizimlar, ular o‘rtasidagi munosabatlar esa rivojlanishga ta’sir etuvchi mezotizim sifatida talqin qilinadi.[84] Mazkur nuqtayi nazar o‘smirning intellektual natijasini faqat individual qobiliyat yoki dars sifati bilan izohlash yetarli emasligini ko‘rsatadi. Ota-ona o‘quv vazifalariga qanday munosabat bildirishi, o‘qituvchi o‘smirning mustaqil fikriga qancha o‘rin berishi, ikki tomonning talablarida izchillik mavjudligi va bolaning fikri munosabat jarayonida qabul qilinishi kognitiv faollik uchun muhim psixologik fon hosil qiladi.

Oilaviy ta’limiy maqom bo‘yicha olingan natijalar mantiqiy fikrlash ko‘rsatkichlari guruhlar kesimida bir xil emasligini ko‘rsatgan. Raven testi bo‘yicha Kruskal-Uollis mezoni $H=14,365$ va $p=0,001$ darajasida statistik ahamiyatli farqni qayd etgan. O‘rta maxsus ma’lumotli oilalar guruhida o‘rtacha rang 198,72, oliy ma’lumotli guruhda 154,77, o‘rta ta’lim guruhida 127,75, maktabni tamomlamaganlar guruhida 131,50 bo‘lgan. Natija oilaning formal ta’lim darajasi bilan mantiqiy fikrlash o‘rtasidagi aloqani sodda chiziqli bog‘lanish tarzida talqin qilish mumkin emasligini anglatadi. G. Gardner metodikasida mantiqiy-matematik intellekt bo‘yicha oliy ma’lumotli guruh 194,77 o‘rtacha rang bilan yuqori natija ko‘rsatgan, farq $H=14,365$ va $p=0,001$ darajasida ahamiyatli. Vizual-fazoviy, verbal-lingvistik, tana-kinestetik, musiqiy, emotsional va ekzistensial intellekt shkalalarida ham guruhlar o‘rtasida statistik farqlar aniqlangan. Demak, oilaning ta’limiy kapitali muhim omil, lekin intellektning turli ko‘rinishlari oiladagi real muloqot sifati, faoliyat imkoniyatlari va bolaning qiziqishlariga berilgan qo‘llab-quvvatlash bilan birga baholanishi zarur.

Jins bo‘yicha tahlil kognitiv profillarning o‘ziga xosligini ko‘rsatgan. Raven testi natijasida o‘g‘il bolalarning o‘rtacha rangi 146,76, qiz bolalarniki 104,16 bo‘lib, farq $U=5293,000$ va $p<0,001$ darajasida ahamiyatli. Gardner metodikasida o‘g‘il bolalarda mantiqiy-matematik va vizual-fazoviy ko‘rsatkichlar yuqoriroq, qiz bolalarda verbal-lingvistik hamda emotsional yoki shaxslararo intellekt ko‘rsatkichlari yuqoriroq qayd etilgan. Musiqiy intellekt bo‘yicha $p=0,214$ bo‘lib, jinslar o‘rtasidagi farq statistik ahamiyatga ega emas. Olingan tafovutlarni biologik qat’iylik sifatida tushuntirish ilmiy jihatdan cheklangan bo‘ladi. Oila va maktab o‘quv topshiriqlarini jinsiy stereotiplarga tayangan holda taqsimlamasligi, qizlarda

82Nishanova Z.T., Kamilova N.G‘., Abdullayeva D.U., Xolnazarova M.X. Rivojlanish psixologiyasi. Pedagogik psixologiya. Toshkent: O‘zbekiston faylasuflari milliy jamiyati nashriyoti, 2018. 600 b.

83Выготский Л.С. Собрание сочинений. В 6 т. Т. 2. Проблемы общей психологии. Москва: Педагогика, 1982. 504 с.

84Bronfenbrenner U. The Ecology of Human Development: Experiments by Nature and Design. Cambridge, MA: Harvard University Press, 1979. pp. 21-26.

fazoviy va mantiqiy masalalarga, o‘g‘il bolalarda verbal ifoda, hissiy anglash va hamkorlik faoliyatiga teng imkoniyat yaratishi maqsadga muvofiq.

Qadriyatlar yo‘nalishlari bilan mantiqiy fikrlash o‘rtasidagi korrelyatsiyalar intellektual rivojlanishning motivatsion asosini ochib beradi. Raven testi bo‘yicha o‘z ustida ishlash r=0,461, ijodkorlik r=0,417, yutuqlarga yo‘nalganlik r=0,387, ma’naviy qoniqish r=0,338 va faol ijtimoiy munosabatlar r=0,295 koeffitsiyentlari bilan ijobiy bog‘langan. O‘zlikni saqlash shkalasi bilan r=-0,216 darajasida manfiy aloqa qayd etilgan. Mantiqiy fikrlash faqat topshiriq bajarish texnikasi bilan belgilanmaydi. O‘smirning yangilik izlashga tayyorligi, o‘z imkoniyatini kengaytirishga intilishi, maqsadga erishish motivi va ijtimoiy faoliyati aqliy faoliyatni qo‘llab-quvvatlaydigan ichki resurs vazifasini bajaradi. Oila va maktabning hamkorligi mazkur motivlarni bir xil yo‘nalishda mustahkamlasa, o‘smir bilimni tashqi nazorat uchun emas, shaxsiy rivojlanish vositasi sifatida qabul qilish imkoniga ega bo‘ladi.

Ota-ona va bola o‘zaro ta’sirini ifodalovchi ko‘rsatkichlar orasida eng muhim natijalar hamkorlik hamda munosabatdan qoniqish bilan bog‘liq. Raven testi bo‘yicha hamkorlik r=0,427, bolaning ota-ona munosabatlaridan qoniqishi r=0,447 koeffitsiyenti bilan mantiqiy fikrlashga ijobiy aloqador. Rad etish bilan r=-0,385, ota-onaning avtoritarligi bilan r=-0,332, kelishmovchilik bilan r=-0,306, hissiy masofa bilan r=-0,298 darajasida manfiy aloqalar aniqlangan. I.M. Markovskaya ota-ona va bola o‘zaro ta’sirida hamkorlikni bolaning huquq va qadr-qimmatini tan olish, sheriklikka asoslangan munosabat sifatida tavsiflaydi.[85] Empirik ko‘rsatkichlar oiladagi konstruktiv hamkorlikning o‘smir tafakkuri uchun faqat hissiy qulaylik emas, balki intellektual faoliyatni rag‘batlantiruvchi psixologik mexanizm ekanini ko‘rsatadi. Fikriga quloq solingan o‘smir o‘z pozitsiyasini asoslashga, boshqa nuqtayi nazarni ko‘rib chiqishga va qaror oqibatini tahlil qilishga ko‘proq imkon topadi.

Ijtimoiy-psixologik moslashuv ko‘rsatkichlari bilan aloqalar mazkur xulosani kengaytiradi. Mantiqiy fikrlash moslashganlik bilan r=0,476, o‘z-o‘zini qabul qilish bilan r=0,436, ichki nazorat bilan r=0,414, boshqalarni qabul qilish bilan r=0,386 va hissiy qulaylik bilan r=0,379 darajasida ijobiy bog‘langan. Moslashmaganlik r=-0,457, o‘z-o‘zini qabul qilmaslik r=-0,451, tashqi nazorat r=-0,409, hissiy noqulaylik r=-0,337 va muammodan qochish r=-0,324 koeffitsiyentlari bilan manfiy aloqa ko‘rsatgan. Mantiqiy masalani hal qilish uchun diqqatni saqlash, xatoni tahlil qilish va yechimni qayta ko‘rib chiqish zarur. Ichki nazorat va o‘zini qabul qilish yuqori bo‘lgan o‘smir xatoni shaxsiy muvaffaqiyatsizlik belgisi sifatida emas, faoliyatni tuzatish signali sifatida qabul qilishga moyil bo‘ladi. Oiladagi qo‘llab-quvvatlovchi munosabat hamda maktabdagi xolis qayta aloqa mazkur sifatlarni mustahkamlashi mumkin.

XULOSA. Xulosa qilib aytganda ota-ona bilan hamkorlik va munosabatdan qoniqish mantiqiy fikrlash bilan ijobiy, rad etish, avtoritar munosabat, hissiy masofa va kelishmovchilik esa manfiy aloqador bo‘lgan. Mazkur natijalar oila-maktab hamkorligining psixologik mazmunini aniq belgilaydi. Samarali model o‘smirga nisbatan kelishilgan talablar, ikki tomonlama muloqot, intellektual mustaqillikni qo‘llab-quvvatlash, hissiy xavfsizlik, individual qobiliyatlar monitoringi va muammoli vaziyatlarni hamkorlikda yechishga tayanishi kerak.

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RAQAMLI MOLIYAVIY XIZMATLARNING MINTAQAVIY IQTISODIY RIVOJLANISHDAGI O‘RNI

Urazbayeva Ilmira Konisbayevna
Toshkent davlat iqtisodiyot universiteti, «Moliya va hisob» kafedrasi PhD katta o‘qituvchisi
Ika.urazbaeva150@gmail.com
https://doi.org/10.5281/zenodo.22897380

Annotatsiya. *Ushbu tezisda raqamli moliyaviy xizmatlarning hududlar iqtisodiy rivojlanishiga ta’siri, moliyaviy ommaboplikni kengaytirish, kichik biznes va aholining moliyaviy resurslardan foydalanish imkoniyatlarini yaxshilashdagi ahamiyati tahlil qilinadi. Mobil banking, elektron to‘lovlar, raqamli identifikatsiya, elektron hamyonlar, QR va kontaktsiz to‘lov texnologiyalarining iqtisodiy faollikka ta’siri O‘zbekiston tajribasi asosida yoritilgan. Raqamli moliyaviy infratuzilmaning hududlar o‘rtasidagi moliyaviy xizmatlardan foydalanish tafovutini kamaytirish imkoniyatlari ko‘rib chiqilgan.*
Kalit so‘zlar: *raqamli moliyaviy xizmatlar, mintaqaviy iqtisodiyot, moliyaviy ommaboplik, elektron to‘lov, mobil banking, fintex, kichik biznes, raqamli infratuzilma, iqtisodiy inklyuziya.*
Abstract. *The article examines the role of digital financial services in regional economic development, with particular emphasis on financial inclusion, access to financial resources for households and small businesses, and the reduction of transaction costs. The study considers mobile banking, electronic payments, digital identification, electronic wallets, QR payments and contactless technologies in the context of Uzbekistan.*
Keywords: *digital financial services, regional economy, financial inclusion, electronic payments, mobile banking, fintech, small business, digital infrastructure, economic inclusion.*

KIRISH

So‘nggi yillarda moliya tizimidagi eng sezilarli o‘zgarishlardan biri bank va to‘lov xizmatlarining an’anaviy ofisdan mobil telefon va boshqa raqamli kanallarga ko‘chib borayotganidir. Ilgari bank xizmatidan foydalanish uchun mijozning bank filiali joylashgan hududga borishi, ma’lum vaqt sarflashi va ko‘plab operatsiyalarni bevosita xodim orqali amalga oshirishi talab etilgan bo‘lsa, bugungi sharoitda hisobvaraqni boshqarish, pul o‘tkazish, kommunal to‘lovni amalga oshirish, kredit to‘lash, valyuta ayirboshlash yoki ayrim moliyaviy mahsulotlarni rasmiylashtirish masofadan bajarilmoqda. Bu o‘zgarishning ahamiyati ayniqsa yirik moliyaviy markazlardan uzoqda joylashgan tuman va shaharlarda yaqqol ko‘rinadi.

Raqamli moliyaviy xizmatlarning mintaqaviy iqtisodiyotga ta’sirini faqat to‘lovni tezlashtirish bilan izohlash yetarli emas. Masala ancha keng. Moliyaviy xizmatga kirish imkoniyati yaxshilanganda tadbirkorning pul aylanmasini boshqarishi osonlashadi, aholi jamg‘arma va to‘lovlarni rasmiy moliyaviy tizim orqali amalga oshira boshlaydi, davlat va biznes o‘rtasidagi hisob-kitoblarda shaffoflik kuchayadi.

ASOSIY QISM

Raqamli moliyaviy xizmatlarning iqtisodiy ahamiyatini tushunishda avvalo moliyaviy ommaboplik masalasiga e’tibor qaratish lozim. Moliyaviy xizmat aholi yashaydigan joydan uzoqda bo‘lsa yoki undan foydalanish ortiqcha xarajat talab etsa, bunday hududdagi odamlar

rasmiy bank xizmatidan kamroq foydalanadi. Ayniqsa qishloq joylarda bu muammo bank bo‘limlarining soni bilan bog‘liq bo‘lishi mumkin. Raqamli kanal esa bank filialining geografik joylashuviga bo‘lgan bog‘liqlikni ma’lum darajada kamaytiradi. Mobil ilova ishlaydigan hududda mijoz oddiy operatsiyalarning katta qismini masofadan bajarishi mumkin.

O‘zbekistonda moliyaviy ommaboplik masalasi ilgari ham jiddiy muammo sifatida qayd etilgan. M. Ahunovning ADB Institute doirasidagi tadqiqotida uy xo‘jaliklari va korxonalarning katta qismi jamg‘arma hamda qarz masalalarida norasmiy mexanizmlarga tayangani, raqamli moliyaviy mahsulotlardan foydalanish esa past darajada bo‘lgani ko‘rsatilgan. Muallif moliyaviy infratuzilmani rivojlantirish, moliyaviy savodxonlikni yaxshilash va iste’molchilarni himoya qilishni moliyaviy inklyuziyani kengaytirishning zarur shartlari sifatida ko‘rsatadi [1].

Keyingi yillarda vaziyat sezilarli darajada o‘zgardi. Jahon banki mutaxassislari D. Babasyan, M. Melecky va N. Podchoeva ma’lumotlariga ko‘ra, O‘zbekistonda bank hisobvarag‘iga ega katta yoshli aholi ulushi 2011-yildagi 23 foizdan 2021-yilda 44 foizgacha oshgan. 2017-yildagi 445 ta bankomat soni 2022-yilga kelib 11 mingdan oshgan, masofaviy bank xizmatlari foydalanuvchilari esa qariyb 25 millionga yetgan. Shu bilan birga, mualliflar moliyaviy xizmat ko‘rsatish nuqtalarining hududlar bo‘yicha taqsimlanishi hali ham bir xil emasligini qayd etadilar [4].

Aynan mana shu nomutanosiblik raqamli moliyaning mintaqaviy rivojlanishdagi o‘rnini kuchaytiradi. Masalan, chekka tumandagi kichik savdo yoki xizmat ko‘rsatish korxonasi uchun alohida bank terminalini o‘rnatish, naqd pul inkassatsiyasini tashkil etish va har kuni bankka borish ma’lum xarajatlarni yuzaga keltiradi. QR-kod, mobil ekvayring yoki Tap-to-Phone kabi texnologiyalar esa nisbatan kam infratuzilma orqali naqd pulsiz to‘lovni qabul qilish imkonini beradi. Natijada kichik tadbirkor ham raqamli to‘lov tizimiga qo‘shila oladi.

Markaziy bankning 2025-yil yakunlari bo‘yicha e’lon qilingan yillik hisobotidagi 2024-yil ma’lumotlari bu jarayonning ko‘lamini ko‘rsatadi. “QR-online” tizimi orqali tadbirkorlik subyektlariga berilgan QR-kodlar soni qariyb 108 mingga yetgan, ular orqali bajarilgan operatsiyalar hajmi 441,8 milliard so‘mni tashkil etgan. Tap-to-Phone tizimidan foydalanuvchi subyektlar soni 2025-yil 1-yanvar holatiga qariyb 3,2 mingtaga yetgan. NFC texnologiyasi yordamida amalga oshirilgan tranzaksiyalar hajmi esa 2024-yilda 41,4 trillion so‘mni tashkil qilgan [3].

Bu ko‘rsatkichlarning mintaqaviy iqtisodiyot uchun mazmuni shundaki, to‘lov infratuzilmasiga kirish osonlashgani sayin kichik biznesning bozorga kirish xarajati pasayadi. Savdo yoki xizmat ko‘rsatish shoxobchasi faqat naqd pul bilan ishlashga majbur bo‘lmaydi. To‘lovni qabul qilish usullarining ko‘payishi esa mijozlar doirasini kengaytiradi. Shu bilan birga, elektron tranzaksiyalar korxonaning moliyaviy tarixini shakllantiradi. Kelajakda banklar va boshqa moliya tashkilotlari tadbirkorning pul oqimi haqida ko‘proq ma’lumotga ega bo‘lib, kreditga layoqatlilikni baholashda faqat garovga emas, faoliyat natijalariga ham tayanishi mumkin.

Raqamli moliyaviy xizmatlarning ikkinchi muhim yo‘nalishi — aholining kundalik xarajatlarini soddalashtirishidir. 2024-yilda O‘zbekistondagi to‘lov tashkilotlari orqali amalga oshirilgan operatsiyalar umumiy hajmi oldingi yilga nisbatan 1,8 baravar oshib, 333 trillion so‘mga yetgan. Shu xizmatlar orqali aholi 26,2 trillion so‘m kommunal to‘lov, 14,8 trillion so‘m mobil aloqa, 14,3 trillion so‘m davlat xizmatlari, 5,7 trillion so‘m kredit to‘lovlari va 5,3 trillion so‘m budjet hamda soliq to‘lovlarini amalga oshirgan. Elektron hamyonlar soni esa 15,6 milliondan 20,6 millionga ko‘paygan [3].

Mazkur raqamlar faqat moliyaviy sektor hajmining oshganini anglatmaydi. Ular aholining vaqt va transport xarajatlarini kamaytirishga ham xizmat qiladi. Masalan, tuman markazidan uzoq qishloqda yashovchi fuqaro oddiy to‘lov uchun bank, soliq yoki xizmat ko‘rsatuvchi tashkilot kassasiga borishi shart bo‘lmasa, uning iqtisodiy xarajati kamayadi. Alohida odam uchun bu kichik tejamkorlik bo‘lib ko‘rinishi mumkin, biroq millionlab foydalanuvchilar miqyosida uning iqtisodiy samarasi sezilarli bo‘ladi.

XULOSA VA MUNOZARA

Raqamli moliyaviy xizmatlarning mintaqaviy iqtisodiy rivojlanishdagi o‘rni tobora ortib bormoqda. Ularning eng muhim xususiyati moliyaviy xizmatni geografik jihatdan mijozga yaqinlashtirishidadir. Mobil banking, elektron hamyon, QR, NFC, masofaviy identifikatsiya va boshqa fintex yechimlari orqali aholining bank filialiga jismonan borishga bo‘lgan ehtiyoji kamaymoqda. Bu, ayniqsa, moliyaviy infratuzilma nisbatan kam rivojlangan hududlar uchun katta ahamiyatga ega.

O‘zbekiston tajribasi raqamli to‘lovlar va masofaviy xizmatlarning qisqa muddat ichida katta ko‘lamga chiqqanini ko‘rsatadi. Biroq raqamli tranzaksiyalar hajmining o‘sishini mintaqaviy rivojlanishning yakuniy natijasi deb qabul qilish to‘g‘ri emas. Asosiy masala ushbu xizmatlarning mahalliy tadbirkorlik, bandlik, investitsiya, daromad va moliyaviy barqarorlikka qanday ta’sir etayotganini aniqlashdir.

Shu nuqtayi nazardan, raqamli moliyani rivojlantirish siyosati uch yo‘nalishni birlashtirishi zarur: sifatli raqamli va to‘lov infratuzilmasi, foydalanuvchining moliyaviy-raqamli savodxonligi hamda ishonchli iste’molchi himoyasi. Bundan tashqari, xizmatlarni hududlarning iqtisodiy ixtisoslashuviga moslashtirish lozim. Qishloq xo‘jaligi hududi, sanoat markazi va turizm rivojlangan mintaqaning moliyaviy ehtiyoji bir xil emas.

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LEVERAGING GENERATIVE ARTIFICIAL INTELLIGENCE AND LSTM-BASED PREDICTIVE MODELS TO ENHANCE HOSPITAL QUALITY OF CARE

Dr Gyanti Thakur
Associate Professor, Ajou University, Tashkent
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Abstract. *Hospitals have extensive data, but this information is often fragmented across electronic records, laboratory systems, nursing notes, medication records, patient feedback, and administrative databases. This paper proposes a conceptual framework that combines Generative Artificial Intelligence (AI) with a Long Short-Term Memory (LSTM) deep-learning model to improve hospital quality of care. The generative component synthesizes verified structured and unstructured information into readable summaries and draft explanations, while the LSTM component analyzes sequential indicators to estimate clinical or operational risk. The clinician-in-the-loop workflow requires the authorized professionals to review the outputs before informing the care or quality-management decisions. The paper describes the research objectives, conceptual architecture, proposed methodology, evaluation plan, potential benefits, and implementation safeguards. Since no real hospital dataset or experiment results were provided, the framework and expected outcomes are proposed, not proven findings. Future research should test the model with de-identified hospital data and prospective evaluation.*

Keywords: *Generative AI hospital quality of care LSTM deep learning clinical decision support patient safety predictive analytics.*

1. Introduction

Quality of care is multidimensional and includes safety, effectiveness, timeliness, efficiency, equity, patient-centeredness, and continuity. Hospitals must coordinate decisions across clinical teams while managing the large volumes of changing information. The relevant data may be found across electronic health records (EHRs), laboratory and imaging systems, medication records, nursing documentation, patient complaints, and operational dashboards. The manual review can be time-consuming and challenging to recognize trends early.

Common conventional machine-learning applications usually classify cases or estimate outcomes, such as readmission, deterioration, or prolonged hospitalization. Generative AI adds a language-oriented capability; it can organize complex records into summaries, draft patient-facing instructions, and help the staff to retrieve and interpret information. The outputs can be used for communication, but it may contain unsupported or inaccurate statements; hence, it is required to verify.This paper proposes a decision-support framework in which a generative model performs evidence-based synthesis, while an LSTM network identifies temporal patterns. The system is not intended to replace the physicians, nurses, or hospital administrators; it highlights the relevant risks, makes the information easy-to-read, and is used to support the quality-improvement workflows under the professional's supervision.

2. Background and Related Work

Digital information systems are relevant to hospital performance since they impact the

information access, communication, service delivery, and operational coordination. The contextual material supplied for this paper discusses the mobile technology services and the hospital performance in Delhi, India. It provides the broader relevance of the digital services, but does not prove the effectiveness of the Generative AI or LSTM models; hence, the present framework is treated as a research design, not proven intervention. Generative AI systems, including the transformer-based language models, learn the patterns from the data and generate the text or other outputs. Potential hospital applications include the discharge summaries, patient education materials, clinical-record summaries, translations, and quality-improvement reports. Their usefulness depends on the grounding of the generated content in the reliable records, protection of the sensitive data, and human review. LSTM networks are intended for sequential data and use the gated memory mechanisms to learn the dependencies across time. It is relevant to hospital information since the vital signs, laboratory values, medication exposure, staffing, occupancy, and adverse events change over time. An LSTM may estimate a risk or forecast from such sequences. The generative component can explain the model output in the accessible language, but preserves the distinction between the statistical estimate and the clinical fact.

3. Research Objectives

- To design the conceptual Generative AI framework for the hospital quality-of-care activities.
- To incorporate the LSTM model to predict the time-dependent clinical or operational risks.
- To identify a clinician-supervised workflow to limit the unsafe or unsupported AI-generated recommendations.
- To specify the data requirements, evaluation measures, ethical safeguards, and implementation challenges.
- To establish the basis for the future empirical testing on the de-identified hospital dataset.

4. Proposed Research Methodology

4.1 Research Design and Data Inputs

The study is conceptual and design-oriented. It specifies a combined model and plans for the following validation; it does not report the training/testing on the real hospital dataset. The future implementation would use the de-identified and access-controlled data collected with the institutional approval. The structured inputs may include the age group, admission and discharge dates, diagnosis codes, medication records, laboratory results, vital signs, length of stay, readmission status, staffing measures, and patient-safety events. The unstructured inputs may include the progress notes, discharge summaries, nursing notes, patient complaints, and quality-improvement reports.

Data preparation should include the standardization and timestamp before modeling. The preparations should also include the checks for the missingness, duplicated records, inconsistent units, outliers, and documentation errors. The data splitting should be done at patient level, and where feasible, across time or sites, to minimize the leak and assess the generalizability. Sensitive information should be minimized and protected during the processing.

4.2 Generative AI Component

A transformer-based language model or a healthcare-adapted large language model will process the approved clinical and operational text. The candidate tasks include summarizing the patient's recent trajectory, explaining a predictive risk score, drafting the discharge instructions for the professional's editing, identifying potentially incomplete documentation, and producing the quality improvement summaries. The retrieval-augmented generation (RAG) or another

evidence-based method should connect the generation to the records and approved guidance. Where possible, the statements should identify their supporting source and the time of origin. The model should not invent the diagnoses, medication orders, or the clinical facts. The outputs should be labeled as AI-generated drafts, and the high-risk content should be reviewed by the authorized professional. It should state the limitation if the evidence is missing or conflicting, rather than generating a confident conclusion.

4.3 LSTM Predictive Component

The LSTM pathway would receive the time-ordered observations for the patient or hospital unit. The patient-level sequences could include the hourly vital signs and laboratory results; the operational sequences could include the daily bed occupancy, waiting times, staffing levels, and adverse-event counts. The model would produce a risk score or forecast for the predefined target, such as clinical deterioration, unplanned intensive-care transfer, 30-day readmission, prolonged length of stay, or the increase in the safety incidents.

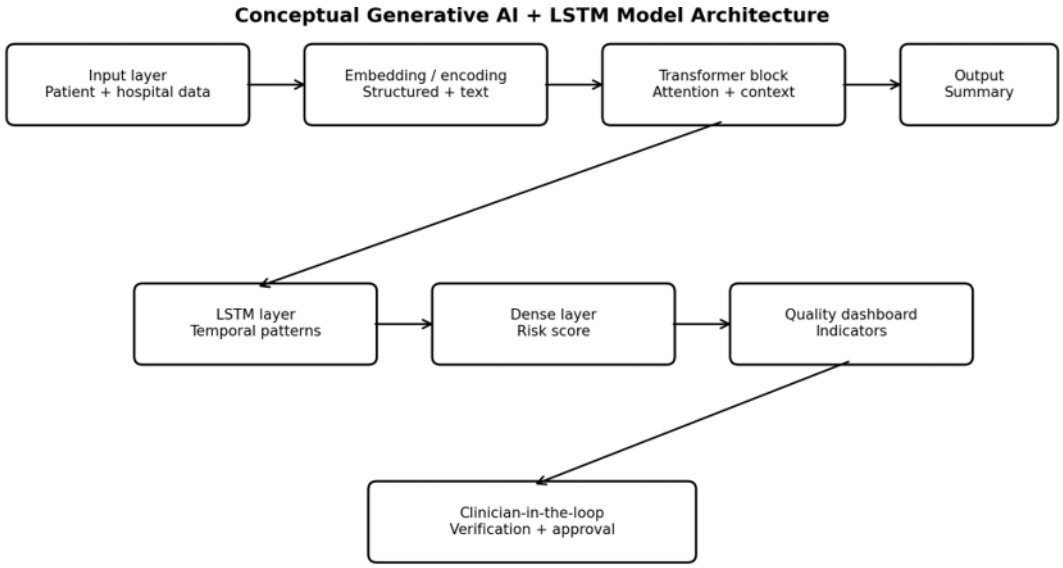
4.4 Integrated Workflow and Human Review

The proposed workflow has five stages: (1) secure ingestion and preprocessing of the approved data; (2) LSTM analysis of the temporal sequences; (3) retrieval of the relevant verified records; (4) generation of a concise explanation or draft summary and (5) review and action by a clinician or authorized quality officer. The interface should display the prediction, supporting evidence, data freshness, missing information, uncertainty, and the escalation rationale. The reviewers should have an option to approve, edit, or reject an output.

An audit trail should record the input and model versions, generated text, reviewer decision, and final action. The role-based access, encryption, retention limits, and clear accountability are required. The external model services should be assessed for the privacy, security, and legal compliance before any patient information is transferred.

5. Proposed Model Architecture

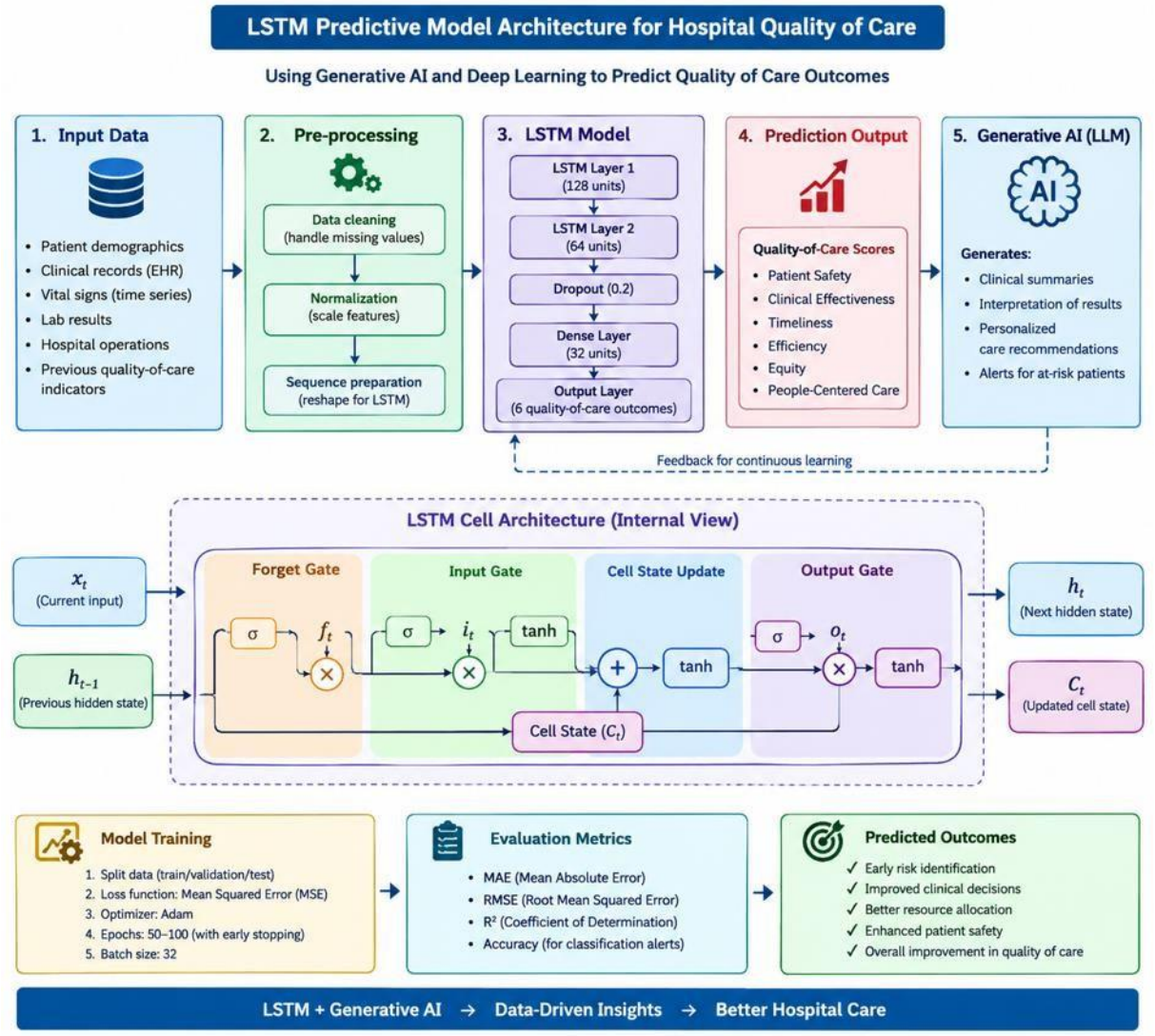
The architecture has two complementary pathways. The language pathway receives the approved narrative records and retrieves the relevant evidence to support the summarization. The temporal pathway receives the sequential clinical or operational measurements, and generates the forecast or risk score. The fusion and presentation layer brings the two outputs together in a quality-of-care dashboard. The dashboard should not obscure the content from the predictive model, the language model, and the human review



6. Potential Benefits

If validated and implemented safely, the combined framework may allow the staff to synthesize the fragmented records faster, communicate the information consistently, identify the emerging clinical or operational risks, and produce the standardized quality-improvement reports. LSTM prediction may help prioritize the review of the time-sensitive patterns, while Generative AI may make the models' outputs and the source information easy to understand. These are potential benefits, which require the measurement; they are not established results of the present conceptual paper.

7. Evaluation Plan and Proposed Outcomes



8. Ethical, Legal, and Practical Challenges

Hallucination is a central concern since the fluent generated text can be inaccurate. In healthcare, unsupported content can impact the diagnosis, medication, discharge planning, or communication. Evidence grounding, uncertainty display, source traceability, and human review are essential, particularly for high-risk tasks. Privacy

and security requires de-identification where appropriate, encryption, role-based access, audit logs, secure hosting, clear retention policies. The consent and applicable health-data rules should be considered before the data are used for training or inference. The bias can occur when the datasets under-represent particular populations, languages, conditions, or care settings. Local

validation and subgroup analysis are required, and the staff training should address the automation bias.

The operational adoption also depends on EHR interoperability, reliable infrastructure, cybersecurity, maintenance, model monitoring, and the clear incident-reporting process. The responsibility for AI-supported decisions must be explicit. The hospitals should define who may approve the outputs, how the errors are escalated, and when the system must be paused or withdrawn.

9. Discussion

The framework assigns the different roles to prediction and generation. LSTM models can identify the temporal patterns, but their numerical outputs may be difficult for some users to interpret. Generative AI can translate a score and the supporting evidence into concise language but should not calculate or invent the clinical facts independently. Combining the components may support the interpretable decision-support workflow, provided that the interface preserves the provenance and uncertainty. Hospital quality is broader than clinical prediction. Patient experience, communication, waiting time, staffing, documentation quality, medication safety, and continuity may also matter. Evaluation should consider whether the system improves the real processes without increasing the workload, inequity, or risk. A key limitation is the absence of the original empirical results: the architecture, outcomes, and evaluation measures are proposed, not proven. Future research should use the de-identified data, compare the combined approach with the standard practice and component-only approaches, and assess both clinician comprehension and the patient-relevant outcomes.

10. Conclusion

This paper proposes the conceptual framework to integrate the Generative AI and LSTM-based predictive analytics to support the hospital quality of care. The generative component can synthesize the verified information and support the communication, while the LSTM component can analyze the temporal patterns and estimate the clinical or operational risk. Safe use requires secure data governance, evidence-based generation, transparent evaluation, fairness testing, monitoring, and professional supervision. Since no real hospital dataset was analyzed, the framework should be regarded as a research proposal, requiring the retrospective and prospective validation, not as evidence of demonstrated clinical benefit.

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UNIVERSITET BOSHQARUVINI RAQAMLI TRANSFORMATSIYALASHDA INSTITUTSIONAL TAYYORGARLIK OMILLARI

Qo‘chqorov Baxodir Maxkamovich
Toshkent shahridagi Adju universiteti prorektori;
Nizomiy nomidagi milliy pedagogika universiteti mustaqil tadqiqotchisi.
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Annotatsiya. *Ushbu maqolada zamonaviy ta’lim tizimida boshqaruv jarayonlarini raqamlashtirish masalalari va innovatsion menejment modellarini joriy etishning nazariy-amaliy jihatlari tahlil qilinadi. Maqolada ta’lim muassasalarida elektron hujjat aylanishi, ma’lumotlar bazasiga asoslangan qaror qabul qilish tizimlari, sun’iy intellekt va raqamli platformalar orqali boshqaruv samaradorligini oshirish imkoniyatlari yoritilgan. Shuningdek, xorijiy va mahalliy tajriba asosida innovatsion menejment modellarining afzalliklari, ularni joriy etishdagi asosiy muammolar hamda ularni bartaraf etish yo‘llari ko‘rib chiqilgan. Tadqiqot natijalari ta’lim muassasalari rahbariyati uchun raqamli transformatsiya strategiyasini ishlab chiqishda amaliy tavsiyalar sifatida xizmat qilishi mumkin.*

Kalit so‘zlar: *raqamlashtirish, ta’lim menejmenti, innovatsion boshqaruv modellari, raqamli transformatsiya, elektron boshqaruv tizimi, ta’lim sifati, sun’iy intellekt, qaror qabul qilish tizimlari, kadrlar salohiyati, ta’lim muassasasi.*

Kirish

Zamonaviy dunyoda axborot-kommunikatsiya texnologiyalarining jadal rivojlanishi barcha sohalarda, jumladan, ta’lim tizimida ham tub o‘zgarishlarni taqozo etmoqda. Ta’lim muassasalarining boshqaruv jarayonlarini raqamlashtirish nafaqat texnik jarayon, balki institutsional madaniyatni, boshqaruv falsafasini va kadrlar salohiyatini tubdan qayta ko‘rib chiqishni talab qiluvchi kompleks o‘zgarish hisoblanadi. Innovatsion menejment modellarining joriy etilishi ta’lim muassasalarida shaffoflik, operativlik va samaradorlikni ta'minlashning muhim omiliga aylanmoqda.

1. Ta’lim boshqaruvini raqamlashtirishning nazariy asoslari.

Raqamlashtirish jarayoni ta’lim muassasalarida an’anaviy boshqaruv usullaridan voz kechib, ma'lumotlarga asoslangan (data-driven) boshqaruv tamoyillariga o‘tishni anglatadi. Mazkur jarayonning mohiyati shundan iboratki, boshqaruv qarorlari endilikda subyektiv baholash yoki tajribaga asoslangan intuitsiya asosida emas, balki real vaqt rejimida yig‘iladigan, tizimlashtirilgan va tahlil qilinadigan ma’lumotlar asosida qabul qilinadi. Bu, o‘z navbatida, ta’lim muassasasi faoliyatining barcha jabhalarini o‘quv jarayonidan tortib, ilmiy-tadqiqot faoliyatigacha, kadrlar salohiyatidan tortib moliyaviy resurslarni taqsimlashgacha shaffof va boshqariladigan holga keltiradi.

Nazariy jihatdan, ta’lim boshqaruvini raqamlashtirish uchta asosiy bosqichni o‘z ichiga oladi: birinchisi, mavjud jarayonlarni raqamli formatga o‘tkazish (informatizatsiya), ikkinchisi, bu jarayonlarni o‘zaro integratsiyalashgan yagona tizimga birlashtirish, uchinchisi esa yig‘ilgan ma’lumotlar asosida prognozlash va qaror qabul qilishni avtomatlashtirish. Aynan shu uchinchi

bosqich innovatsion menejment modellari bilan bevosita bog‘liq bo‘lib, ta’lim muassasasini “reaktiv” boshqaruvdan “proaktiv” boshqaruvga o‘tkazish imkonini beradi.

Bu jarayon quyidagi asosiy yo‘nalishlarni o‘z ichiga oladi:

Elektron hujjat aylanishi tizimlarini joriy etish. An’anaviy qog‘oz asosidagi hujjat aylanishidan voz kechish ta’lim muassasasi ichidagi buyruqlar, xatlar, hisobotlar va boshqa rasmiy hujjatlarning harakatlanish tezligini bir necha barobar oshiradi. Elektron hujjat aylanishi tizimi orqali har bir hujjatning holati (ko‘rib chiqilmoqda, imzolanmoqda, ijro etilmoqda) real vaqtda kuzatilishi mumkin, bu esa byurokratik to‘siqlarni kamaytiradi va boshqaruv jarayonlarining javobgarlik darajasini oshiradi. Bundan tashqari, bunday tizimlar hujjatlar arxivini xavfsiz saqlash va istalgan vaqtda ularga kirish imkonini ham ta’minlaydi.

Talaba va professor-o‘qituvchilar faoliyatini monitoring qilish uchun raqamli platformalar yaratish. Bunday platformalar talabalarning akademik o‘zlashtirishi, davomat ko‘rsatkichlari, o‘quv yuklamasi bo‘yicha statistik ma’lumotlarni yig‘ish va tahlil qilish imkonini beradi. Professor-o‘qituvchilar faoliyati bo‘yicha esa dars soatlari yuklamasi, ilmiy-metodik ishlar, talabalar bilan olib borilgan tarbiyaviy ishlar kabi ko‘rsatkichlar bir joyda jamlanadi. Bu, o‘z navbatida, rahbariyatga har bir kafedra yoki fakultet faoliyatini ob’ektiv taqqoslash va zaif nuqtalarni aniqlash imkonini beradi.

Ilmiy-pedagogik salohiyatni baholashning avtomatlashtirilgan mexanizmlari. Professor-o‘qituvchilarning ilmiy nashrlari, xalqaro konferensiyalardagi ishtiroki, grant loyihalari, sitatalanish ko‘rsatkichlari (Scopus, Web of Science kabi bazalar bo‘yicha) avtomatik tarzda yig‘ilib, umumlashtirilgan reyting yoki hisobot shaklida taqdim etiladi. Bu mexanizm inson omili tufayli yuzaga keladigan xatoliklarni kamaytiradi va baholash jarayonini adolatli hamda ob’ektiv qiladi.

KPI (asosiy samaradorlik ko‘rsatkichlari) tizimlarini raqamli asosda yuritish. KPI tizimining raqamlashtirilishi har bir xodim yoki bo‘linmaning belgilangan maqsadlarga qanchalik erishganini son ko‘rsatkichlar orqali aniq ifodalash imkonini beradi. Bu tizim, ayniqsa, ilmiy salohiyatni rivojlantirish, xalqaro hamkorlikni kengaytirish va ta’lim sifatini oshirish kabi strategik yo‘nalishlarda rahbariyat uchun qaror qabul qilishning ishonchli asosiga aylanadi. Shuningdek, raqamli KPI tizimi xodimlarning o‘z natijalarini real vaqtda kuzatib borishiga va shu orqali o‘z-o‘zini rivojlantirish motivatsiyasiga ega bo‘lishiga xizmat qiladi.

Innovatsion menejment modellari

Ta’lim tizimida raqamli transformatsiya jarayonlarining chuqurlashuvi an’anaviy, ierarxik va qat’iy markazlashgan boshqaruv modellaridan voz kechishni hamda moslashuvchan, tezkor va ma’lumotlarga asoslangan innovatsion menejment modellariga o‘tishni taqozo etadi. Zamonaviy ta’lim menejmentida quyidagi innovatsion modellar keng qo‘llanilmoqda:

1. Adaptiv boshqaruv modeli. Ushbu model tashqi muhitning tez o‘zgaruvchan sharoitlariga, masalan, ta’lim standartlarining yangilanishi, talabalar talabi va bozor ehtiyojlarining o‘zgarishi, raqamli texnologiyalarning jadal rivojlanishi kabi omillarga ta’lim muassasasining tezkor moslashish qobiliyatini shakllantirishga qaratilgan. Adaptiv boshqaruv modelining asosiy xususiyati shundaki, u qat’iy belgilangan reja va tuzilmalarga emas, balki doimiy monitoring va fikr-mulohaza (feedback) mexanizmlariga tayanadi. Bunda rahbariyat real vaqt rejimida yig‘ilgan ma’lumotlar asosida boshqaruv strategiyasini tezkor tarzda qayta ko‘rib chiqish va zarur o‘zgartirishlar kiritish imkoniyatiga ega bo‘ladi. Bu model, ayniqsa, jahon ta’lim tizimidagi tez o‘zgarishlar sharoitida universitetlarning raqobatbardoshligini saqlab qolishida muhim ahamiyat kasb etadi.

2. Loyihaviy boshqaruv (project management) modeli. Bu model ta’lim muassasasi faoliyatidagi har bir yirik vazifa yoki tashabbusni aniq maqsad, muddat, resurs va mas’ul shaxslarga ega bo‘lgan alohida loyiha sifatida tashkil etishga asoslanadi. Masalan, yangi o‘quv dasturini ishlab chiqish, xalqaro akkreditatsiyadan o‘tish yoki ilmiy-tadqiqot infratuzilmasini modernizatsiya qilish kabi vazifalar aniq bosqichlarga (initsiatsiya, rejalashtirish, amalga oshirish, monitoring va yakunlash) bo‘linadi. Loyihaviy boshqaruv yondashuvining afzalligi shundaki, u har bir vazifaning bajarilish jarayonini shaffof qiladi, resurslardan oqilona foydalanishni ta’minlaydi va natijalarni aniq muddatlarda baholash imkonini beradi. Bunday model doirasida ko‘pincha Gantt jadvallari, Kanban taxtalari kabi raqamli boshqaruv vositalaridan foydalaniladi.

3. Tarmoqli (network) boshqaruv modeli. Ushbu model an’anaviy vertikal (yuqoridan pastga) boshqaruv tuzilmasidan farqli o‘laroq, fakultetlar, kafedralar va bo‘limlar o‘rtasida gorizontal hamkorlik va o‘zaro axborot almashinuvini kuchaytirishga yo‘naltirilgan. Tarmoqli model doirasida qaror qabul qilish jarayoni markazlashgan bitta nuqtada emas, balki turli darajadagi mutaxassislar va bo‘linmalar ishtirokida, kollegial tarzda amalga oshiriladi. Bu yondashuv, xususan, fanlararo (interdisciplinary) ilmiy loyihalarni amalga oshirishda, hamda turli fakultetlar o‘rtasida resurs va tajriba almashinuvini tashkil etishda katta samara beradi. Raqamli platformalar bu modelning amaliy joriy etilishini yanada osonlashtiradi, chunki ular turli bo‘linmalar o‘rtasida axborotning tezkor va shaffof almashinuvini ta’minlaydi.

4. Sun’iy intellektga asoslangan qaror qabul qilish tizimlari. Bu model innovatsion menejment modellari orasida eng yuqori texnologik darajaga ega bo‘lib, katta hajmdagi ma’lumotlarni (Big Data) tahlil qilish, ulardan qonuniyatlarni aniqlash va shu asosda boshqaruv qarorlarini optimallashtirishga xizmat qiladi. Sun’iy intellekt algoritmlari yordamida, masalan, talabalarning o‘quv jarayonidagi qiyinchiliklarini oldindan bashorat qilish, professor-o‘qituvchilarning ilmiy salohiyatini tahlil qilish yoki ta’lim resurslarini eng samarali taqsimlash bo‘yicha tavsiyalar ishlab chiqish mumkin. Bunday tizimlarning joriy etilishi boshqaruv qarorlarining sub‘ektivlik darajasini pasaytiradi va ularni ko‘proq ilmiy asoslangan (evidence-based) qarorlarga aylantiradi. Shu bilan birga, bu yo‘nalish rivojlanishning eng murakkab bosqichi hisoblanadi, chunki u yuqori malakali mutaxassislar va sifatli ma’lumotlar bazasi mavjudligini talab qiladi.

Yuqorida ko‘rib chiqilgan to‘rtta model bir-birini istisno etmaydi, aksincha, ular ta’lim muassasasining rivojlanish bosqichi va ehtiyojlariga qarab birgalikda, kompleks tarzda qo‘llanilishi mumkin. Masalan, adaptiv boshqaruv modeli strategik yo‘nalishni belgilasa, loyihaviy boshqaruv aniq vazifalarni amalga oshirishni ta’minlaydi, tarmoqli model esa bo‘linmalar o‘rtasidagi hamkorlikni mustahkamlaydi va sun’iy intellekt tizimlari barcha ushbu jarayonlarni ma’lumotlar bilan ta’minlab, ularning samaradorligini oshiradi.

Joriy etishdagi muammolar va yechimlar

Raqamlashtirish jarayonida quyidagi muammolar kuzatiladi: kadrlarning raqamli savodxonlik darajasi yetarli emasligi, moliyaviy resurslar cheklovi, tizimlar o‘rtasidagi integratsiya muammolari. Bu muammolarni bartaraf etish uchun uzluksiz malaka oshirish tizimini yo‘lga qo‘yish, bosqichma-bosqich joriy etish strategiyasidan foydalanish va rahbariyat tomonidan o‘zgarishlarni boshqarish (change management) yondashuvini qo‘llash tavsiya etiladi.

Xulosa

Xulosa qilib aytganda, ta’lim tizimida boshqaruv jarayonlarini raqamlashtirish va innovatsion menejment modellarini joriy etish zamon talabiga aylangan zaruriyatdir. Bu jarayon

ta’lim muassasalarining raqobatbardoshligini oshirish, resurslardan oqilona foydalanish va sifatli ta’lim xizmatlarini taqdim etish imkonini beradi. Kelgusida bu yo‘nalishda amaliy tadqiqotlarni davom ettirish maqsadga muvofiqdir.

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SUN’IY INTELLEKTDAN FOYDALANISHDAGI YUTUQLAR VA MUAMMOLAR

Ahmedova Nilufar Farxodovna[1], Mamatqulova Dildora Farhodovna[2]
[1]Qarshi davlat texnika universiteti dotsenti
[2]Qarshi davlat texnika universiteti Ilmiy-tadqiqotlar, innovatsiyalar va ilmiy-pedagogik kadrlarni tayyorlash bo‘limi uslubchisi
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Annotatsiya. *Ushbu maqolada sun'iy intellekt (SI) texnologiyalaridan turli sohalarda foydalanishning zamonaviy holati, erishilgan yutuqlar va yuzaga kelayotgan muammolar ilmiy jihatdan tahlil qilinadi. Sog‘liqni saqlash, ta'lim, sanoat va davlat boshqaruvi sohalarida SI qo‘llanilishining ijobiy natijalari, shuningdek ish o‘rinlarining qisqarishi, algoritmik xolislik (bias), maxfiylik, noto‘g‘ri ma'lumotlarning tarqalishi va energiya-ekologik yuk kabi muammolar xalqaro tadqiqot va statistik ma'lumotlar (Stanford AI Index, McKinsey, PwC, IEA, Pew Research, UNDP) asosida yoritiladi. O‘zbekiston Respublikasida sun'iy intellekt sohasini rivojlantirish bo‘yicha qabul qilingan strategik hujjatlar ham ko‘rib chiqiladi. Maqolaning asosiy qismida har bir aniqlangan muammoga nisbatan xalqaro amaliyotda sinovdan o‘tgan aniq yechimlar (huquqiy tartibga solish, texnik vositalar, tashkiliy chora-tadbirlar) taklif etiladi.*

Kalit so‘zlar: *sun'iy intellekt, mashinaviy o‘qitish, raqamlashtirish, algoritmik xolislik, ma'lumotlar maxfiyligi, mehnat bozori, avtomatlashtirish, energiya sarfi, C2PA, EU AI Act.*

Abstract. *This article provides a scientific analysis of the current state, achievements, and emerging challenges associated with the use of artificial intelligence (AI) technologies across various sectors. The positive outcomes of AI applications in healthcare, education, industry, and public administration are examined, along with challenges such as job displacement, algorithmic bias, privacy concerns, the spread of misinformation, and the energy and environmental burden associated with AI. These issues are analyzed based on international research and statistical data from sources including the Stanford AI Index, McKinsey, PwC, the International Energy Agency (IEA), Pew Research Center, and the United Nations Development Programme (UNDP). The article also reviews strategic documents adopted in the Republic of Uzbekistan aimed at developing the field of artificial intelligence. The main part of the article proposes specific solutions to each identified challenge, including legal regulations, technical measures, and organizational actions that have been tested in international practice.*

Keywords: *artificial intelligence, machine learning, digitalization, algorithmic bias, data privacy, labor market, automation, energy consumption, C2PA, EU AI Act*

Kirish. So‘nggi yillarda sun'iy intellekt (SI) texnologiyalari inson faoliyatining deyarli barcha sohalariga faol ravishda kirib bormoqda. Stenford universiteti sun'iy intellekt indeksi (Stanford AI Index) ma'lumotlariga ko‘ra, 2025-yilga kelib tashkilotlarning 78 foizi ish jarayonlarida sun'iy intellektdan foydalanmoqda, bu ko‘rsatkich 2024-yilda atigi 55 foizni tashkil etgan edi; bunday tashkilotlarning 91 foizi SI ni o‘z faoliyatining muhim yoki ustuvor yo‘nalishi deb hisoblaydi. Buyuk to‘rtlikka kiruvchi konsalting kompaniyasi PwC o‘tkazgan so‘rovnoma natijalariga ko‘ra, rahbarlarning 54 foizi sun'iy intellekt yechimlari kompaniya unumdorligini allaqachon oshirganini tan olgan. Global miqyosda sun'iy intellekt bozori hajmi 2025-yilda 244

milliard AQSh dollariga yetgan bo‘lib, bu ko‘rsatkich oldingi yilga nisbatan 31 foizga o‘sishni anglatadi. Xalqaro konsalting kompaniyasi McKinsey & Company tadqiqotiga ko‘ra, generativ sun'iy intellekt global iqtisodiyotga har yili 2,6 trilliondan 4,4 trillion AQSh dollarigacha qo‘shimcha qiymat qo‘shishi mumkin, dastur va boshqa texnologiyalarga integratsiya hisobga olinganda bu ko‘rsatkich 7,9 trillion dollargacha yetishi prognoz qilinmoqda.

O‘zbekiston Respublikasida ham sun'iy intellekt texnologiyalarini rivojlantirishga alohida e'tibor qaratilmoqda. Prezidentning 2024-yil 14-oktabrdagi PQ-358-son qarori bilan "Sun'iy intellekt texnologiyalarini 2030-yilgacha rivojlantirish strategiyasi" tasdiqlangan, unga muvofiq Vazirlar Mahkamasining 2025-yil 10-iyuldagi 425-son qarori bilan 2025–2026-yillarda amalga oshiriladigan ustuvor loyihalar belgilab berildi, jumladan "Sun'iy intellekt va raqamli iqtisodiyotni rivojlantirish markazi" davlat muassasasi tashkil etildi. Bunday sur'atlar bilan rivojlanayotgan texnologiyaning nafaqat imkoniyatlarini, balki undan foydalanish jarayonida yuzaga keladigan xavf va muammolarni, shuningdek ularni bartaraf etishning ilmiy asoslangan yo‘llarini chuqur tahlil qilish dolzarb ahamiyat kasb etadi.

Sun'iy intellektdan foydalanishdagi yutuqlar. Sun'iy intellekt texnologiyalarining eng sezilarli yutuqlaridan biri - bu turli sohalarda mehnat unumdorligini oshirish va qarorlar qabul qilish jarayonini tezlashtirishdir. Sog‘liqni saqlash sohasida SI algoritmlari tibbiy tasvirlarni tahlil qilish, kasalliklarni erta bosqichda aniqlash va davolash usullarini individuallashtirishda keng qo‘llanilmoqda. Ta'lim sohasida esa sun'iy intellekt o‘quv jarayonini shaxsiylashtirish, talabalarning bilim darajasini avtomatik baholash va o‘qituvchilarning ma'muriy yukini kamaytirish imkonini bermoqda - bu borada O‘zbekistonda ham 2025-yil aprel oyida Nukus innovatsion institutida "Sun'iy intellekt va ta'lim: imkoniyatlar, muammolar va istiqbollar" mavzusidagi xalqaro ilmiy-amaliy anjuman o‘tkazilgani fikrimizning dalilidir.

Iqtisodiy nuqtai nazardan, McKinsey tadqiqotiga ko‘ra, generativ sun'iy intellektning qiymatining taxminan 75 foizi to‘rtta sohaga - mijozlarga xizmat ko‘rsatish, marketing va savdo, dasturiy ta'minot ishlab chiqish hamda ilmiy-tadqiqot va tajriba-konstruktorlik ishlariga to‘g‘ri keladi. Xususan, bank sohasida sun'iy intellekt yiliga 200–340 milliard dollar, chakana savdo va iste'mol tovarlari sohasida esa 400–660 milliard dollar qo‘shimcha qiymat yaratishi mumkin. Harvard Business Publishing tadqiqotlari sun'iy intellekt bozorining 2030-yilga kelib global iqtisodiyotga 15,7 trillion AQSh dollaridan ortiq hissa qo‘shishini prognoz qilmoqda. Sanoat sohasida, jumladan kimyo-texnologiya va gaz-kimyo korxonalarida, sun'iy intellekt texnologik jarayonlarni optimallashtirish, uskunalarning nosozligini oldindan bashorat qilish (predictive maintenance) va energiya sarfini kamaytirish uchun qo‘llanilmoqda, bu esa ishlab chiqarish xarajatlarini sezilarli darajada pasaytirish imkonini beradi. Shuningdek, generativ sun'iy intellekt bozori ham tez sur'atlar bilan o‘smoqda - 2025-yilda uning hajmi 62,75 milliard dollarni tashkil etgan bo‘lib, 2030-yilga kelib 356 milliard dollarga yetishi kutilmoqda.

Sun'iy intellektning yana bir muhim yutug‘i - bu foydalanuvchilar sonining keskin o‘sishi va texnologiyaning ommaviylashuvidir. So‘rovnomalar natijalariga ko‘ra, aholining 66 foizi muntazam ravishda sun'iy intellekt vositalaridan foydalanadi, bu esa texnologiyaning kundalik hayotga chuqur singib borayotganidan dalolat beradi.

Sun'iy intellektdan foydalanishdagi muammolar. Sun'iy intellektning jadal rivojlanishi bilan bir qatorda, uni qo‘llash jarayonida bir qancha jiddiy muammolar ham yuzaga kelmoqda. Xalqaro sun'iy intellekt xavfsizligi bo‘yicha 2025-yilgi hisobotda (International AI Safety Report 2025) ta'kidlanishicha, nazoratsiz joriy etilgan sun'iy intellekt tizimlari noto‘g‘ri ma'lumotlarning

tarqalishi, kiberxavfsizlik tahdidlari va tizimli ish o‘rinlarining qisqarishi kabi xavflarni keltirib chiqarishi mumkin.

Birinchidan, mehnat bozoriga ta'sir masalasi alohida e'tiborga loyiq. Pew Research Center tomonidan o‘tkazilgan so‘rovnomada AQSh aholisining 56 foizi sun'iy intellekt tufayli ish o‘rinlarini yo‘qotishdan xavotirda ekanligini bildirgan, mutaxassislar orasida esa bu ko‘rsatkich 25 foizni tashkil etgan - bu farq jamoatchilik va mutaxassislar o‘rtasidagi xavf idrokidagi sezilarli tafovutni ko‘rsatadi. Boshqa bir tadqiqotga ko‘ra, ekspertlarning 73 foizi sun'iy intellekt ish o‘rinlarini yaxshilashiga ishonsa, jamoatchilikning atigi 23 foizigina shu fikrga qo‘shiladi.

Ikkinchidan, algoritmik xolislik (bias) va adolatsizlik muammosi dolzarbligicha qolmoqda. Sun'iy intellekt tizimlari ko‘pincha xolis bo‘lmagan ma'lumotlar to‘plami asosida o‘qitiladi, natijada ishga qabul qilish, huquqni muhofaza qilish va tibbiyot sohalarida tizimli kamsitishni kuchaytirishi mumkin. Birlashgan Millatlar Tashkilotining Taraqqiyot dasturi (UNDP) tomonidan 2025-yil dekabr oyida e'lon qilingan hisobotda ta'kidlanishicha, qishloq va mahalliy jamoalar ko‘pincha sun'iy intellektni o‘qitish uchun ishlatiladigan ma'lumotlar to‘plamida yetarlicha aks etmaydi, bu esa davlatlar o‘rtasidagi rivojlanish tafovutini yanada kengaytirishi mumkin.

Uchinchidan, noto‘g‘ri ma'lumotlar va soxta kontent (deepfake) muammosi kuchayib bormoqda. So‘rovnomalarga ko‘ra, mutaxassislarning 70 foizi va aholining 66 foizi odamlarning sun'iy intellektdan noto‘g‘ri ma'lumot olishidan jiddiy xavotirda. Bundan tashqari, foydalanuvchi ma'lumotlarining maxfiyligi ham muhim muammo hisoblanadi - 2025-yilda mashhur sun'iy intellekt tizimlaridan birining foydalanuvchi suhbatlari qidiruv tizimlarida indekslanib, ommaga ochiq bo‘lib qolgani bunga yaqqol misol bo‘la oladi.

To‘rtinchidan, sun'iy intellekt tizimlariga haddan tashqari ishonish (overreliance) muammosi ham ilmiy jamoatchilik e'tiborini tortmoqda - inson mustaqil tanqidiy fikrlash qobiliyatining pasayishi, qarorlar uchun javobgarlikning noaniqlashuvi shular jumlasidandir. Shuningdek, atigi 2 foiz tashkilotgina to‘liq mas'uliyatli sun'iy intellektni joriy etish standartlariga javob berishi - ko‘pchilik tashkilotlarda hali ham tegishli etik va xavfsizlik nazorati yetarli darajada shakllanmaganini ko‘rsatadi.

Beshinchidan, sun'iy intellektning energiya va ekologik yuki muhim, ammo kam e'tibor qaratiladigan muammolardan biridir. Xalqaro Energetika Agentligi (IEA) hisobotiga ko‘ra, ma'lumotlar markazlarining global elektr energiyasi iste'moli 2025-yilda 485 terravatt-soatga yetib, oldingi yilga nisbatan 17 foizga oshgan, sun'iy intellektga ixtisoslashgan markazlarning iste'moli esa 50 foizga o‘sgan. 2030-yilga kelib bu ko‘rsatkich taxminan 950 terravatt-soatga, ya'ni Yaponiyaning hozirgi yillik elektr energiyasi iste'moliga yaqin darajaga yetishi prognoz qilinmoqda. AQShda ma'lumotlar markazlari 2024-yilda mamlakat elektr energiyasining 4 foizidan ortig‘ini iste'mol qilgan bo‘lsa, 2030-yilga kelib bu ko‘rsatkich 9–17 foizga yetishi mumkin. Bu esa energiya tizimlariga qo‘shimcha yuk, elektr narxining oshishi va suv resurslaridan foydalanish bilan bog‘liq ekologik muammolarni keltirib chiqaradi.

Muammolarni bartaraf etish yo‘llari (yechimlar). Yuqorida aniqlangan har bir muammo bo‘yicha xalqaro amaliyotda allaqachon sinovdan o‘tgan yoki sinovdan o‘tayotgan aniq yechimlar mavjud. Ularni quyidagi tartibda tizimlashtirish mumkin.

- Mehnat bozoriga ta'sirni yumshatish. Mehnat bozoridagi salbiy ta'sirni kamaytirish uchun ishchi kuchini qayta tayyorlash (reskilling) va malaka oshirish (upskilling) dasturlarini keng joriy etish zarur. McKinsey tahlili shuni ko‘rsatadiki, sun'iy intellekt ko‘proq vazifalarni avtomatlashtirsa ham, agar ishchilarning kasbiy o‘tishi to‘g‘ri boshqarilsa, texnologiya yangi ish

o‘rinlarini yaratish va iqtisodiy o‘sishga xizmat qilishi mumkin. Amaliy yechim sifatida: (a) ta'lim muassasalarida sun'iy intellekt bilan ishlash bo‘yicha maxsus kurslarni o‘quv dasturlariga kiritish, (b) korxonalarda ishchilarni yangi, yuqori qiymatli vazifalarga (masalan, SI tizimlarini nazorat qilish va sozlash) yo‘naltirish, (c) davlat darajasida ishsizlikdan ijtimoiy himoya va qayta tayyorlash fondlarini kengaytirish tavsiya etiladi.

- Algoritmik xolislikka qarshi kurash. Algoritmik xolislik muammosini bartaraf etish uchun sun'iy intellekt tizimlarini joriy etishdan oldin mustaqil algoritmik auditdan o‘tkazish, o‘qitish ma'lumotlar to‘plamining tarkibini xilma-xillashtirish va natijalarni muntazam monitoring qilish zarur. Yevropa Ittifoqining sun'iy intellekt to‘g‘risidagi qonuni (EU AI Act, Regulation (EU) 2024/1689) yuqori xavfli SI tizimlari uchun majburiy risk-menejment tizimi, shaffoflik va inson nazorati talablarini joriy etadi - bu boshqa mamlakatlar, jumladan O‘zbekiston uchun ham me'yoriy-huquqiy baza ishlab chiqishda foydali tajriba bo‘lishi mumkin. UNDP tavsiyalariga ko‘ra, rivojlanayotgan davlatlar o‘z mahalliy tillari va ijtimoiy-madaniy xususiyatlarini aks ettiruvchi milliy ma'lumotlar to‘plamlarini yaratishga sarmoya kiritishi lozim, bu esa jahon miqyosidagi ma'lumotlar tengsizligini kamaytiradi.

- Dezinformatsiya va deepfake bilan kurashish. Sun'iy intellekt yordamida yaratilgan soxta kontentni aniqlash uchun xalqaro miqyosda kontent kelib chiqishini tasdiqlash (content provenance) standartlari joriy etilmoqda. Xususan, C2PA (Coalition for Content Provenance and Authenticity) texnik standarti kontentga "raqamli suv belgisi" (watermark) va kelib chiqishi haqidagi metama'lumotlarni o‘rnatish imkonini beradi; ushbu standartning 2026-yilgi versiyasi endi matn, video va jonli translyatsiyalarni ham qamrab oladi. EU AI Act 50-moddasiga muvofiq, 2026-yil avgust oyidan boshlab sun'iy intellekt tizimlari ishlab chiqaruvchilari o‘z mahsulotlarini mashinada o‘qiladigan tarzda belgilashi va deepfake kontent haqida ochiq ma'lumot berishi majburiy bo‘ladi. Bunday texnik va huquqiy vositalarni O‘zbekiston sharoitida ham moslashtirib joriy etish, shuningdek aholi orasida raqamli va media savodxonligini oshirish orqali dezinformatsiyaga qarshi immunitetni kuchaytirish tavsiya etiladi.

- Ma'lumotlar maxfiyligini ta'minlash. Foydalanuvchi ma'lumotlarining maxfiyligini himoya qilish uchun "loyihalashtirish bosqichidanoq maxfiylik" (privacy by design) tamoyiliga rioya qilish, ma'lumotlarni minimallashtirish va shifrlash, shuningdek foydalanuvchilarga o‘z ma'lumotlarini o‘chirish huquqini berish zarur. Tashkilotlar darajasida ma'lumotlarni qayta ishlash siyosatini shaffof yuritish va mustaqil maxfiylik auditlarini o‘tkazish, davlat darajasida esa ma'lumotlarni himoya qilish to‘g‘risidagi qonunchilikni (shu jumladan O‘zbekistonning shaxsga doir ma'lumotlar to‘g‘risidagi qonunchiligini) sun'iy intellekt tizimlariga nisbatan aniqlashtirish tavsiya etiladi.

- Haddan tashqari ishonishning oldini olish. Sun'iy intellekt tizimlariga haddan tashqari ishonish xavfini kamaytirish uchun barcha muhim qarorlarda "inson nazorati doirasida" (human-in-the-loop) tamoyilini joriy etish, ya'ni yakuniy qarorni doimo malakali mutaxassis tasdiqlashi shart qilib qo‘yilishi lozim. Shuningdek, ta'lim tizimida tanqidiy fikrlash va sun'iy intellekt savodxonligini rivojlantirishga alohida e'tibor qaratish, foydalanuvchilarga SI tizimlarining cheklovlari va xato qilish ehtimoli haqida doimiy ma'lumot berib borish zarur.

- Energiya va ekologik yukni kamaytirish. IEA hisobotiga ko‘ra, texnologiya kompaniyalari energiya muammosini hal qilish uchun yangilanuvchi energiya manbalariga sarmoya kiritishni kuchaytirmoqda - 2025-yilda ma'lumotlar markazlari sektori yangilanuvchi energiya bo‘yicha tuzilgan korporativ xarid shartnomalarining qariyb 40 foizini tashkil etgan, shuningdek yadro va kichik modulli reaktor (SMR) loyihalari bilan tuzilgan shartnomalar hajmi

2024-yil oxiridagi 25 gigavattdan hozirgi kunda 45 gigavattgacha oshgan. Bundan tashqari, bir vazifani bajarish uchun sarflanadigan energiya miqdori texnologik takomillashuv hisobiga tobora kamayib bormoqda. Korxona va davlat darajasida sun'iy intellekt infratuzilmasini rejalashtirishda energiya samaradorligi yuqori uskunalardan foydalanish, ma'lumotlar markazlarini yangilanuvchi energiya manbalariga yaqin joylarda joylashtirish va sovutish tizimlarida suvni tejovchi texnologiyalarni qo‘llash tavsiya etiladi.

Xulosa.

Sun'iy intellekt texnologiyalari sog‘liqni saqlash, ta'lim, sanoat va iqtisodiyotning boshqa sohalarida sezilarli yutuqlarga erishish imkonini bermoqda - bu tashkilotlarning sun'iy intellektdan foydalanish ko‘rsatkichlarining yildan-yilga o‘sib borayotgani va uning global iqtisodiyotga qo‘shayotgan ulkan (yiliga bir necha trillion dollarlik) hissasi bilan tasdiqlanadi. Shu bilan birga, ish o‘rinlarining qisqarishi, algoritmik xolislik, ma'lumotlar maxfiyligining buzilishi, noto‘g‘ri ma'lumotlarning tarqalishi va energiya-ekologik yuk kabi muammolar ham real xavf sifatida saqlanib qolmoqda. Ushbu maqolada ko‘rsatilganidek, har bir muammoning o‘ziga xos, xalqaro amaliyotda sinovdan o‘tgan yechimlari mavjud - qayta tayyorlash dasturlaridan tortib, algoritmik audit, kontent kelib chiqishini tasdiqlash standartlari (C2PA) va yangilanuvchi energiya sarmoyalarigacha. Shuning uchun sun'iy intellektni joriy etishda ilm-fan, texnologiya, huquq va etika sohalari o‘rtasida muvozanatni saqlash, shuningdek O‘zbekiston kabi rivojlanayotgan davlatlarda ushbu sohani tizimli va bosqichma-bosqich rivojlantirish strategiyasini izchil amalga oshirish zamonaviy fan va amaliyotning eng dolzarb vazifalaridan biri bo‘lib qolmoqda.

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ПРОАКТИВНЫЕ МЕХАНИЗМЫ УПРАВЛЕНИЯ СОЦИАЛЬНО-ЭКОНОМИЧЕСКИМ РАЗВИТИЕМ РЕГИОНОВ УЗБЕКИСТАНА

Абдуллаева Одинахон Гайратжон кизи
Выпускница магистратуры Ташкентского государственного экономического университета, Ташкент, Узбекистан
ORCID: 0009-0001-6298-5277
https://doi.org/10.5281/zenodo.23012120

Аннотация. *Актуальность темы определяется необходимостью переводить региональное управление от устранения последствий к раннему выявлению рисков и подготовке сценарных решений; цель состоит в оценке связи проактивных механизмов с качеством управленческих решений в регионах Узбекистана. Сравнительный анализ социально-экономического развития выполнен на выборке N=120 за 2024–2025 гг.; сопоставимость рядов проверялась тестами стационарности, эндогенность контролировалась системной обобщённой оценкой моментов, а надёжность измерительного инструментария составила α=0,86. Описательные показатели представлены следующим образом: качество управленческих решений — M=3,69, диапазон 2,20–4,90; развитость проактивных механизмов — M=3,61, диапазон 1,90–4,80; раннее выявление рисков — M=3,74, диапазон 2,10–4,80; сценарное планирование — M=3,58, диапазон 1,90–4,70; межведомственная координация — M=3,46, диапазон 1,80–4,60. Системная оценка моментов выявила положительную связь проактивности с качеством решений: β=0,42 при p<0,01. Научный вклад заключается в методологическом объединении раннего мониторинга, сценарного планирования и координации в единую рамку оценки регионального управления.*

Ключевые слова: *аналитика рисков, межведомственная координация, мониторинг, проактивность, сравнительный анализ, сценарное планирование, Узбекистан, управленческие решения*

Annotatsiya. *Mavzuning dolzarbligi hududiy boshqaruvni oqibatlarni bartaraf etishdan xatarlarni erta aniqlash va ssenariyli qarorlarni tayyorlashga yo‘naltirish zarurati bilan belgilanadi; maqsad O‘zbekiston hududlarida proaktiv mexanizmlar bilan boshqaruv qarorlari sifati o‘rtasidagi bog‘liqlikni baholashdan iborat. Ijtimoiy-iqtisodiy rivojlanishning qiyosiy tahlili 2024–2025-yillarda N=120 tanlanma asosida o‘tkazildi; qatorlarning taqqoslanuvchanligi statsionarlik testlari bilan tekshirildi, endogenlik tizimli umumlashtirilgan momentlar bahosi orqali nazorat qilindi, o‘lchov vositasining ishonchliligi esa α=0,86 ni tashkil etdi. Tavsifiy ko‘rsatkichlar quyidagicha bo‘ldi: boshqaruv qarorlari sifati — M=3,69, diapazon 2,20–4,90; proaktiv mexanizmlar rivojlanganligi — M=3,61, diapazon 1,90–4,80; xatarlarni erta aniqlash — M=3,74, diapazon 2,10–4,80; ssenariyli rejalashtirish — M=3,58, diapazon 1,90–4,70; idoralararo muvofiqlashtirish — M=3,46, diapazon 1,80–4,60. Tizimli baholash proaktivlik va qarorlar sifati o‘rtasida ijobiy bog‘liqlikni ko‘rsatdi: β=0,42, p<0,01. Ilmiy hissa erta monitoring, ssenariyli rejalashtirish va muvofiqlashtirishni hududiy boshqaruvni baholashning yagona metodologik doirasida birlashtirishdan iborat.*

Kalit so‘zlar: *xatarlar tahlili, idoralararo muvofiqlashtirish, monitoring, proaktivlik, qiyosiy tahlil, ssenariyli rejalashtirish, O‘zbekiston, boshqaruv qarorlari*

Abstract. *The topic is timely because regional governance must move beyond consequence management toward early risk detection and scenario-based decisions; the study evaluates how proactive mechanisms are associated with the quality of managerial decisions across Uzbekistan’s regions. A comparative analysis of socioeconomic development used a sample of N=120 for 2024–2025; stationarity tests checked series comparability, a system generalized method of moments estimator controlled for endogeneity, and the measurement instrument achieved α=0.86 reliability. Descriptive indicators were as follows: managerial decision quality, M=3.69, range 2.20–4.90; development of proactive mechanisms, M=3.61, range 1.90–4.80; early risk detection, M=3.74, range 2.10–4.80; scenario planning, M=3.58, range 1.90–4.70; interagency coordination, M=3.46, range 1.80–4.60. The system estimator identified a positive association between proactivity and decision quality: β=0.42 at p<0.01. The contribution is a methodological framework combining early monitoring, scenario planning, and coordination for evaluating regional governance.*

Keywords: *risk analytics, interagency coordination, monitoring, proactivity, comparative analysis, scenario planning, Uzbekistan, managerial decisions*

ВВЕДЕНИЕ

Разрыв между прогнозированием и реагированием осложняет управление социально-экономическим развитием регионов Узбекистана, особенно при изменчивости рынка труда и инвестиционных потоков [1]. Стратегические документы закрепляют необходимость территориальной координации и повышения качества управленческих решений [2].

Цель исследования — определить связь проактивных механизмов с качеством управления и управленческих решений в 12 регионах Узбекистана за 2024–2025 гг. Объектом выступает управление социально-экономическим развитием регионов, предметом — раннее выявление рисков, сценарное планирование и межведомственная координация. Научная новизна определяется объединением анкетирования, 12 полуструктурированных интервью и контент-анализа 36 региональных программ; задачи: 1) операционализировать проактивные механизмы; 2) оценить качество управления; 3) сопоставить практики; 4) обосновать совершенствование решений. Смешанный дизайн формирует основу последующего сравнительного анализа.

МЕТОДОЛОГИЯ

Сопоставление прогнозирования и реагирования операционализировано смешанным дизайном исследования за 2024–2025 гг.: анкетированы 120 руководителей и специалистов органов регионального управления, проведены 12 полуструктурированных интервью и проанализированы 36 региональных программ. Инструментарий включал структурированную анкету, протокол интервью, шкалу проактивных механизмов и кодировочную матрицу документов; надёжность шкалы составила α=0,86.

Таблица 1 — *Операционализация показателей*

Показатель	Тип	Источник
Проактивные механизмы	независимый	анкета
Качество управления	зависимый	анкета
Раннее выявление рисков	управленческий	интервью
Сценарное планирование	управленческий	программы

Источник: составлено автором

Как показано в таблице 1, количественные и документальные признаки объединены для проверки гипотезы о положительном влиянии проактивных механизмов на управленческие решения.

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

где Y_{it} — качество управления; X_{it} — проактивные механизмы; Z_{it} — сценарное планирование; μ_i — региональный эффект; λ_t — временной эффект.

Для проверки эндогенности применена системная обобщённая оценка моментов, а сопоставимость рядов контролировалась тестами стационарности; результаты формируют основу сравнительного анализа регионов.

РЕЗУЛЬТАТЫ И ОБСУЖДЕНИЕ

Коэффициент системной обобщённой оценки моментов подтвердил положительную связь развитости проактивных механизмов с качеством управления: β=0,42, p<0,01. При N=120 руководителей и специалистов региональных органов управления надёжность шкалы составила α Кронбаха=0,86, что поддерживает согласованность измерения управленческих решений.

Таблица 2 — *Сравнительная оценка проактивных механизмов по 12 регионам*

Показатель	Среднее (M)	Ст. откл. (SD)	Min	Макс	β	p
Раннее выявление рисков	3,74	0,61	2,10	4,80	0,31	<0,01
Сценарное планирование	3,58	0,67	1,90	4,70	0,27	0,02
Межведомственная координация	3,46	0,72	1,80	4,60	0,24	0,03
Качество управленческих решений	3,69	0,59	2,20	4,90	0,42	<0,01

Источник: расчёты автора по материалам анкетирования и 36 программ социально-экономического развития за 2024–2025 гг.

Результаты сопоставления визуализированы на рисунке 1.

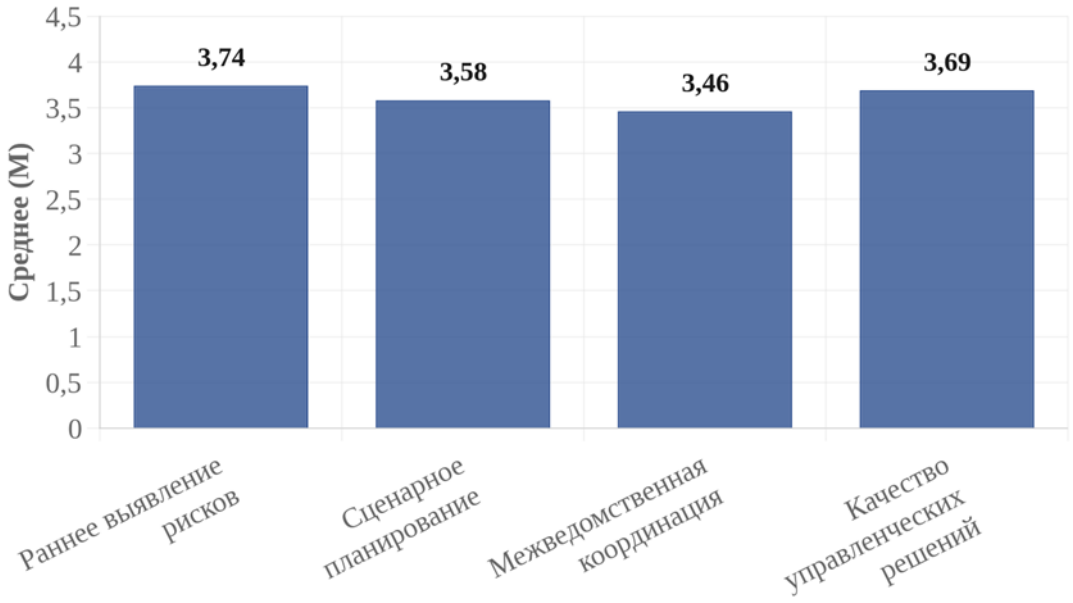


Рисунок 1 — Сравнительная оценка проактивных механизмов по 12 регионам (диаграмма)

Источник: составлено автором

Согласно данным таблицы 2, наиболее выраженным компонентом оказалось раннее выявление рисков, тогда как межведомственная координация получила минимальное среднее значение. Сопоставление с 36 программами 2024–2025 гг. выявило преимущественное закрепление мониторинга и сценарных мероприятий в документах регионов с более высокими оценками управленческих решений.

Таблица 3 — *Описательная статистика по показателю качества управленческих решений*

Переменная	Набл.	Среднее (M)	Ст. откл. (SD)	Min	Макс
Качество управленческих решений	120	3,69	0,59	2,20	4,90

Источник: расчёты автора

Таблица 4 — *Описательная статистика по показателю развитости проактивных механизмов*

Переменная	Набл.	Среднее (M)	Ст. откл. (SD)	Min	Макс
Развитость проактивных механизмов	120	3,61	0,63	1,90	4,80

Источник: расчёты автора

Содержательно это означает, что проактивное управление связывает стратегический менеджмент, мониторинг социально-экономических рисков и качество

управленческих решений. Вывод согласуется с приоритетом территориальной сбалансированности и результативности управления, закреплённым в стратегических документах Узбекистана [2]. Ограничением остаётся зависимость оценок от восприятия респондентов и неодинаковой детализации региональных программ. Региональным органам управления целесообразно закрепить центры мониторинга, сценарное планирование и межведомственные регламенты, что создаёт основу для итогового обобщения.

ЗАКЛЮЧЕНИЕ

Сопоставление регионов и системная обобщённая оценка моментов подтвердили, что усиление проактивных механизмов связано с повышением качества управления социально-экономическим развитием регионов Узбекистана ($\beta=0,42$; $p<0,01$). Эмпирическое объединение анкетных, интервью- и документальных материалов обеспечило целостную оценку влияния раннего выявления рисков, сценарного планирования и координации на управленческие решения. Региональным органам управления целесообразно закрепить центры мониторинга, обязательное сценарное планирование и межведомственные регламенты управленческих решений. На следующем этапе следует расширить временной горизонт анализа, сопоставив проактивные механизмы, управление и социально-экономическое развитие регионов Узбекистана.

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RAQAMLI TA’LIM MUHITIDA SUN’IY INTELLEKT TEXNOLOGIYALARIDAN FOYDALANIB TALABALARNING KASBIY KOMPETENTLIGINI RIVOJLANTIRISH: METODIK IMKONIYATLAR, TAMOYILLAR VA QARAMA-QARSHILIKLAR

Iskandarov Botir Qurbonovich
Buxoro davlat texnika universiteti tayanch doktoranti
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Annotatsiya. *Maqolada raqamli ta’lim muhitida sun’iy intellekt (SI) texnologiyalaridan foydalanib talabalarning kasbiy kompetentligini rivojlantirish metodikasini takomillashtirish muammosi ko‘rib chiqilgan. Kasbiy kompetentlik tushunchasi va uning raqamli sharoitdagi transformatsiyasi tahlil qilingan, kompetentlikning tarkibiy tuzilmasi aniqlangan. SI texnologiyalarining didaktik imkoniyatlari kompetentlik komponentlari bilan bog‘langan holda tasniflangan hamda metodikani takomillashtirishning beshta tamoyili asoslangan. Ta’lim amaliyoti tahlili asosida beshta qarama-qarshilik ajratilgan va ularni raqamli ta’lim muhiti hamda sun’iy intellekt vositalari yordamida bartaraf etish yo‘llari ko‘rsatilgan.*
Kalit so‘zlar: *kasbiy kompetentlik, raqamli ta’lim muhiti, sun’iy intellekt, adaptiv ta’lim, intellektual repetitor, o‘quv analitikasi, metodika, akademik halollik.*

Abstract. *The paper examines the problem of improving the methodology for developing students’ professional competence using artificial intelligence (AI) technologies in a digital learning environment. The concept of professional competence and its transformation under digital conditions are analysed, and the structure of the competence is identified. The didactic possibilities of AI technologies are classified in relation to the competence components, and five principles for improving the methodology are substantiated. Based on an analysis of educational practice, five contradictions are identified, and ways to resolve them through the digital learning environment and artificial intelligence tools are proposed.*
Keywords: *professional competence, digital learning environment, artificial intelligence, adaptive learning, intelligent tutoring, learning analytics, methodology, academic integrity.*

Kirish. Ta’lim tizimining raqamli transformatsiyasi va sun’iy intellekt texnologiyalarining jadal rivoji zamonaviy oliy ta’lim oldiga sifat jihatidan yangi vazifalarni qo‘ymoqda. YUNESKOning ta’lim va ilmiy tadqiqotlarda generativ sun’iy intellektdan foydalanishga oid yo‘riqnomasida ta’kidlanishicha, mazkur texnologiyalar o‘quv jarayonini shaxsiylashtirish va uning samaradorligini oshirish uchun keng imkoniyatlar ochadi, biroq ularni faqat pedagogik jihatdan asoslangan, inson nazoratini saqlagan holda joriy etish maqsadga muvofiqdir [4]. O‘zbekistonda “Raqamli O‘zbekiston — 2030” strategiyasi ta’lim sohasini raqamlashtirishni ustuvor yo‘nalish sifatida belgilagan [1], “2022—2026-yillarga mo‘ljallangan Yangi O‘zbekiston taraqqiyot strategiyasi”da esa ta’lim sifatini oshirish va raqamli kompetensiyalarni rivojlantirish vazifalari qo‘yilgan [2].

Zamonaviy mehnat bozori bitiruvchidan tor sohaviy bilimlar bilan bir qatorda raqamli vositalar bilan ishlash, katta hajmdagi ma’lumotlarni tahlil qilish va tez o‘zgaruvchan kasbiy

vaziyatlarga mustaqil moslashish qobiliyatini talab qiladi. Bu holat kasbiy kompetentlikni shakllantirish metodikasini raqamli ta’lim muhiti va SI vositalari imkoniyatlarini hisobga olgan holda qayta ko‘rib chiqishni taqozo etadi. Shu bilan birga, sun’iy intellekt texnologiyalaridan foydalanib kasbiy kompetentlikni rivojlantirishning yaxlit metodik tizimi, uning tamoyillari va pedagogik shart-sharoitlari yetarlicha ishlab chiqilmagan. Mazkur maqolaning maqsadi — raqamli ta’lim muhitida SI texnologiyalari yordamida talabalarning kasbiy kompetentligini rivojlantirish metodikasining imkoniyatlari, tamoyillari va asosiy qarama-qarshiliklarini ilmiy-nazariy jihatdan asoslashdan iborat.

Tadqiqot metodologiyasi va adabiyotlar tahlili. Tadqiqotda nazariy tahlil, tushunchalarni qiyoslash, me’yoriy-huquqiy hamda o‘quv-uslubiy hujjatlar mazmunini tahlil qilish, xorijiy va mahalliy tajribani umumlashtirish metodlaridan foydalanildi. Metodologik asos sifatida kompetentlik, faoliyatli, shaxsga yo‘naltirilgan va tizimli yondashuvlar qabul qilindi [7].

Kasbiy ta’limda kompetentlik yondashuvining nazariy asoslari mahalliy pedagogikada atroflicha ishlab chiqilgan [7]. Xorijiy tadqiqotlarda sun’iy intellektning ta’limdagi qo‘llanilishi bo‘yicha tizimli sharhlar SIning shaxsiylashtirilgan o‘qitish, baholash va o‘quv jarayonini boshqarishdagi imkoniyatlarini ko‘rsatadi, ammo ularning aksariyati pedagogik asoslanish yetishmasligi va metodik jihatdan tor qo‘llanishga urg‘u beradi [11; 12]. O‘qituvchining raqamli kompetentligini tavsiflovchi DigCompEdu doirasi [6] hamda YUNESKOning talabalar uchun sun’iy intellekt kompetensiyalari doirasi [5] mazkur sohada mo‘ljal beruvchi hujjatlar sanaladi. Intellektual repetitor tizimlarining samaradorligini o‘rgangan tadqiqotlar ularning natijadorligi an’anaviy o‘qitishdan yuqori, ayrim hollarda inson-repetitor darajasiga yaqin ekanini ko‘rsatgan [10]. Shu bilan birga, mavjud manbalarda SI texnologiyalari kasbiy kompetentlikni rivojlantirishning yaxlit metodik konstrukti sifatida — tamoyillari, shart-sharoitlari va qarama-qarshiliklari bilan birgalikda — maxsus tadqiq etilmagan.

Adabiyotlar tahlili shuni ko‘rsatadiki, sun’iy intellektni ta’limga tatbiq etish bo‘yicha ishlar shartli ravishda uch guruhga ajratiladi: birinchisi — texnologik yechimlarni (adaptiv platformalar, chatbotlar, intellektual repetitorlar) tavsiflashga qaratilgan; ikkinchisi — SIning o‘quv natijalariga ta’sirini empirik o‘lchashga bag‘ishlangan; uchinchisi — etik, huquqiy va akademik halollik masalalarini o‘rganadi. Biroq ushbu yo‘nalishlar ko‘pincha bir-biridan ajralgan holda rivojlanmoqda: texnologik imkoniyatlar pedagogik maqsadlar va kompetentlikning aniq tarkibiy qismlari bilan yetarlicha bog‘lanmagan. Bu esa SI vositalarini alohida-alohida qo‘llashdan yaxlit metodik tizimga o‘tish zaruratini keltirib chiqaradi, bunda texnologiya tanlovi kompetentlikning muayyan komponentini rivojlantirish vazifasidan kelib chiqishi lozim.

Natijalar va muhokama.

1. Kasbiy kompetentlik va uning raqamli sharoitdagi transformatsiyasi. Kasbiy kompetentlik shaxsning kasbiy vazifalarni muvaffaqiyatli hal etishga yo‘naltirilgan bilim, ko‘nikma, malaka, qadriyat va shaxsiy sifatlarining yaxlit birligi sifatida tushuniladi. Raqamli ta’lim muhiti va SI texnologiyalari sharoitida uning tarkibi yangi mazmun kasb etadi: an’anaviy kognitiv va faoliyatli tarkibiy qismlarga raqamli-texnologik va kommunikativ-kollaborativ qatlam qo‘shiladi. Tahlil asosida kompetentlik tarkibida beshta komponent ajratildi: motivatsion-qadriyatli (kasbga va uzluksiz o‘rganishga munosabat), kognitiv (tizimli kasbiy bilimlar), faoliyatli-texnologik (kasbiy vazifalarni, shu jumladan raqamli va intellektual vositalar yordamida hal etish), kommunikativ-kollaborativ (jamoada va raqamli muhitda o‘zaro hamkorlik) hamda refleksiv-baholovchi (o‘z faoliyati natijalarini tanqidiy baholash).

Komponentlar ierarxik emas, balki funksional bog‘lanishda bo‘lib, har biri qolganlarining rivojlanishi uchun shart-sharoit yaratadi.

2. SI texnologiyalarining didaktik imkoniyatlari. Sun’iy intellekt vositalarining kompetentlikni rivojlantirishdagi imkoniyatlari ularning turlariga ko‘ra farqlanadi. Quyidagi jadvalda asosiy vosita turlari, ularning didaktik imkoniyatlari va ustuvor ravishda rivojlantiradigan kompetentlik komponentlari umumlashtirilgan (1-jadval).

1-jadval

Sun’iy intellekt vositalarining didaktik imkoniyatlari va kompetentlik komponentlari bilan bog‘liqligi

SI vositasi turi	Didaktik imkoniyat	Rivojlanadigan komponent
Adaptiv o‘quv tizimlari	Individual o‘quv traektoriyasi, topshiriq murakkabligi va tempini avtomatik sozlash	Kognitiv, motivatsion-qadriyatli
Intellektual repetitor (ITS)	Bosqichma-bosqich yo‘naltirish va tezkor, shaxsiylashtirilgan qayta aloqa	Faoliyatli-texnologik, kognitiv
Generativ SI	Kasbiy vaziyatlarni modellashtirish, mashq materiallari va ssenariylar yaratish	Faoliyatli-texnologik, kommunikativ
O‘quv analitikasi	O‘quv jarayonini kuzatish, muammoli joylarni diagnostikalash	Refleksiv-baholovchi
Virtual va simulyatsion muhit	Xavfsiz sharoitda takroriy kasbiy amaliyot va tajriba	Faoliyatli-texnologik, motivatsion

Jadvaldan ko‘rinib turibdiki, SI vositalari kompetentlikning barcha komponentlarini qamrab olish imkonini beradi, biroq ularning ta’siri avtomatik emas: har bir vosita aniq o‘quv vazifasi va pedagogik ssenariy doirasidagina samarali natija beradi. Masalan, generativ SI kasbiy kontekstga ega vaziyatlarni tez modellashtirishga yordam bersa-da, agar topshiriq faqat tayyor javob olishga qaratilgan bo‘lsa, u mustaqil faoliyat o‘rnini bosib qolishi mumkin. Aksincha, o‘sha vosita talabadan yechim variantlarini qiyoslash, ularni asoslash va xatolarni tahlil qilishni talab qiladigan ssenariyda refleksiv-baholovchi hamda faoliyatli-texnologik komponentlarni bir vaqtda rivojlantiradi. Shu bois metodika markaziga texnologiyaning o‘zi emas, balki uni qamrab oluvchi o‘quv topshirig‘ining tuzilishi qo‘yilishi zarur.

3. Metodikani takomillashtirish tamoyillari. Tahlil asosida SI texnologiyalaridan foydalanib kasbiy kompetentlikni rivojlantirish metodikasini takomillashtirishning quyidagi tamoyillari asoslandi: 1) kasbiy-kontekstuallik — o‘quv topshiriqlari real kasbiy faoliyat mantig‘iga muvofiq loyihalanadi; 2) adaptivlik va individuallashtirish — o‘qitish mazmuni va tempi talabaning individual natijalariga moslanadi; 3) o‘quvchi subyektligining ustuvorligi — SI yordamchi vosita sifatida qo‘llaniladi, kasbiy qaror qabul qilish mas’uliyati talabada saqlanadi; 4) refleksivlik va shaffoflik — topshiriqlarda yakuniy javob emas, balki unga olib boruvchi mulohaza yo‘li va uni asoslash asosiy qiymat kasb etadi; 5) akademik halollik va etik mas’uliyatning integratsiyasi — SI vositalaridan foydalanish qoidalari o‘quv jarayonining ajralmas qismiga aylantiriladi.

4. Amaliyotdagi qarama-qarshiliklar. Oliy ta’lim amaliyoti tahlili quyidagi qarama-qarshiliklarni aniqlash imkonini berdi: 1) mehnat bozorining raqamli kompetensiyalarga bo‘lgan ehtiyoji bilan kasbiy tayyorgarlik metodikasining an’anaviy, inertsion tashkil etilishi o‘rtasida; 2) SI vositalarining keng didaktik imkoniyatlari bilan ularni maqsadli va tizimli qo‘llash metodikasining ishlab chiqilmaganligi o‘rtasida; 3) o‘qitishni individuallashtirish zarurati bilan ommaviy ta’limning unifikatsiyalangan tashkiliy shakllari o‘rtasida; 4) sun’iy intellektning tayyor yechim taklif eta olishi bilan mustaqil kasbiy tafakkur va akademik halollikni shakllantirish zarurati o‘rtasida; 5) kompetentlik darajasini obyektiv baholash zarurati bilan raqamli va SI sharoitiga mos diagnostik apparatning yetishmasligi o‘rtasida.

5. Pedagogik shart-sharoitlar va risklar. Ajratilgan qarama-qarshiliklarning sezilarli qismini raqamli ta’lim muhiti va SI vositalaridan maqsadli foydalanish orqali bartaraf etish mumkin. Adaptiv tizimlar individuallashtirish muammosini yumshatadi, o‘quv analitikasi esa yangi diagnostik ko‘rsatkichlarni ochib beradi. Biroq metodikaning samaradorligi bir qator pedagogik shart-sharoitlarga rioya etilishiga bog‘liq: o‘quv topshiriqlarining real kasbiy faoliyat mazmuni bilan bog‘lanishi; o‘qituvchining raqamli va sun’iy intellekt kompetentligi yetarli darajada bo‘lishi [6]; talabalarda mustaqil va tanqidiy tafakkurni rag‘batlantiruvchi baholash tizimining mavjudligi; SI vositalaridan foydalanishning shaffof etik qoidalari; hamda tegishli texnik-uslubiy ta’minotning yo‘lga qo‘yilishi.

Ayni paytda SI vositalarini qo‘llash bir qator pedagogik risklarni ham keltirib chiqaradi: tayyor yechimlarning oson olinishi mustaqil izlanish o‘rniga tayyorni qabul qilish odatini shakllantirishi, akademik halollikni ta’minlash murakkablashishi va o‘zlashtirishning yuzaki bo‘lib qolishi mumkin [13]. Bu risklarni bartaraf etishning asosiy yo‘li — topshiriqlarni yakuniy javobga emas, balki unga olib boruvchi mulohaza yo‘li va uni asoslashga yo‘naltirilgan tarzda loyihalash. Bunday yondashuvda sun’iy intellekt talabaning o‘rnini bosuvchi emas, balki uning kasbiy tafakkurini kengaytiruvchi va o‘quv jarayonini shaxsiylashtiruvchi vositaga aylanadi.

Xulosa. O‘tkazilgan tahlil quyidagi xulosalarga kelish imkonini berdi. Raqamli ta’lim muhiti va sun’iy intellekt texnologiyalari sharoitida kasbiy kompetentlik tarkibi motivatsion-qadriyatli, kognitiv, faoliyatli-texnologik, kommunikativ-kollaborativ va refleksiv-baholovchi komponentlar bilan boyiydi. SI vositalari kompetentlikning barcha komponentlarini rivojlantirish imkoniyatiga ega bo‘lsa-da, ularning samaradorligi pedagogik loyihalash sifatiga bevosita bog‘liq. Metodikani takomillashtirishning beshta tamoyili va ta’lim amaliyotidagi beshta qarama-qarshilik tadqiqotning yo‘nalishini belgilaydi. Texnologiyalarning o‘zi yechim bo‘la olmaydi: ularning natijadorligi o‘qituvchining tayyorgarlik darajasi va akademik halollik shartlariga muvofiqligiga bog‘liq. Keyingi tadqiqot yo‘nalishi — kompetentlikni rivojlantirishning strukturaviy-mazmuniy modeli va uni raqamli muhitda amalga oshirish metodikasini ishlab chiqishdan iborat.

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HUDUDIY MOLIYAVIY VA SOLIQ SALOHIYATINING O‘ZARO BOG‘LIQLIGI VA UNI BAHOLASH YONDASHUVLARI

Ziyotov Mirobid Ergashovich
Qashqadaryo viloyati soliq boshqarmasi boshlig‘i o‘rinbosari
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Annotatsiya. *Mazkur tezisda hududiy moliyaviy va soliq salohiyatining iqtisodiy mazmuni hamda o‘zaro bog‘liqligi tahlil qilingan. Moliyaviy salohiyat hududning mavjud va potensial moliyaviy resurslardan foydalanish imkoniyati, soliq salohiyati esa ushbu imkoniyatlarning budjet daromadlariga safarbar etilishi mumkin bo‘lgan qismi sifatida yoritilgan. Shuningdek, soliq bazasi, soliq tushumlari, investitsiyalar va iqtisodiy faollik o‘rtasidagi bog‘liqlik asoslangan hamda hududiy soliq salohiyatini kompleks baholash zarurligi ko‘rsatib berilgan.*

Kalit so‘zlar: *moliyaviy salohiyat, soliq salohiyati, soliq bazasi, soliq tushumlari, budjet daromadlari, investitsiya, iqtisodiy faollik.*

Аннотация. *В тезисе проанализированы экономическое содержание и взаимосвязь регионального финансового и налогового потенциала. Раскрыта роль налоговой базы, налоговых поступлений, инвестиций и экономической активности в формировании налогового потенциала региона. Обоснована необходимость комплексной оценки налогового потенциала с учетом основных экономических и фискальных факторов.*

Ключевые слова: *финансовый потенциал, налоговый потенциал, налоговая база, налоговые поступления, бюджетные доходы, инвестиции, экономическая активность.*

Abstract. *This thesis analyzes the economic content and interrelationship between regional financial and tax potential. The role of the tax base, tax revenues, investment, and economic activity in shaping regional tax potential is examined. The study emphasizes the need for a comprehensive assessment of tax potential based on key economic and fiscal factors.*

Keywords: *financial potential, tax potential, tax base, tax revenues, budget revenues, investment, economic activity.*

Kirish

Milliy iqtisodiyotning moliyaviy salohiyati davlat budjeti daromadlari va soliq tushumlari, davlat maqsadli jamg‘armalari mablag‘lari, investitsion resurslar, bank-moliya tizimi imkoniyatlari, kapital bozori vositalari hamda tashqi moliyalashtirish manbalari asosida shakllanadi. Ushbu moliyaviy manbalarning hajmi, tarkibiy tuzilishi va ulardan foydalanish samaradorligi mamlakatda iqtisodiy o‘sishni ta’minlash, investitsiya jarayonlarini rag‘batlantirish hamda ijtimoiy rivojlanish dasturlarini moliyaviy jihatdan qo‘llab-quvvatlash imkoniyatlarini belgilaydi.

Hududlar kesimida moliyaviy salohiyat, avvalo, mahalliy budjetlarning daromad bazasi, hududda faoliyat yurituvchi xo‘jalik subyektlarining moliyaviy barqarorligi, aholi daromadlari, investitsion jozibadorlik, kredit resurslaridan foydalanish imkoniyati va hududdagi umumiy iqtisodiy faollik kabi omillar orqali namoyon bo‘ladi. Mazkur omillarning rivojlanganlik darajasi hududning moliyaviy mustaqilligini ta’minlash, investitsiyalarni jalb qilish imkoniyatlarini

kengaytirish hamda mahalliy ijtimoiy-iqtisodiy dasturlarni amalga oshirish salohiyatiga bevosita ta’sir ko‘rsatadi.

Moliyaviy salohiyat mamlakat va hududlarning iqtisodiy rivojlanish imkoniyatlarini belgilovchi muhim omillardan biri bo‘lib, unda mavjud moliyaviy resurslarni safarbar qilish va ulardan oqilona foydalanish imkoniyatlari namoyon bo‘ladi. Shu nuqtayi nazardan, hududning moliyaviy salohiyati uning iqtisodiy mustaqillik darajasini ta’minlash, shuningdek, mahalliy rivojlanish dasturlarini moliyaviy jihatdan amalga oshirish imkoniyatlarini ifodalaydi.

Moliyaviy salohiyatning yetarli darajada shakllanishi iqtisodiy o‘sishni jadallashtirish, ijtimoiy infratuzilmani modernizatsiya qilish, aholi turmush darajasini yaxshilash va hududlar o‘rtasidagi rivojlanish tafovutlarini kamaytirishga xizmat qiladi. Bunda moliyaviy resurslarning barqaror shakllantirilishi va samarali boshqarilishi iqtisodiyotning raqobatbardoshligini mustahkamlash, investitsion faollikni oshirish hamda davlatning ustuvor ijtimoiy-iqtisodiy vazifalarini moliyaviy ta’minlash uchun zarur shartlardan biri hisoblanadi.



1-rasm. Moliyaviy salohiyatni gorizontal tasniflanishi va uning asosiy elementlari [1].

Shunday qilib, moliyaviy salohiyat iqtisodiy tizimda moliyaviy resurslarni shakllantirish, safarbar etish va ulardan samarali foydalanish imkoniyatlarini ifodalovchi kompleks iqtisodiy kategoriya sifatida qaraladi. Uning hajmi va tarkibiy tuzilishi davlat hamda hududlarning fiskal imkoniyatlarini, shu jumladan, soliq tushumlarini shakllantirish imkoniyatlarini belgilovchi muhim omillardan biridir. Shu sababli moliyaviy salohiyatning soliq salohiyati bilan o‘zaro aloqadorligini o‘rganish soliq salohiyatini baholashning nazariy va metodologik asoslarini takomillashtirish nuqtayi nazaridan muhim hisoblanadi.

Mahalliy tadqiqotchilardan L. Bo‘ronova moliyaviy salohiyatni soliq salohiyatining moddiy asosi sifatida baholab, uni qamrov darajasiga ko‘ra davlat, hudud, tarmoq va alohida xo‘jalik yurituvchi subyekt miqyosida guruhlaydi. Mazkur yondashuvdan kelib chiqib, soliq salohiyatini ham tegishli darajalarda, ya’ni milliy iqtisodiyot, hudud, tarmoq hamda alohida

korxona doirasida ko‘rib chiqish mumkin. Bu esa moliyaviy va soliq salohiyatini turli iqtisodiy darajalarda o‘zaro bog‘liq holda tadqiq etish zarurligini ko‘rsatadi.

Moliyaviy va soliq salohiyatining o‘zaro nisbatini yanada aniqroq ifodalash maqsadida ularning mazmuni, shakllanish manbalari, funksiyalari va hududiy rivojlanishga ta’siri quyidagi jadvalda taqqoslangan..

1-jadval

Soliq salohiyati va moliyaviy salohiyatning o‘zaro bog‘liqligi[86]

Mazmun yo‘nalishlari	Soliq salohiyati (Tax Capacity)	Moliyaviy salohiyat (Financial Capacity)	O‘zaro bog‘liqlik mazmuni
Ta’rif	Iqtisodiyotning maksimal darajada yig‘ilishi mumkin bo‘lgan soliq resurslari	Hudud yoki davlatning moliyalashtirish va rivojlanish imkoniyatlari	Soliq salohiyati – moliyaviy salohiyatning asosiy manbai
Manba	Soliq bazasi, YaIM, korxonalar faoliyati, aholi daromadlari	Budjet daromadlari, kredit imkoniyatlari, investitsiya, aktivlar	Soliq salohiyati ortishi moliyaviy salohiyatni kuchaytiradi
Ahamiyat	Soliq bazasini aniqlash, soliq siyosati samaradorligini baholash	Infratuzilma, ijtimoiy dasturlar, investitsiyani ta’minlash	Soliq salohiyati yuqori hududlarda moliyaviy salohiyat ham kuchli bo‘ladi
Funksiya	Davlat budjetga barqaror tushumlar shakllantirish	Moliyaviy barqarorlikni ta’minlash, xarajatlarni qoplash	Moliyaviy barqarorlik soliq salohiyatiga to‘liq bog‘liq
Tarkibiy qismlar	Soliq bazasi, soya iqtisodiyoti darajasi, ma’murchilik sifat	Budjet daromadlari, kreditlar, investitsion zaxiralar	Soliq bazasini kengaytirish moliyaviy zaxiralarni oshiradi
Hudud rivojiga ta’siri	Korxonalar soni va iqtisodiy faollik oshishi bilan soliq tushumlari ko‘payadi	Infratuzilma rivojlanadi, investitsiya kirishi ortgani uchun iqtisod yuksaladi	Infratuzilma→ishlab chiqarish→soliq tushumlari→moliyalash→qayta rivojlanish sikli
O‘lchash usuli	“Tax capacity”, “Tax effort”, RTS modeli, soliq bazasi tahlili	Budjet balansi, investitsiya hajmi, kredit reytingi, moliyaviy resurslar	Har ikkisi iqtisodiy potensialni baholovchi indikator sifatida qo‘llaniladi

[86] Jurayev X.A. Soliq salohiyatini baholash metodologiyasini takomillashtirish. Iqtisodiyot fanlari doktori (Doctor of Science) ilmiy darajasini olish uchun yozilgan dissertatsiya.

Mazmun yo‘nalishlari	Soliq salohiyati (Tax Capacity)	Moliyaviy salohiyat (Financial Capacity)	O‘zaro bog‘liqlik mazmuni
Natija	Soliq tushumlarini maksimallashtirish imkoniyati	Davlat programmalarini moliyalashtirish qudrati	Soliq salohiyati past bo‘lsa → moliyaviy salohiyat ham cheklanadi
Xavflar	Soya iqtisodiyoti, imtiyozlar, ma’murchilikdagi kamchilikla	Budjet tanqisligi, qarz oshishi, investitsiya kamayishi	Soliq salohiyati pasayishi moliyaviy xavfni kuchaytiradi
Ilmiy xulosa	Soliq salohiyati – iqtisodiy resurslarning fiskal ifodasi	Moliyaviy salohiyat – iqtisodiy qudratning moliyaviy ifodasi	Ikkalasi ham hudud iqtisodiy qudratining egizi va bir-birini to‘ldiruvchi kategoriyalar

Soliq salohiyati moliyaviy salohiyatning muhim tarkibiy qismlaridan biri bo‘lib, u davlat va mahalliy budjetlarga safarbar etilishi mumkin bo‘lgan soliq tushumlari hajmi hamda ularni undirish imkoniyatlarini ifodalaydi. Moliyaviy salohiyat esa mazmunan kengroq kategoriya bo‘lib, milliy iqtisodiyot, hudud, tarmoq yoki alohida xo‘jalik yurituvchi subyekt darajasida iqtisodiy faoliyatni amalga oshirish uchun mavjud va potensial moliyaviy resurslar hamda moliyalashtirish imkoniyatlarini qamrab oladi. Xususan, tadbirkorlik subyektlari miqyosida u ishlab chiqarish jarayonining uzluksizligini ta’minlash va foyda olish bilan bog‘liq xarajatlarni moliyalashtirishning moddiy asosini tashkil etadi.

Davlat miqyosida moliyaviy salohiyat aholini ijtimoiy himoya qilish, ijtimoiy xizmatlarni moliyalashtirish, iqtisodiy o‘sishni rag‘batlantirish, infratuzilmani rivojlantirish hamda strategik vazifalarni amalga oshirish uchun safarbar etilishi mumkin bo‘lgan moliyaviy resurslarni o‘z ichiga oladi. Shu jihatdan, moliyaviy salohiyat davlatning barcha mavjud va potensial moliyaviy imkoniyatlarini qamrab oluvchi keng kategoriyani anglatadi. Soliq salohiyati esa mavjud iqtisodiy baza asosida shakllanishi va fiskal mexanizmlar orqali budjetga safarbar etilishi mumkin bo‘lgan soliq tushumlarining potensial hajmini tavsiflaydi. Demak, mazkur ikki kategoriya o‘zaro uzviy bog‘liq bo‘lsa-da, moliyaviy salohiyat qamrovi jihatidan kengroq bo‘lib, soliq salohiyati uning muhim fiskal tarkibiy qismlaridan biri sifatida namoyon bo‘ladi.

Moliyaviy salohiyat iqtisodiyotning mavjud va potensial moliyaviy imkoniyatlarini qamrab olsa, soliq salohiyati ushbu imkoniyatlarning fiskal mexanizmlar orqali davlat va mahalliy budjetlarga safarbar etilishi mumkin bo‘lgan qismini ifodalaydi. Shu sababli soliq salohiyatini baholashda nafaqat amaldagi soliq tushumlari, balki mavjud iqtisodiy va moliyaviy resurslarning soliqqa tortilishi mumkin bo‘lgan qismini aniqlash ham muhim ahamiyat kasb etadi. Ayniqsa, iqtisodiy faollikni rag‘batlantirish, investitsion muhitni yaxshilash, yashirin iqtisodiyot ko‘lamini qisqartirish va soliq ma’murchiligini takomillashtirish orqali mavjud moliyaviy resurslarning fiskal resurslarga aylanish darajasini oshirish mumkin.

Mazkur yondashuv moliyaviy va soliq salohiyatining bir tomonlama emas, balki o‘zaro ta’sir qiluvchi kategoriyalar ekanligini ko‘rsatadi. Bir tomondan, moliyaviy salohiyatning kengayishi yangi xo‘jalik faoliyati, investitsiyalar va daromad manbalarining shakllanishi orqali soliqqa tortish bazasini kengaytiradi. Ikkinchi tomondan, soliq tushumlarining budjetda

jamlanishi davlat xarajatlari va investitsiyalarini moliyalashtirish imkoniyatlarini oshirib, iqtisodiy faollikning kuchayishiga hamda yangi moliyaviy resurslarning vujudga kelishiga sharoit yaratadi.

Xususan, budjetga safarbar etilgan soliq tushumlarining iqtisodiyotga qayta yo‘naltirilishi real sektor ishlab chiqarish imkoniyatlarini kengaytirish, yangi korxonalar va infratuzilma obyektlarini barpo etish hamda qo‘shimcha daromad manbalarini shakllantirishga xizmat qilishi mumkin. Natijada yangi soliq obyektlari va soliq bazalarining yuzaga kelishi soliq salohiyatining kengayishiga olib keladi. Shu ma’noda, moliyaviy va soliq salohiyati o‘rtasidagi munosabatni “moliyaviy resurslar – soliq bazasi – soliq tushumlari – budjet xarajatlari va investitsiyalar – iqtisodiy faollik – yangi soliq bazasi” ketma-ketligida ifodalash mumkin.

Demak, moliyaviy va soliq salohiyati o‘rtasidagi o‘zaro ta’sir doiraviy xarakterga ega bo‘lib, ularning rivojlanishi hudud va davlatning iqtisodiy faolligi, investitsion imkoniyatlari hamda fiskal siyosat samaradorligi bilan chambarchas bog‘liq. Shu bois soliq salohiyatini oshirishda soliq yukini mexanik ravishda kuchaytirishdan ko‘ra, mavjud iqtisodiy bazani kengaytirish, yangi soliq manbalarini shakllantirish va moliyaviy resurslarning samarali aylanishini ta’minlash muhim hisoblanadi. Mazkur jarayonlarni samarali boshqarish hududlarning moliyaviy mustaqilligi va budjet barqarorligini mustahkamlashga xizmat qiladi.

Yuqoridagi tahlillardan kelib chiqib, moliyaviy salohiyat va soliq salohiyati o‘zaro uzviy bog‘liq bo‘lgan, biroq iqtisodiy mazmuni va qamrovi jihatidan farqlanuvchi kategoriyalar sifatida namoyon bo‘ladi. Moliyaviy salohiyat hudud yoki davlatning mavjud va potensial moliyaviy resurslarni shakllantirish hamda ulardan foydalanish imkoniyatlarini ifodalasa, soliq salohiyati mazkur imkoniyatlarning fiskal mexanizmlar orqali budjet daromadlariga safarbar etilishi mumkin bo‘lgan qismini tavsiflaydi. Shu sababli hududlarning soliq salohiyatini faqat amaldagi soliq tushumlari hajmi asosida baholash ularning real fiskal imkoniyatlarini to‘liq aks ettirmaydi.

Shundan kelib chiqib, hududiy soliq salohiyatini baholashda amaldagi soliq tushumlari bilan bir qatorda soliq bazasining hajmi va tarkibi, hududdagi iqtisodiy faollik darajasi, aholi va xo‘jalik yurituvchi subyektlar daromadlari, investitsion faollik, yashirin iqtisodiyot ko‘lami hamda soliq ma’murchiligi samaradorligini kompleks hisobga olish maqsadga muvofiq. Bunday yondashuv hududning mavjud fiskal natijalari bilan uning potensial soliq imkoniyatlarini farqlash, soliq salohiyatidan foydalanish darajasini aniqlash va uni oshirishning ustuvor yo‘nalishlarini belgilash imkonini beradi.

Mazkur yondashuv asosida soliq salohiyatini hududning moliyaviy salohiyatini shakllantiruvchi va kengaytiruvchi omillar bilan o‘zaro bog‘liq holda baholash, ya’ni «moliyaviy resurslar – soliq bazasi – soliq tushumlari – budjet xarajatlari va investitsiyalar – iqtisodiy faollik – yangi soliq bazasi» ko‘rinishidagi takror ishlab chiqarish zanjiri orqali tahlil qilish taklif etiladi. Bu esa soliq salohiyatini statik ko‘rsatkich sifatida emas, balki hudud iqtisodiy rivojlanishi bilan birgalikda shakllanib va kengayib boruvchi dinamik iqtisodiy kategoriya sifatida baholash imkonini beradi.

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ИССЛЕДОВАНИЕ ВЛИЯНИЯ УСЛОВИЙ ДИФФУЗИОННОГО ЛЕГИРОВАНИЯ НА МАГНИТНОЕ УПОРЯДОЧЕНИЕ КРЕМНИЯ, ЛЕГИРОВАННОГО Mn И Ge

Зикриллаев Н.Ф. Абдкрахманов Б.А. Кушиев Г.А. Казаков Т.О.
Ташкентский государственный технический университет имени Ислама Каримова,
Узбекистан 100095, Узбекистан, Ташкент, ул. Университета 2
https://doi.org/10.5281/zenodo.23266894

В настоящее время одним из перспективных направлений полупроводникового материаловедения является развитие спинтроники, позволяющей управлять электрическими и магнитными свойствами материалов. Особый интерес представляет получение кремниевых систем с устойчивым магнитным упорядочением при комнатной температуре. Примесь марганца (Mn) привлекает внимание благодаря своему магнитному моменту, однако его диффузия и растворимость в кремнии сильно зависят от технологических условий. В данной работе исследовано совместное введение марганца и германия (Ge) в кремниевую матрицу. Атомы германия, обладая большим радиусом, создают локальные напряжения в кристаллической решётке, что влияет на диффузию и распределение атомов Mn. Проведён анализ влияния условий диффузионного легирования на магнитные и фотоэлектрические свойства системы Si<MnGe>. Методы SEM и EDS позволили изучить морфологию поверхности и состав, а также определить роль Ge в формировании кластеров Mn

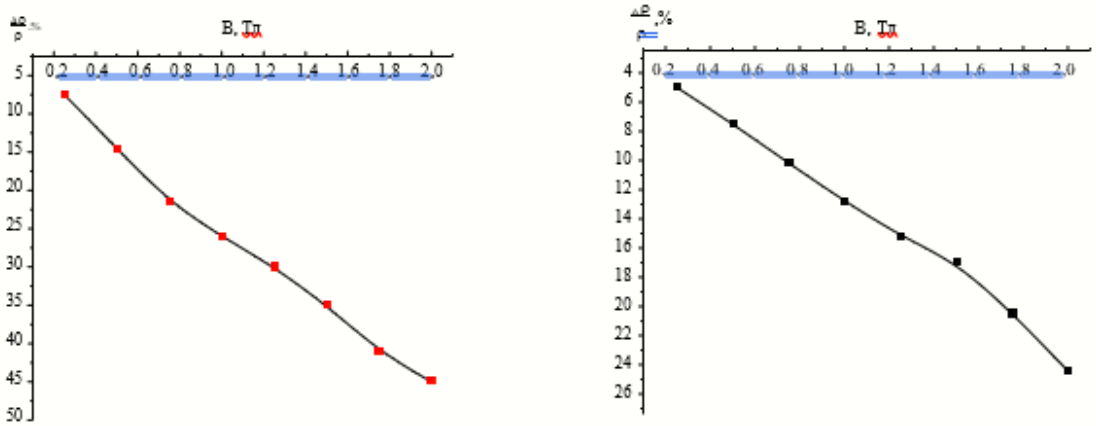


Рис.1 Зависимость ОМС от магнитного поля в образцах p-Si<GeMn> , при E=100 В/см, а)T=77K, б)T=300K

Установлено, что в образцах наблюдается эффект отрицательного магнитосопротивления: с ростом магнитного поля B относительное сопротивление Δρ/ρ уменьшается.

Эксперименты, проведённые при температурах 80 K и 300 K, показали характерные особенности отрицательного магнитосопротивления (ОМС) в образцах Si<GeMn>. При низкой температуре (80 K) эффект ОМС достигает 32–33%, что объясняется более упорядоченным выравниванием магнитных моментов ионов марганца во внешнем поле и снижением рассеяния носителей заряда. Локальные упругие напряжения, создаваемые атомами германия в кремниевой решётке, способствуют кластеризации атомов марганца и

формированию устойчивого ферромагнитного порядка. Практическая значимость работы заключается в том, что даже при комнатной температуре (300 K) эффект ОМС сохраняется на уровне около 24%. Это свидетельствует о формировании стабильного магнитного состояния за счёт взаимодействия марганца и германия и расширяет перспективы применения материала в спинтронных устройствах.

Морфология поверхности и элементный состав образцов были исследованы с помощью сканирующего электронного микроскопа Jeol JSM-IT200LA. SEM-изображения (рис. 2а) показали образование микронеоднородностей и кластеров на поверхности кремния после диффузии, что связано с перераспределением атомов марганца и германия.

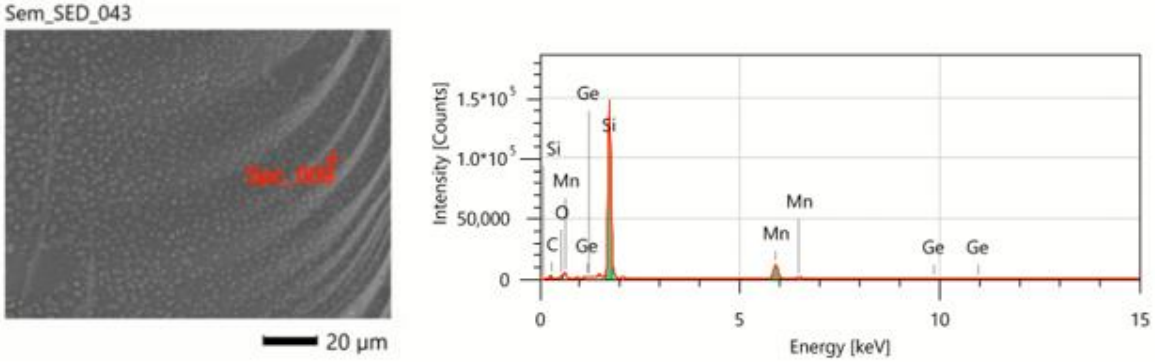


рис.2. Элементный состав легированного кремния примесными атомами германия и марганца

Результаты EDS-анализа подтвердили элементный состав образца: основную матрицу составляет кремний (52,45%), также присутствуют марганец (21,96%) и германий (0,29%). Высокая концентрация марганца способствует формированию выраженных магнитных свойств, тогда как даже небольшое количество германия играет важную роль, создавая локальные упругие напряжения в кристаллической решётке и влияя на упорядоченное распределение атомов марганца. Полученные количественные данные свидетельствуют о формировании качественной магнитной полупроводниковой системы в результате диффузии. Наличие

углерода и кислорода объясняется взаимодействием поверхности образца с атмосферой и фоновыми эффектами в камере микроскопа. Установлено, что выбранные условия диффузии обеспечивают образование в кремнии высококонцентрированных магнитных центров на основе марганца. Атомы германия способствуют кластеризации марганца и формированию стабильных магнитных центров. Под воздействием внешнего магнитного поля наблюдается эффект отрицательного магнитосопротивления, сохраняющийся даже при комнатной температуре, что указывает на высокий уровень магнитного упорядочения материала. Кроме того, в легированных образцах отмечено увеличение фотопроводимости в инфракрасной области, обусловленное взаимодействием глубоких энергетических уровней марганца и магнитных кластеров. В целом система Si<MnGe> представляет собой многофункциональный материал с сочетанием магнитных и оптических свойств, перспективный для применения в спинтронике и высокочувствительных сенсорных технологиях.

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BO‘LAJAK MATEMATIKA O‘QITUVCHILARINI INNOVATSION FAOLIYATGA TAYYORLASHDA RAQAMLI TEXNOLOGIYALARDAN FOYDALANISHNING AMALIY AHAMIYATI

Ilhomova Sadoqat Ulug‘bek qizi
Qo‘qon davlat universiteti matematika kafedrasi stajyor o‘qituvchisi
Qo‘qon, O‘zbekiston
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Annotatsiya. *Maqolada bo‘lajak matematika o‘qituvchilarini innovatsion faoliyatga tayyorlashda raqamli texnologiyalardan foydalanishning amaliy ahamiyati ko‘rib chiqildi. 2021–2025-yillarda xalqaro nashrlarda e’lon qilingan sakkizta manba, ikkita asosiy ramka va uchta milliy me’yoriy hujjat tahlil qilindi. DigCompEdu, HeDiCom, TPACK va YuNESKOning pedagoglar uchun sun’iy intellekt kompetensiyalari ramkalari taqqoslanib, ularning kesishuvi aniqlandi. Olti raqamli texnologiya guruhi matematika o‘qituvchisining innovatsion faoliyatining to‘rt tarkibiy qismi bilan moslashtirildi va har bir guruhning matematik tushunchalarni vizuallashtirish, masala yechish, modellashtirish, baholash va refleksiya jarayonlaridagi amaliy ahamiyati baholandi. Bo‘lajak matematika o‘qituvchilari tayyorgarligidagi asosiy bo‘shliq raqamli ko‘nikma bilan uni sinalgan pedagogik yechimga aylantirish qobiliyati o‘rtasidagi uzilish ekani belgilandi.*

Kalit so‘zlar: *kasbiy kompetentlik; sun’iy intellekt; oliy ta’lim; DigCompEdu; TPACK; immersiv o‘qitish.*

Abstract*. The article discusses the practical importance of using digital technologies in preparing future mathematics teachers for innovative activities. Eight sources, two main frameworks, and three national normative documents were analyzed. The DigCompEdu, HeDiCom, TPACK, and UNESCO AI competency frameworks for teachers were compared. Six groups of digital technologies were aligned with four components of mathematics teachers’ innovative activity, with attention to visualizing mathematical concepts, problem solving, mathematical modeling, assessment, and reflection. The main gap was identified as the disconnect between digital skills and the ability to transform them into tested pedagogical solutions in mathematics lessons.*

Keywords: *professional competence; artificial intelligence; higher education; DigCompEdu; TPACK; immersive learning.*

KIRISH

Raqamli texnologiyalar matematika ta’limining mazmuni, metodlari va tashkil etish shakllarini o‘zgartirmoqda. Bugungi matematika o‘qituvchisidan tayyor elektron vositani ishlatish bilan cheklanmasdan, matematik tushunchalarni vizuallashtirish, murakkab masalalarni modellashtirish, interaktiv topshiriqlar yaratish, yangi pedagogik yechimni loyihalash, sinab ko‘rish va natijasini baholash talab qilinadi. Shu sababli pedagogik ta’lim muassasalarining vazifasi bo‘lajak matematika o‘qituvchisini oddiy raqamli vosita foydalanuvchisi sifatida emas,

matematika ta’limida innovatsion faoliyatni amalga oshira oladigan mutaxassis sifatida tayyorlashga qaratilmoqda.

O‘zbekistonda bu yo‘nalish davlat siyosati darajasida ustuvor vazifa sifatida belgilangan. “Raqamli O‘zbekiston – 2030” strategiyasini tasdiqlagan O‘zbekiston Respublikasi Prezidentining 2020-yil 5-oktabrdagi PF-6079-son Farmoni raqamli texnologiyalarni davlat boshqaruvi, iqtisodiyot va ta’lim kabi sohalarga keng joriy etish vazifalarini belgiladi. Oliy ta’lim tizimini 2030-yilgacha rivojlantirish konsepsiyasi (PF-5847) hamda “O‘zbekiston – 2030” strategiyasi (PF-158) bu yo‘nalishni davom ettirdi. Strategik maqsadlarni auditoriya amaliyotiga aylantirish uchun oliy pedagogik ta’lim darajasida aniq kompetensiyalar bilan ularni shakllantiruvchi texnologiyalar o‘rtasidagi bog‘liqlikni belgilash zarur.

Xalqaro tadqiqotlar pedagoglarning raqamli kompetentligini ta’lim sifatining muhim omili sifatida ko‘rsatmoqda. Yevropa Komissiyasining DigCompEdu ramkasi pedagoglar uchun 22 ta raqamli kompetensiyani olti yo‘nalishda tavsiflaydi. Tondeur va hammualliflari oliy ta’lim o‘qituvchilari uchun to‘rt o‘lchovli HeDiCom (Higher Education Digital Competence) ramkasini ishlab chiqdi [2, b. 33–53]. Sailer va hammualliflari o‘qituvchilarning o‘zi baholagan texnologiya bilan o‘qitish ko‘nikmalari munosabatlarga qaraganda o‘quvchilarning faol, konstruktiv va interaktiv faoliyatini yo‘lga qo‘yishga ko‘proq hissa qo‘shishi mumkinligini ko‘rsatdi.

2022-yil oxirida ChatGPT’ning paydo bo‘lishi muhokamaga yangi o‘lchov qo‘shdi. Mishra va hammualliflari TPACK (Technological Pedagogical Content Knowledge – texnologik pedagogik fan bilimi) ramkasini [4, b. 60–70] generativ sun’iy intellekt davri uchun qayta ko‘rib chiqdi va bu texnologiyaning generativ hamda ijtimoiy xususiyatga ega ekanini belgiladi [5, b. 235–251].

Bo‘lajak matematika o‘qituvchilarining tayyorgarligiga oid dalillar cheklangan, ammo muhim. Lucas va hammualliflari Portugaliya va Ispaniyadagi 203 nafar bo‘lajak matematika o‘qituvchisining sun’iy intellektni kelajakdagi amaliyotga kiritishga tayyorligini solishtirib, ikkala mamlakatda ham ular to‘liq tayyor emasligini aniqladi. O‘zbekistonda Abdurashidova va hammualliflari Toshkent davlat texnika universitetidagi 300 nafar respondent orasida so‘rov o‘tkazib, ularning 83 foizi raqamli texnologiyalarning ta’lim sifatiga ijobiy ta’sirini e’tirof etganini qayd etdi. Immersiv muhitlar bo‘yicha Makransky va Petersen virtual voqelikda o‘rganish jarayonini qiziqish, motivatsiya, o‘ziga ishonch, o‘zini virtual tanada his qilish, kognitiv yuklama va o‘z-o‘zini boshqarish kabi olti omil bilan tavsiflovchi nazariy modelni taklif qildi [10, b. 937–958].

Mavjud tadqiqotlarning ko‘pchiligi raqamli kompetentlikning o‘zini tavsiflash bilan cheklanadi. Raqamli texnologiya guruhlarini aynan matematika o‘qituvchisining innovatsion faoliyati tarkibiy qismlari bilan bog‘lovchi amaliy tizim esa tahlil qilingan manbalarda yetarli darajada yoritilmagan. Shu bo‘shliqni to‘ldirish uchun ushbu maqola xalqaro tajriba va milliy kontekstni birlashtiradi. Maqolaning maqsadi – bo‘lajak matematika o‘qituvchilarini innovatsion faoliyatga tayyorlashda raqamli texnologiyalardan foydalanishning amaliy ahamiyatini ochib berish, raqamli vositalarning matematik mazmunni tushuntirish, masala yechish, modellashtirish, baholash va refleksiya jarayonlaridagi o‘rnini aniqlash hamda tayyorgarlikning amaliy modelini tavsiflash.

MATERIALLAR VA TADQIQOT USULLARI

Tadqiqot tahliliy-sintetik sharh turida bajarildi. Sharh bo‘lajak matematika o‘qituvchilari tayyorgarligidagi raqamli texnologiyalarning amaliy ahamiyatiga oid nazariy va amaliy dalillarni

umumlashtirishga qaratildi. Muallif birlamchi so‘rov yoki tajriba o‘tkazmadi; shu sababli maqola eksperimental emas, sharh maqolasi hisoblanadi.

Tahlilga 2021–2025-yillarda xalqaro nashrlarda e’lon qilingan sakkizta manba, ikkita asosiy ramka [1; 4, b. 60–70] va O‘zbekiston Respublikasi Prezidentining uchta me’yoriy hujjati kiritildi. Manbalar to‘rtta mezon bo‘yicha tanlandi: nashr yili 2021–2025; mavzu o‘qituvchilar, bo‘lajak o‘qituvchilar yoki oliy ta’limda raqamli kompetentlik va sun’iy intellektga bag‘ishlangani; matn ingliz tilida bo‘lgani; raqamli ob’ekt identifikatori (DOI) mavjud yoki hujjat rasmiy bo‘lgani. Har bir manbaning bibliografik ma’lumotlari va DOI raqami nashriyot yozuvlari hamda ochiq repozitoriylar orqali tekshirildi.

Tanlash tizimli sharh protokoli bo‘yicha emas, maqsadli tanlov asosida o‘tdi. Bu qaror sohaning tez o‘zgarishi bilan izohlanadi: sun’iy intellekt sohasidagi tadqiqotlar tez ko‘payib borgani uchun muallif nufuzli xalqaro jurnallarda va YuNESKO nashrida chop etilgan manbalarni ustun qo‘ydi.

Tahlil usullari

Uch usul qo‘llandi. Birinchidan, kontent-tahlil har bir manbadan tadqiqot maqsadi, ob’ekti va asosiy topilmani ajratib oldi. Ikkinchidan, ramkalarni taqqoslash DigCompEdu, HeDiCom, TPACK va YuNESKOning pedagoglar uchun sun’iy intellekt kompetensiyalari ramkasi tarkibining kesishuvini aniqladi. Uchinchidan, kontseptual modellashtirish raqamli texnologiya guruhlarini innovatsion faoliyat tarkibiy qismlari bilan moslashtirdi.

Ushbu maqolada innovatsion faoliyat deganda bo‘lajak matematika o‘qituvchisining matematik mazmun va o‘quvchilarning ehtiyojlaridan kelib chiqib yangi yoki moslashtirilgan pedagogik yechimni loyihalash, matematika darsida joriy etish, natijalarini baholash hamda tajribasi haqida mulohaza yuritib, uni hamkasblar bilan ulashish jarayoni tushuniladi. Natijalarga ta’sir qilishi mumkin bo‘lgan bir necha xato manbasi mavjud. Birinchidan, maqsadli tanlov muallifning sub’ektiv qarori bilan bog‘liq. Ikkinchidan, tanlov ingliz tilidagi nashrlar bilan cheklangani sababli o‘zbek va rus tilidagi tadqiqotlar to‘liq qamralmadi. Uchinchidan, ilmiy nashrlarda muvaffaqiyatli natijalar ko‘proq e’lon qilinadi, shuning uchun texnologiyalarning afzalligi bo‘rttirilgan ko‘rinishi ehtimoli bor. To‘rtinchidan, tahlil qilingan ko‘plab natijalar respondentlarning o‘zi baholagan ko‘rsatkichlariga tayanadi. Beshinchidan, generativ sun’iy intellekt sohasi tez o‘zgarayotgani sababli ba’zi xulosalar qisqa muddatda eskirishi mumkin.

NATIJALAR VA ULARNING MUHOKAMASI

Tahlil innovatsion faoliyatni to‘rt tarkibiy qismga ajratish mumkinligini ko‘rsatdi: matematika darsini loyihalash, joriy etish, o‘quv natijalarini baholash hamda refleksiya va tajribani ulashish. Bu bo‘linish DigCompEdu yo‘nalishlari bilan mos keladi: “o‘qitish va o‘rganish” yo‘nalishi matematik mavzu bo‘yicha raqamli dars va topshiriqlarni loyihalash hamda joriy etishni, “baholash” yo‘nalishi o‘quvchilarning matematik natijalarini tahlil qilishni, “kasbiy faollik” yo‘nalishi esa refleksiya va hamkorlikni qamrab oladi [1]. HeDiCom ramkasining “o‘qitish amaliyoti” va “kasbiy rivojlanish” o‘lchovlari ham shu tarkibga mos tushadi [2, b. 33–53].

To‘rt qism bir-biridan alohida turmaydi, tsikl hosil qiladi: refleksiya natijasi yangi loyihalash bosqichining boshlang‘ich nuqtasiga aylanadi. Bo‘lajak matematika o‘qituvchisi bu tsiklni pedagogik amaliyot davomida bir necha marta takrorlasa, raqamli vosita kasbiy tajribaning ajralmas qismiga aylanadi. Innovatsion loyihalash texnologiya, pedagogika va matematik mazmun bilimlarining kesishuvini talab qiladi [4, b. 60–70]. Shu sababli

texnologiyani alohida kompyuter savodxonligi kursida o‘rgatish bilan bir qatorda, matematika o‘qitish metodikasi mashg‘ulotlariga ham kiritish mantiqan asoslangan.

Tahlil qilingan manbalar asosida raqamli texnologiyalar olti guruhga ajratildi va har biri innovatsion faoliyatning mos tarkibiy qismi bilan bog‘landi (1-jadval).

1-jadval

Raqamli texnologiya guruhlari, ularning innovatsion faoliyat tarkibiy qismlari bilan bog‘liqligi va amaliy ahamiyati

Texnologiya guruhi	Faoliyat qismi	Bo‘lajak matematika o‘qituvchisi uchun amaliy ahamiyat	Asosiy xavf
O‘quv jarayonini boshqarish tizimlari va aralash o‘qitish muhitlari	Joriy etish	Bir mavzu bo‘yicha onlayn va auditoriya mashg‘ulotlarini uyg‘unlashtirgan modul yaratish va uning ishlashini kuzatish	Infratuzilma va internet sifatiga bog‘liqlik
Interaktiv kontent yaratish vositalari	Loyihalash	Matematik tushunchalarni faol o‘zlashtirish, masala yechish va interaktiv faoliyatni yo‘lga qo‘yadigan topshiriqlarni tayyorlash	Vosita shakli pedagogik maqsaddan ustun kelishi
Baholash va o‘quv tahlili vositalari	Baholash	Formativ baholash ma’lumotlariga tayanib matematika darsini tuzatish va o‘quvchilarning matematik rivojlanishini kuzatish	Ma’lumotlar maxfiyligi va natijalarni noto‘g‘ri talqin qilish
Immersiv va simulyatsion muhitlar	Joriy etish va refleksiya	Real sinfga chiqishdan oldin virtual muhitda matematika mikro-darsini sinab ko‘rish	Yuqori xarajat va kognitiv yuklama
Generativ sun’iy intellekt	Loyihalash va baholash	Matematika darsi rejasi, masala va topshiriq hamda teskari aloqa qoralamasini tez yaratish va matematik jihatdan tanqidiy tekshirish	Noto‘g‘ri axborot, ortiqcha ishonish, akademik halollik
Hamkorlikdagi bulutli vositalar	Refleksiya va ulashish	Matematika darsi materiallarini hamkasblar bilan birgalikda yaratish, portfolio yuritish va tajriba almashish	Mualliflik va ma’lumotlar xavfsizligi

Birinchi guruh – o‘quv jarayonini boshqarish tizimlari va aralash o‘qitish muhitlari – bo‘lajak matematika o‘qituvchisiga yangi yechimni real o‘quv muhitida joriy etish uchun tayyor infratuzilma beradi. Abdurashidova va hammualliflari Toshkent davlat texnika universitetida 300 nafar respondent orasida o‘tkazgan so‘rovda 83 foiz ishtirokchi raqamli texnologiyalarning ta’lim sifatiga ijobiy ta’sirini e’tirof etdi, 72 foizi foydali raqamli resurslarga kirish imkoniyatini bildirdi, 68 foizi esa universitetni innovatsion muassasa deb baholadi. Bu natijalar

respondentlarning sub’ektiv fikrini aks ettiradi va bitta universitetga tegishli. Shu sababli ularni sababiy bog‘liqlik dalili sifatida emas, qulay muhit mavjudligining ko‘rsatkichi sifatida baholash o‘rinli.

Ikkinchi guruh – interaktiv kontent yaratish vositalari – matematika darsini loyihalash bosqichiga xizmat qiladi. Sailer va hammualliflarning topilmasiga ko‘ra, o‘qituvchining o‘zi baholagan texnologiya bilan o‘qitish ko‘nikmalari o‘quvchilarning faol, konstruktiv va interaktiv faoliyatini yo‘lga qo‘yish bilan bog‘liq bo‘lgan; mualliflarning xulosasiga ko‘ra, munosabatlarga qaraganda aynan ko‘nikmalar o‘quv faoliyatini yo‘lga qo‘yishga ko‘proq hissa qo‘shishi mumkin. Bundan amaliy tavsiya kelib chiqadi: bo‘lajak matematika o‘qituvchilariga interaktiv vositalarni nazariy tanishuv orqali emas, aniq matematik faoliyatni loyihalash orqali o‘rgatish kerak. Ya’ni talaba vositaning o‘zini emas, o‘quvchi bajaradigan faoliyatni, masalan, grafik qurish, funksiyani tadqiq etish, geometrik shaklni modellashtirish yoki masalani bir necha usulda yechishni loyihalaydi.

Uchinchi guruh – baholash va o‘quv tahlili vositalari. Bond va hammualliflarning ma’lumotiga ko‘ra, oliy ta’limdagi sun’iy intellekt sharhlarining 28,8 foizi profil tuzish va bashorat qilishga bag‘ishlangan, asosiy topilmalar esa moslashuvchan tizimlar va shaxsiylashtirishning ustunligini ko‘rsatgan. Bu bo‘lajak matematika o‘qituvchisi uchun test, masala yechimi va formativ baholash ma’lumotlarini tahlil qilib, qaysi matematik tushuncha yoki ko‘nikmada qiyinchilik mavjudligini aniqlash hamda darsni tuzatish ko‘nikmasi muhimligini bildiradi. Shu bilan birga, xuddi shu sharh axloq, hamkorlik va tadqiqot qat’iyligini kuchaytirish zarurligini ta’kidlaydi. Binobarin, baholash vositalarini o‘rgatishda ma’lumotlar maxfiyligi va natijalarni tanqidiy talqin qilish alohida mavzu bo‘lishi lozim.

To‘rtinchi guruh – immersiv va simulyatsion muhitlar. Makransky va Petersen modeliga ko‘ra, boshqa vositalarda sinalgan o‘qitish usullari immersiv muhitda ham ishlaydi, biroq vosita va usul o‘zaro ta’sir qiladi, ya’ni muhitning o‘zi emas, undan qanday foydalanish natijani belgilaydi [10, b. 937–958]. Amaliy ahamiyati shundaki, bo‘lajak matematika o‘qituvchisi real sinfga chiqishdan oldin simulyatsiya qilingan muhitda matematika mikro-darsini sinab ko‘rishi mumkin; bu muallifning taklifi bo‘lib, model o‘zi nazariy xarakterga ega va matematika o‘qituvchisini tayyorlash sharoitida empirik sinovni talab qiladi.

Beshinchi guruh – generativ sun’iy intellekt – alohida muhokamaga loyiq va keyingi bo‘limda yoritiladi. Oltinchi guruh – hamkorlikdagi bulutli vositalar – refleksiya va ulashish bosqichini qo‘llab-quvvatlaydi. DigCompEdu “kasbiy faollik” yo‘nalishi hamkasblar bilan hamkorlik va refleksiv amaliyotni kasbiy kompetensiya sifatida ajratadi, HeDiCom esa kasbiy rivojlanishni alohida o‘lchov sifatida belgilaydi [2, b. 33–53]. Bulutli hujjat va portfolio vositalari bu faoliyatni ko‘rinadigan va tekshiriladigan qiladi. Tanlangan manbalarda bu guruhning alohida empirik baholanishi kam uchradi, shu sababli unga oid xulosa ramkalarga tayanadi.

Generativ sun’iy intellekt va pedagogik bilim

Generativ sun’iy intellekt 2022-yildan beri matematika o‘qituvchisini tayyorlashga eng kuchli ta’sir qilayotgan texnologiya guruhi bo‘ldi.

Mishra va hammualliflar TPACK ramkasining texnologik, pedagogik, mazmuniy va kontekstual bilim sohalari generativ sun’iy intellekt ta’sirida qayta ko‘rib chiqilishi kerakligini ko‘rsatdi. Mualliflar bu texnologiyaning boshqa raqamli vositalar bilan umumiy xususiyatlarini (ko‘p shaklli, noaniq va beqaror ekanini) hamda yangi xususiyatlarini (generativ va ijtimoiy ekanini) ajratdi, kontekstual bilimni esa texnologiyaning jamiyatga ta’sirini ham qamrab

oladigan darajada kengaytirishni taklif qildi [5, b. 235–251]. Bu bo‘lajak matematika o‘qituvchisi uchun ikki oqibat beradi. Birinchisi, sun’iy intellekt natijasini matematik mazmun va pedagogik maqsad bo‘yicha tekshirish ko‘nikmasi kasbiy bilimning bir qismiga aylanadi. Ikkinchisi, texnologiya endi passiv vosita emas, o‘quv jarayonidagi faol ishtirokchiga o‘xshab ta’sir qiladi. YuNESKO ramkasi bu o‘zgarishni “o‘qituvchi – sun’iy intellekt – o‘quvchi” munosabati sifatida tavsiflaydi va 2022-yilgacha atigi yettita davlat pedagoglar uchun sun’iy intellekt ramkasi yoki kasbiy rivojlantirish dasturini ishlab chiqqanini qayd etadi.

Shu dalillar asosida bo‘lajak matematika o‘qituvchilari uchun uch qatlamli ko‘nikma tavsiya etiladi: birinchi qatlam – sun’iy intellektdan matematika darsi rejasi, masala va topshiriqlar qoralamasini yaratishda foydalanish; ikkinchi qatlam – hosil qilingan matematik yechim, formula yoki izohni ishonchli manbalar va mustaqil hisob-kitob bilan solishtirib tanqidiy tekshirish; uchinchi qatlam – o‘quvchilarni texnologiyadan mas’uliyatli foydalanishga o‘rgatish. Bu qatlamlar YuNESKO ramkasidagi “sun’iy intellekt pedagogikasi”, “sun’iy intellekt etikasi” va “inson markazli yondashuv” yo‘nalishlariga mos keladi.

Bo‘lajak matematika o‘qituvchilarining tayyorgarlik holati

Tayyorgarlik holatiga oid dalillar ikkita muammoni ko‘rsatadi. Birinchi muammo – sun’iy intellekt bo‘yicha bilim va ishonchning yetarli emasligi: Portugaliya va Ispaniyadagi 203 nafar bo‘lajak o‘qituvchi orasida ishonch, bilim va raqamli kompetentlik bo‘yicha mamlakatlar o‘rtasida sezilarli farq topilmadi; mualliflar bo‘lajak matematika o‘qituvchilari ikkala mamlakatda ham to‘liq tayyor emasligini va pedagogik ta’lim dasturlarida qayta ko‘rib chiqilishi lozim bo‘lgan jihatlar borligini qayd etdi.

Ikkinchi muammo – ko‘nikmadan faoliyatga o‘tish uzilishi. Sailer va hammualliflar o‘qituvchining o‘zi baholagan ko‘nikmalari o‘quv faoliyatini yo‘lga qo‘yish bilan bog‘liqligini ko‘rsatdi. Bundan ko‘rinadiki, ko‘nikma yetarli shart emas: bo‘lajak pedagog texnologiyaning aniq dars sharoitidagi foydasini ko‘rishi kerak. Ushbu xulosa muallifning talqini bo‘lib, uni to‘g‘ridan-to‘g‘ri sinagan tadqiqot tahlil qilingan manbalar orasida uchramadi.

Milliy kontekstda Abdurashidova va hammualliflarning natijalari universitetda raqamli muhitga nisbatan ijobiy munosabat mavjudligini ko‘rsatadi; respondentlar talabalar, o‘qituvchilar va ma’muriy xodimlardan iborat bo‘lgan, natijalar esa bo‘lajak matematika o‘qituvchilariga alohida tegishli emas. Ijobiy munosabat bo‘lajak matematika o‘qituvchisining innovatsion faoliyatga tayyorligini o‘z-o‘zidan isbotlamaydi; Sailer va hammualliflar ham munosabatga emas, ko‘nikmaga tayanish muhimligini ko‘rsatgan.

Amaliy model: to‘rt bosqichli tayyorlash tsikli

Yuqoridagi tahlil asosida bo‘lajak matematika o‘qituvchilarini innovatsion faoliyatga tayyorlashning to‘rt bosqichli amaliy modeli taklif qilindi (1-rasm).

1. Anglash →	**2. Sinash →**	**3. Loyihalash →**	**4. Refleksiya va ulashish ↺**
Ssenariyga asoslangan o‘zini baholash; ramkalar bilan tanishish	Olti texnologiya guruhini kichik topshiriqlarda sinash; afzallik va xavflarni qayd etish	TPACK mantiqida innovatsion dars yoki modul loyihasi; sun’iy intellektdan faqat qoralama sifatida foydalanish	Amaliyotda joriy etish; teskari aloqa; portfolio; hamkasblarga taqdim etish

Kesishuvchi qatlam: axloq, ma’lumotlar himoyasi, akademik halollik va natijani ma’lumot asosida baholash

1-rasm. Bo‘lajak matematika o‘qituvchilarini innovatsion faoliyatga tayyorlashning to‘rt bosqichli amaliy modeli.

Birinchi bosqich – anglash. Talaba o‘zining raqamli va sun’iy intellekt kompetensiyalarini ssenariyga asoslangan o‘zini baholash vositasi bilan aniqlaydi. Sailer va hammualliflarning ssenariyga asoslangan o‘zini baholash vositasi bunday yondashuvga misol bo‘la oladi. Ikkinchi bosqich – sinash. Talaba olti texnologiya guruhining har birini kichik topshiriqda sinab, afzallik va xavflarni yozma qayd etadi. Uchinchi bosqich – loyihalash. Talaba TPACK mantiqi asosida bitta mavzu bo‘yicha innovatsion dars yoki modul loyihasini tayyorlaydi; sun’iy intellektdan faqat qoralama sifatida foydalanadi va har bir natijani tekshiradi. To‘rtinchi bosqich – refleksiya va ulashish. Talaba loyihani matematika o‘qituvchisi pedagogik amaliyotida joriy etadi, o‘quvchilardan teskari aloqa to‘playdi, natijani portfolioga kiritadi va hamkasblariga taqdim etadi.

Modelni to‘rt semestrga taqsimlash mumkin, biroq bu taqsimot ham tavsiya xarakterida. Har bir bosqichda tayyorgarlik darajasini baholash uchun portfolioga asoslangan mezonlar taklif qilindi (2-jadval).

2-jadval

Bo‘lajak matematika o‘qituvchisining innovatsion tayyorgarligini portfolio orqali baholash mezonlari (taklif)

Mezon	Ko‘rsatkich	Portfolioga kiritiladigan dalil
Raqamli vositani tanlash	Vositani pedagogik maqsadga mos tanlaydi	Tanlovni asoslovchi qisqa yozma izoh
Pedagogik loyihalash	Matematik mazmun, pedagogika va texnologiyani bog‘lovchi dars yoki modul loyihasini yaratadi	Matematika darsi rejasi va uning tahlili
Sinash va joriy etish	Matematika darsi loyihasini amaliyotda sinab, o‘quvchilardan teskari aloqa to‘playdi	Kuzatuv daftari va o‘quvchilar fikri
Baholash va tahlil	Natijani ma’lumotlar asosida baholab, loyihani qayta ishlaydi	Boshlang‘ich va yakuniy natijalarni taqqoslash hisoboti
Axloq va xavfsizlik	Sun’iy intellekt natijasini tekshiradi, shaxsiy ma’lumotlarni himoya qiladi	Tekshiruv jurnali va foydalanish qoidalari
Refleksiya va ulashish	Tajribani hamkasblarga taqdim etadi va ularning fikrini hisobga oladi	Matematika darsi loyihasi taqdimoti va hamkasb sharhi

Mezonlar tayyorgarlikni bitta test bilan emas, bir nechta dalil bilan baholashga imkon beradi. Masalan, “axloq va xavfsizlik” mezoni bo‘yicha talaba sun’iy intellekt natijasini qanday tekshirganini ko‘rsatuvchi jurnalni taqdim etadi. Mezonlar muallif tomonidan ramkalar asosida tuzilgan va hali validatsiya qilinmagan; ularning ishonchliligini va qo‘llanilish qulayligini pilot tadqiqotda tekshirish lozim.

Modelni joriy etish uchun pedagogik universitetlarga beshta amaliy chora tavsiya etiladi. Birinchi chora – raqamli texnologiyalarni alohida kursda emas, matematika o‘qitish metodikasi

mashg‘ulotlari ichida o‘rgatish. Ikkinchi chora – matematika o‘qituvchisi pedagogik amaliyoti rahbarlarini model bo‘yicha tayyorlash, chunki refleksiya va ulashish bosqichi ularning ishtirokisiz ishlamaydi. Uchinchi chora – portfolio asosidagi baholashni joriy etish. To‘rtinchi chora – internet va qurilmalarga kirish tengsizligini hisobga olib, har bir topshiriq uchun kam resursli muqobil variant tayyorlash. Beshinchi chora – sun’iy intellekt va ma’lumotlardan foydalanish qoidalarini universitet darajasida yozma ravishda belgilash.

Raqamli texnologiyalarning amaliy ahamiyati xavflarsiz emas. Birinchi xavf – ma’lumotlar maxfiyligi va baholash natijalarini noto‘g‘ri talqin qilish; Bond va hammualliflar axloqni kuchaytirish zarurligini alohida ta’kidlagan. Ikkinchi xavf – generativ sun’iy intellektning noto‘g‘ri yoki beqaror natija berishi va unga ortiqcha ishonish [5, b. 235–251]. Uchinchi xavf – raqamli tengsizlik: infratuzilma va qurilmalarga kirish imkoniyati talabalar o‘rtasida teng bo‘lmasa, model ayrim talabalar uchun ortiqcha yuk bo‘lishi mumkin. To‘rtinchi xavf – vosita shaklining pedagogik maqsaddan ustun kelib qolishi; Makransky va Petersen vosita bilan usulning o‘zaro ta’sirini aynan shu sababli ajratib ko‘rsatgan [10, b. 937–958].

Keyingi tadqiqotlar uchta yo‘nalishda davom etishi mumkin. Birinchisi – taklif etilgan modelni bitta yoki bir nechta pedagogik universitetda pilot eksperiment orqali sinash va nazorat guruhi bilan solishtirish. Ikkinchisi – O‘zbekistonda bo‘lajak matematika o‘qituvchilarining raqamli va sun’iy intellekt kompetensiyalarini validatsiyalangan vositalar bilan o‘lchash. Uchinchisi – o‘zbek va rus tilidagi nashrlarni qamrab oladigan kengaytirilgan sharh o‘tkazish. Bu ishlar ushbu maqolada aniqlangan bog‘liqliklarni empirik ma’lumotlar bilan tasdiqlash yoki tuzatish imkonini beradi.

XULOSALAR

Olib borilgan tadqiqot natijalari shuni ko‘rsatadiki, bo‘lajak matematika o‘qituvchilarini innovatsion faoliyatga tayyorlashda raqamli texnologiyalardan foydalanish ta’lim sifatini tubdan yaxshilashda muhim omil hisoblanadi. Raqamli texnologiyalar nafaqat ta’lim jarayonini qiziqarli va interaktiv qiladi, balki bo‘lajak o‘qituvchilarning kasbiy kompetensiyalarini shakllantirishda ham muhim rol o‘ynaydi. Yuqoridagi tahlillar asosida quyidagi asosiy tavsiyalar ishlab chiqildi:

1. Ta’lim dasturlarini boyitish. Oliy ta’lim dasturlariga raqamli texnologiyalar va innovatsion pedagogika bo‘yicha majburiy kurslarni kiritish, TPACK modeli asosida o‘quv rejalarni qayta ko‘rib chiqish va yangilash zarur.

2. Infratuzilmani mustahkamlash. Ta’lim muassasalarining texnik bazasini zamonaviy standartlarga moslashtirish, davlat-xususiy sheriklik mexanizmlarini joriy etish va xalqaro hamkorlikni kuchaytirish tavsiya etiladi.

3. Malaka oshirish tizimi. Pedagoglarning doimiy kasbiy rivojlanishi uchun onlayn va oflayn treninglar, mentorga asoslangan o‘qitish tizimi va sertifikatlash mexanizmlarini joriy etish zarur.

Bo‘lajak matematika o‘qituvchilarini innovatsion faoliyatga tayyorlashda raqamli texnologiyalardan foydalanish nafaqat texnik masala, balki pedagogik falsafa va ta’lim sifatini oshirishning strategik yo‘nalishi hisoblanadi. Kelgusida raqamli texnologiyalarning ta’lim sifatiga uzoq muddatli ta’sirini o‘rganish, TPACK modelini mahalliy sharoitlarga moslashtirish va raqamli vositalardan foydalanish samaradorligini baholashning yangi metodlarini ishlab chiqish istiqbolli yo‘nalishlar hisoblanadi.

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OLIY TA’LIM RAHBARLARINING KOMMUNIKATIV KREATIVLIGINI DIAGNOSTIKA QILISH VA MONITORING MEZONLARI

Mamatova Xilola Muxiddinovna
Guliston davlat pedagogika institutining Yoshlar masalalari va ma’naviy-ma’rifiy ishlar bo‘yicha prorektor
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Annotatsiya. *Maqolada oliy ta’lim muassasalari rahbar-xodimlarining kommunikativ kreativligini aniqlash va rivojlanish dinamikasini kuzatishga mo‘ljallangan ko‘p manbali diagnostik-monitoring tizimi asoslanadi. Konstrukt ochiq muloqot, kreativ fikrlash, hamkorlikni tashkil etish, raqamli kommunikatsiya hamda refleksiya va qayta aloqa parametrlariga ajratildi. Standartlashtirilgan so‘rov va topshiriqlar ekspert intervyusi, kuzatuv, keys va faoliyat dalillari bilan triangulatsiya qilindi. Pilot sinovda 120 respondent ma’lumotlari asosida ichki muvofiqlik koeffitsienti α=0,89, tasdiqlovchi omil tahlilida CFI=0,92 va RMSEA=0,06 natijalari qayd etildi. Natijalar vositaning monitoring uchun istiqbolli ekanini ko‘rsatadi, biroq baholashni jazolovchi attestatsiyaga aylantirmaslik, mahalliy me’yorlarni ishlab chiqish va o‘lchov invarianti hamda mezon validligini keyingi bosqichlarda tekshirish zarurligi asoslanadi.*

Kalit so‘zlar. *diagnostika, monitoring, kommunikativ kreativlik, psixometrik ishonchlilik, oliy ta’lim rahbari, ko‘p manbali baholash*

Kirish. Kommunikativ kreativlik rahbarning yangi g‘oya ishlab chiqishi, uni turli auditoriyaga mos shaklda yetkazishi, boshqalar taklifini eshitishi va murakkab vaziyatlarda konstruktiv yechim yaratishini birlashtiradigan ko‘p o‘lchovli konstrukt hisoblanadi. Uni faqat “yaxshi muloqot qiladi” yoki “kreativ fikrlaydi” kabi umumiy hukmlar bilan baholash boshqaruv qarori uchun yetarli axborot bermaydi. Konstruktning nazariy chegaralari, kuzatiladigan indikatorlari, ma’lumot manbalari va qayta baholash davri aniq belgilanmasa, monitoring subyektiv taassurotlar yig‘indisiga aylanib qoladi [1; 2].

Oliy ta’lim rahbarining faoliyati turli vaziyatlarda namoyon bo‘ladi: strategik yig‘ilish, xodim bilan individual suhbat, nizoni boshqarish, talabalar murojaatiga javob, raqamli platformadagi muloqot va innovatsion loyihani muhokama qilish. Shu sababli bitta o‘z-o‘zini baholash so‘rovnomasi real xulq-atvorni to‘liq qamrab olmaydi. Umumiy metod variansiyasi respondentning ijtimoiy ma’qul javob berishi, kayfiyati yoki bir xil o‘lchov formatidan foydalanish tufayli konstruktlar orasidagi bog‘lanishni sun’iy oshirishi mumkin [3]. Psixometrik sifatni ta’minlash uchun ichki muvofiqlik, konstrukt validligi va ma’lumot manbalari triangulatsiyasi birgalikda ko‘rib chiqilishi zarur.

Shkala ishlab chiqish nazariyasida indikatorlar avval mazmun sohasini yetarli ifodalashi, keyin statistik tuzilma orqali tekshirilishi ta’kidlanadi [1; 4]. Kronbax alfa koeffitsienti bandlarning o‘zaro muvofiqligini baholaydi, lekin yuqori alfa konstrukt bir o‘lchovli yoki mazmunan to‘liq ekanini o‘z-o‘zidan isbotlamaydi [5]. Tasdiqlovchi omil tahlilidagi moslik indekslari nazariy modelning ma’lumotlarga qay darajada mos kelishini ko‘rsatadi; ularni qat’iy “o‘tdi–o‘tmadi” chegarasi sifatida emas, model, tanlanma va boshqa diagnostik dalillar bilan birga talqin qilish lozim [6].

Kommunikativ kreativlikni baholashda kreativ mahsulot, jarayon va muhitni farqlash muhim. Amabile kreativlikni sohaviy bilim, kreativ jarayon ko‘nikmalari va vazifaga motivatsiya bilan bog‘lasa [7], Torrance divergent fikrlashning ravonlik, moslashuvchanlik va originallik ko‘rsatkichlariga e’tibor qaratadi [8]. Transformatsion liderlik vositalari esa rahbarning ilhomlantirish, intellektual rag‘batlantirish va individual yondashuvini kuzatishga yordam beradi [9]. Bularning har biri kerakli, biroq alohida qo‘llanganda kommunikativ kreativlikning to‘liq profilini bermaydi. Maqolaning maqsadi oliy ta’lim rahbar-xodimlari uchun besh parametrli, ko‘p manbali diagnostik-monitoring tizimini tavsiflash, pilot psixometrik natijalarni talqin qilish va undan rivojlantiruvchi boshqaruv vositasi sifatida foydalanish shartlarini aniqlashdir. Asosiy savol shundan iborat: qaysi indikator va ma’lumot manbalari rahbarning kommunikativ-kreativ faoliyatini ishonchli, mazmunan to‘liq va amaliy jihatdan foydali aks ettira oladi?

Metodlar

Tadqiqot ketma-ket aralash metodologiya asosida tashkil etildi: avval konstruktning mazmuniy sohasi nazariy tahlil va ekspert muhokamasi orqali aniqlashtirildi, keyin standartlashtirilgan vositalar pilot sinovdan o‘tkazildi va sifat ma’lumotlari bilan izohlandi [10; 11]. Diagnostik model besh parametrni qamrab oldi: ochiq muloqot, kreativ fikrlash, hamkorlikni tashkil etish, raqamli kommunikatsiya, refleksiya va qayta aloqa. Har bir parametr uchun kamida ikki turdagi dalil belgilandi: respondentning o‘z bahosi hamda tashqi kuzatuv yoki faoliyat mahsuloti.

Standartlashtirilgan blokka test-anketa, ochiq savollar va shkalali baholash kiritildi. Ekspert blokida yarim tuzilmali intervyu, ish jarayonini kuzatish, muammoli keys va loyihalash topshirig‘idan foydalanildi. Liderlik xulq-atvorini tavsiflashda Bass–Avolio yondashuviga, kreativ fikrlash topshiriqlarini tuzishda Torrance tamoyillariga, ish muhitidagi kreativlikni talqin qilishda komponentli modelga tayanildi [7–9]. Instrument bandlari mazmuniy moslik, tushunarlilik, bir ma’nolilik va OTM boshqaruv vaziyatiga daxldorlik mezonlari asosida ko‘rib chiqildi.

Pilot validatsiyada 120 respondent ishtirok etdi. Ichki muvofiqlik Kronbax alfa koeffitsienti, nazariy tuzilmaning ma’lumotga mosligi esa tasdiqlovchi omil tahlili orqali baholandi. CFI va RMSEA indekslari boshqa model diagnostikalari bilan birgalikda ko‘rildi [6]. Asosiy monitoring siklida vositalar 90 nafar rahbar-xodim faoliyatini boshlang‘ich va yakuniy bosqichlarda baholashga moslashtirildi. Natijalar individual “yorliq” berish uchun emas, kuchli jihatlar va rivojlanish ehtiyojlari profilini tuzish uchun talqin qilindi.

1-jadval.

Kommunikativ kreativlik parametrlarining diagnostik xaritasi

-	-	-	-
- Ochiq muloqot	- Aniqlik, tinglash, fikrni tushuntirish	- Shkalali so‘rov va vaziyatli savol	- Intervyu va yig‘ilish kuzatuvi
- Kreativ fikrlash	- Ravonlik, moslashuvchanlik, originallik	- Muammoli keys va ochiq topshiriq	- Ekspert bahosi va yechim mahsuloti
- Hamkorlik	- Jamoani jalb qilish va qarorni	- 360 darajali baholash	- Hamkasb fikri va kuzatuv

	birgalikda ishlab chiqish		
- Raqamli kommunikatsiya	- Kanalni maqsadga mos tanlash, netiket, tezkor javob	- Raqamli kompetensiya anketasi	- Platforma izi va hujjat namunasi
- Refleksiya va qayta aloqa	- Natijani tahlil qilish, feedbackdan foydalanish	- Refleksiv savolnoma	- Kundalik, portfolio va keyingi qaror

Izoh. Har bir parametr bo‘yicha o‘z-o‘zini baholash tashqi dalil bilan tekshiriladi; bitta manba yakuniy hukm uchun yetarli deb olinmaydi.

Natijalar

Pilot sinov natijasida umumiy instrument uchun Kronbax alfa koeffitsienti 0,89 ni tashkil etdi. Bu bandlar orasida yuqori ichki muvofiqlik mavjudligini ko‘rsatadi, biroq natija takroriy yoki mazmunan juda o‘xshash bandlar yo‘qligini alohida tekshirish zaruratini bekor qilmaydi [5]. Tasdiqlovchi omil tahlilida CFI=0,92 va RMSEA=0,06 qayd etildi. Ushbu ikki ko‘rsatkich birgalikda besh parametrli nazariy modelning pilot ma’lumotlarga maqbul darajada mos kelishini ko‘rsatadi [6].

Diagnostik xarita kommunikativ kreativlikni bitta umumiy balldan ko‘ra profil shaklida ko‘rsatishga imkon berdi. Masalan, rahbar kreativ yechimlarni tez ishlab chiqishi, ammo ularni jamoa bilan muhokama qilish yoki raqamli kanalda tushunarli yetkazishda qiynalishi mumkin. Boshqa holatda ochiq muloqot yuqori, lekin refleksiya va qayta aloqa natijalarini keyingi qarorga aylantirish sust bo‘lishi mumkin. Profil yondashuvi malaka oshirish mazmunini individual ehtiyojga mos tanlashga xizmat qiladi.

Monitoring tizimi to‘rt axborot oqimini birlashtirdi: standart ballar, ekspert kuzatuvi, hamkasblar fikri va faoliyat mahsulotlari. Qaror qabul qilishda avval manbalar o‘rtasidagi moslik ko‘rildi; tafovut mavjud bo‘lsa, u xato sifatida emas, qo‘shimcha tahlil talab qiladigan signal sifatida talqin qilindi. Masalan, yuqori o‘z-o‘zini baholash va past kuzatuv bahosi respondentning baholash mezonini boshqacha tushunishi, vaziyat ta’siri yoki ijtimoiy ma’qullik bilan izohlanishi mumkin.

2-jadval.

Diagnostik sifat va monitoring qarorlari matritsasi

1.	2.	3.	4.
5. Pilot tanlanma	6. n=120	7. Dastlabki psixometrik tekshiruv uchun ma’lumot	8. Kengroq va tabaqalashtirilgan tanlanmada takrorlash
9. Ichki muvofiqlik	10. α=0,89	11. Bandlar o‘zaro barqaror ishlagan	12. Bandlararo takrorlanish va subshkalalarni tekshirish
13. Model mosligi	14. CFI=0,92	15. Nazariy tuzilma bilan maqbul moslik	16. Muqobil modellar va invarianti tahlil qilish
17. Qoldiq xatosi	18. RMSEA=0,06	19. Yaqin moslikka dalil	20. Ishonch oralig‘i va boshqa indekslar bilan

			birga talqin qilish
21. Triangulatsiya	22. 4 axborot oqimi	23. Bir manba xatosini kamaytirish	24. Tafovutlarni rivojlantiruvchi suhbatda muhokama qilish
25. Monitoring sikli	26. Boshlang‘ich–rivojlantirish–yakuniy	27. O‘zgarish dinamikasini kuzatish	28. Individual rivojlanish rejasini yangilash

Izoh. CFI va RMSEA alohida qat’iy mezon emas; ular nazariya, tanlanma va boshqa diagnostik dalillar bilan birga baholanadi.

Muhokama

Natijalar kommunikativ kreativlikni ko‘p parametrli konstrukt sifatida o‘lchash mumkinligini ko‘rsatdi. α=0,89 instrumentning ichki barqarorligi haqida ijobiy dalil beradi [5], CFI va RMSEA esa taklif etilgan omil tuzilmasi bilan ma’lumotlar o‘rtasida maqbul muvofiqlik borligini ko‘rsatadi [6]. Biroq psixometrik ko‘rsatkichlar konstruktning barcha jihatlari qamrab olinganini yoki natija real boshqaruv samaradorligini bashorat qilishini to‘liq isbotlamaydi. Shu sababli keyingi validatsiyada mezon validligi, test–retest barqarorligi, lavozim va OTMlar bo‘yicha o‘lchov invarianti tekshirilishi kerak.

Ko‘p manbali dizaynning asosiy afzalligi o‘z-o‘zini baholashni mutlaq haqiqat sifatida qabul qilmasligidadir. Podsakoff va hammualliflar bir xil usul va bir xil respondentdan olingan ma’lumotlar bog‘lanishlarni buzishi mumkinligini ko‘rsatgan [3]. Intervyu, kuzatuv, ekspert bahosi va faoliyat mahsuloti turli xato manbalariga ega bo‘lsa-da, ularning konvergensiyasi talqinni kuchaytiradi. Sifat ma’lumotlari esa ball ortidagi vaziyatni tushuntirib, miqdoriy natijani rivojlantirish rejasiga aylantiradi [10; 11].

Monitoringning boshqaruv qiymati uning qanday maqsadda qo‘llanishiga bog‘liq. Agar natijalar darhol jazolovchi attestatsiya yoki lavozim bo‘yicha hukmga aylantirilsa, respondentlar xavfsiz javoblarni tanlaydi va o‘lchovning mazmuni buziladi. Agar u maxfiy rivojlantiruvchi suhbat, coaching va malaka oshirish rejasiga ulanadigan bo‘lsa, rahbar zaif tomonini yashirishdan ko‘ra uni yaxshilashga manfaatdor bo‘ladi. Trening baholash nazariyasida ham natijani faqat reaksiyalar bilan emas, o‘rganish, xulq-atvor va tashkiliy natija bosqichlari bilan bog‘lash tavsiya etiladi [13].

Raqamli monitoring platformasi ma’lumotni tez yig‘ish va dinamikani ko‘rsatishi mumkin, ammo algoritmik ball insoniy ekspertizani almashtirmasligi kerak. Platformada rollarga asoslangan kirish, ma’lumotni minimal yig‘ish, rozilik, saqlash muddati va natijani kim ko‘rishi aniq belgilanadi. Rahbar profili ommaviy reytingga chiqarilmaydi; individual hisobotda kuchli jihat, rivojlanish ehtiyoji, tavsiya etilgan faoliyat va keyingi o‘lchov sanasi ko‘rsatiladi. Shu tarzda diagnostika nazorat vositasidan uzluksiz kasbiy rivojlanish mexanizmiga aylanadi.

Tadqiqotning asosiy cheklovlari pilot tanlanmaning hajmi va tarkibi, ayrim indikatorlarda o‘z-o‘zini baholash ulushi hamda uzoq muddatli prediktiv validlik ma’lumotlarining yo‘qligidir. Bundan tashqari, yuqori, o‘rta va past daraja chegaralarini universal shaklda belgilashga yetarli normativ baza mavjud emas. Shuning uchun dastlabki bosqichda natijalarni uzluksiz profil sifatida talqin qilish, keyinchalik katta reprezentativ tanlanmada mahalliy me’yorlar ishlab chiqish ilmiy jihatdan ehtiyotkor yo‘l hisoblanadi.

Xulosa

Besh parametrli diagnostik-monitoring tizimi kommunikativ kreativlikni ochiq muloqot, kreativ fikrlash, hamkorlik, raqamli kommunikatsiya va refleksiya birligida baholaydi. Pilot natijalar instrumentning istiqbolli ichki muvofiqligi va konstrukt mosligini ko‘rsatdi. Uning amaliy samarasi bitta ball chiqarishda emas, ko‘p manbali profil asosida rahbarning individual rivojlanish yo‘lini belgilashidadir. Keyingi vazifa o‘lchov invarianti, mezon va prediktiv validlikni kengroq tanlanmada tekshirish hamda etik ma’lumot boshqaruvi qoidalarini institutsionallashtirishdan iborat.

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SONLI USULLAR BO‘YICHA ILMIY TADQIQOTDA INSON VA SUN’IY INTELLEKT HAMKORLIGI: KOSHI TIPIDAGI SINGULYAR INTEGRALLAR UCHUN OPTIMAL KVADRATUR FORMULA MISOLIDA

Aliyev Shoxjaxon Eshdavlatovich
Toshkent shahridagi Adju universiteti
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Annotatsiya. *Maqolada sonli usullar sohasidagi ilmiy tadqiqotda tadqiqotchi va sun’iy intellekt (SI) yordamchisining hamkorligi aniq masala – Koshi tipidagi singulyar integrallar uchun Sard ma’nosidagi optimal kvadratur formulani sonli amalga oshirish misolida tahlil qilingan. Vazifalar taqsimoti va SI natijalarini mustaqil tekshirish bayonnomasi taklif etilgan. Hamkorlik natijasida* $m = 2$ *hol uchun* $O(N)$ *murakkablikdagi algoritm olingan; u chiziqli sistemaning to‘g‘ridan-to‘g‘ri yechimi bilan* 10^{-46} *aniqlikda mos keladi va yupqa profil sirtidagi bosim koeffitsiyentini hisoblashga qo‘llangan. Tekshiruv SI tayyorlagan loyihadagi hamda avvalgi matndagi noaniqliklarni aniqlash imkonini bergan. Magistratura va doktoranturada SIdan foydalanish bo‘yicha tavsiyalar berilgan.*

Kalit so‘zlar: *sun’iy intellekt, inson va SI hamkorligi, ilmiy tadqiqot, natijalarni tekshirish, sonli usullar, optimal kvadratur formula, Koshi tipidagi singulyar integral, akademik halollik.*

Abstract. *The paper analyses collaboration between a researcher and an artificial intelligence (AI) assistant in numerical analysis research, using a concrete problem: the numerical implementation of the Sard-optimal quadrature formula for Cauchy type singular integrals. A division of tasks and a protocol for independent verification of AI output are proposed. The collaboration produced an* $O(N)$ *algorithm for the case* $m = 2$*; it agrees with the direct solution of the linear system to within* 10^{-46} *and is applied to computing the pressure coefficient on a thin airfoil. Verification revealed inaccuracies both in the AI draft and in an earlier text. Recommendations are given for the use of AI in master’s and doctoral studies.*

Keywords: *artificial intelligence, human–AI collaboration, scientific research, verification of results, numerical methods, optimal quadrature formula, Cauchy type singular integral, academic integrity.*

Kirish

O‘zbekistonda sun’iy intellekt texnologiyalarini 2030-yilga qadar rivojlantirish strategiyasi qabul qilingan [1]. YUNESKOning generativ SIdan ta’lim va tadqiqotda foydalanish bo‘yicha qo‘llanmasida insonga yo‘naltirilgan yondashuv va inson nazoratini saqlash zarurligi ta’kidlanadi [2]. Matematikada SI tadqiqotchi intuitsiyasini yo‘naltiruvchi vosita sifatida yangi natijalar olishga yordam bergani ko‘rsatilgan [3].

Shunga qaramay, oliy ta’limda amaliy savol ochiq qolmoqda: magistrant yoki doktorant SI yordamchisi bilan ishlaganda vazifalarni qanday taqsimlashi va olingan natijaga qachon ishonishi mumkin? Hisoblash matematikasi bu savolni o‘rganish uchun qulay sinov maydoni,

chunki SI taklif qilgan formula yoki dasturning to‘g‘riligini aniq yechim, mustaqil hisoblash yoki nazariy baho yordamida obyektiv tekshirish mumkin.

Ishning maqsadi – aniq sonli masala misolida inson va SI hamkorligining sxemasini hamda natijalarni tekshirish bayonnomasini ishlab chiqish, uning samaradorligini ko‘rsatish va oliy ta’lim uchun tavsiyalar berish.

Tadqiqot masalasi

Aerodinamika va elastiklik nazariyasining ko‘plab matematik modellari Koshi yadroli singulyar integrallarga keltiriladi [4]. Quyidagi kvadratur formulani qaraymiz:

$$\text{p.v.}\int_{-1}^{1}\frac{\varphi(x)}{x-t}\,dx \cong \sum_{\beta=0}^{N} C_\beta\,\varphi(x_\beta), \qquad -1<t<1, \qquad (1)$$

bu yerda C_β – koeffitsiyentlar, $x_\beta = h\beta - 1$ – tugunlar, $h = 2/N$, φ – Sobolevning $L_2^{(m)}(-1,1)$ fazosi elementi. Formulaning xatoligi ℓ xatolik funksionalining φ dagi qiymatiga teng va $|(\ell,\varphi)| \le \| \ell \| \cdot \| \varphi^{(m)} \|_{L_2}$. Sard masalasi tugunlar tayinlangan holda $\| \ell \|$ normani eng kichik qiladigan koeffitsiyentlarni topishdan iborat [5]. Bu masala S.L. Sobolev usuli bilan yechilgan va optimal koeffitsiyentlarning oshkor ko‘rinishi olingan [6–8]. Norma kvadrati quyidagicha ifodalanadi:

$$\| \ell \|^2 = (-1)^m \left[\sum_{\beta=0}^{N}\sum_{\gamma=0}^{N} C_\beta\, C_\gamma\, G_m(x_\beta - x_\gamma) - 2\sum_{\beta=0}^{N} C_\beta\, f_m(x_\beta) + J_m(t) \right], \qquad (2)$$

bu yerda $G_m(x) = |x|^{2m-1}/(2(2m-1)!)$, f_m va J_m esa G_m ning singulyar integrallari orqali aniqlanadi. Amaliy hisoblash uchun koeffitsiyentlarni tejamli topish algoritmi va xatolikning tugunlar soniga bog‘liqligi haqidagi sonli ma’lumot zarur. Hamkorlik aynan shu ikki vazifa ustida olib borildi.

Hamkorlik sxemasi va tekshirish bayonnomasi

SI yordamchisi sifatida dastur kodini bajarish imkoniga ega bo‘lgan katta til modeli – Claude (Anthropic) qo‘llanildi. Tadqiqotchi masalani, avvalgi nazariy natijalarni va ilgari hisoblangan qiymatlarni taqdim etdi; SI yordamchisi formulalarni keltirib chiqardi, dastur yozdi va hisoblash tajribalarini bajardi. Vazifalar taqsimoti 1-jadvalda keltirilgan.

1-jadval. Tadqiqot bosqichlarida vazifalar taqsimoti va tekshirish usullari

Bosqich	Tadqiqotchi	SI yordamchisi	Tekshirish usuli
Masalaning qo‘yilishi	Masala, fazo va optimallik mezonini belgilaydi, avvalgi natijalarni beradi	Qo‘yilishni formulalar tilida qayta yozadi	Adabiyot [6–8] bilan solishtirish
Algoritm	Talablarni belgilaydi	Formulalarni keltirib chiqaradi, algoritm taklif etadi	Chiziqli sistemaning to‘g‘ridan-to‘g‘ri yechimi
Dastur va hisoblash	Tajriba yo‘nalishini tanlaydi	Dastur yozadi va hisoblaydi	Aniq yechim; avval olingan qiymatlar [11]
Amaliy model	Model qo‘shish haqida qaror qiladi	Model taklif etadi, qo‘llanish shartini tekshiradi	Aniq analitik yechim
Adabiyot va	Manbalarni tekshiradi,	Matn loyihasini	Birlamchi manba

Bosqich	Tadqiqotchi	SI yordamchisi	Tekshirish usuli
matn	xulosalar uchun javob beradi	tayyorlaydi	sahifalari

Bayonnomaning asosiy qoidasi: SI bergan hech bir formula yoki son mustaqil tekshiruvsiz matnga kiritilmaydi. To‘rt turdagi tekshiruv qo‘llanildi: 1) algoritm natijasini optimallik shartlaridan kelib chiqadigan chiziqli sistemaning to‘g‘ridan-to‘g‘ri yechimi bilan 50 xonali arifmetikada solishtirish; 2) analitik ifodalarni sonli integrallash bilan solishtirish; 3) norma qiymatlarini avval boshqa dastur [11] bilan olingan qiymatlar bilan solishtirish; 4) haqiqiy xatolikning nazariy bahodan oshmasligini tekshirish. Hisoblashlar Python tilida mpmath kutubxonasi yordamida bajarildi.

Natijalar

Matematik natijalar. $F(y) = (y-t)\ln|y-t|, F(t) = 0$ deb belgilaymiz.

1-teorema. $L_2^{(1)}(-1,1)$ fazosida (1) ko‘rinishdagi optimal kvadratur formulaning koeffitsiyentlari quyidagicha:

$$C_0 = \frac{F(x_1)-F(x_0)}{h} - 1 - \ln(1+t), \qquad C_N = \frac{F(x_{N-1})-F(x_N)}{h} + 1 + \ln(1-t),$$

$$C_\beta = \frac{F(x_{\beta-1}) - 2F(x_\beta) + F(x_{\beta+1})}{h}, \qquad \beta = 1,2,\dots,N-1. \qquad (3)$$

Isbot quyidagi tamoyilga tayanadi: Gilbert fazosida chegaralangan funksionalni tugun qiymatlari bo‘yicha eng yaxshi yaqinlashtirish uni interpolyatsion splaynda aniq hisoblashga teng kuchli [9]. $m = 1$ da splayn bo‘lakli-chiziqli, $m = 2$ da esa natural kubik splayn. $m = 2$ uchun quyidagi yordamchi funksiya va vaznlarni kiritamiz ($\sigma = 0$ va $\sigma = 1$ da logarifmli had nolga teng deb olinadi):

$$K(\sigma) = -\frac{2}{3} + \frac{\sigma}{2} + \sigma^2 + \sigma(\sigma^2-1)\ln\left|\frac{1-\sigma}{\sigma}\right|,$$

$$b_i = \frac{h^2}{6}\left[K\left(\frac{t-x_{i-1}}{h}\right) - K\left(\frac{x_{i+1}-t}{h}\right)\right], \qquad i = 1,\dots,N-1. \qquad (4)$$

Algoritm. 1) (3) formula bo‘yicha a_β, $\beta = 0,\dots,N$ hisoblanadi; 2) (4) formula bo‘yicha b_i, $i = 1,\dots,N-1$ hisoblanadi; 3) $y_{i-1} + 4y_i + y_{i+1} = b_i$, $i = 1,\dots,N-1$, $y_0 = y_N = 0$ uch diagonalli sistema haydash usuli bilan yechiladi; 4) koeffitsiyentlar yig‘iladi ($y_{-1} = y_{N+1} = 0$):

$$C_\beta = a_\beta + \frac{6}{h^2}(y_{\beta-1} - 2y_\beta + y_{\beta+1}), \qquad \beta = 0,1,\dots,N. \qquad (5)$$

2-teorema. Algoritm natijasi $L_2^{(2)}(-1,1)$ fazosidagi (1) ko‘rinishdagi optimal kvadratur formulaning koeffitsiyentlaridir.

Algoritm $O(N)$ amal talab qiladi; to‘la matritsali chiziqli sistemani to‘g‘ridan-to‘g‘ri yechish esa $O(N^3)$ amalni talab etadi.

Amaliy model. Yupqa profil nazariyasida [10] nol hujum burchagi ostida aylanib oqilayotgan simmetrik profil sirtidagi tezlik g‘alayoni u va bosim koeffitsiyenti C_p profilning yarim qalinligi $\eta(x)$ orqali ifodalanadi:

$$\frac{u(t)}{V_\infty} = -\frac{1}{\pi}\,\text{p.v.}\int_{-1}^{1}\frac{\eta'(x)}{x-t}\,dx, \qquad C_p(t) = -\frac{2u(t)}{V_\infty}, \qquad (6)$$

bu yerda V_∞ – oqim tezligi, profil vatari $[-1,1]$ kesma. Model sifatida nisbiy qalinligi 0,1 bo‘lgan $\eta(x) = 0{,}1\cos(\pi x/2)$ profil olindi; uning aniq yechimi integral sinus va integral

kosinus orqali ifodalanadi. 2-jadvalda $t = 0$ uchun norma hamda C_p absolyut xatoligining $[-0{,}9;\ 0{,}9]$ kesmadagi eng katta qiymati E keltirilgan.

2-jadval. Xatolik funksionalining normasi ($t = 0$) va C_p ning eng katta xatoligi

N	$\| \ell \|, m = 1$	$\| \ell \|, m = 2$	$E, m = 1$	$E, m = 2$
20	0,46303	$9{,}9418 \cdot 10^{-3}$	$6{,}6382 \cdot 10^{-4}$	$2{,}5474 \cdot 10^{-4}$
40	0,32805	$3{,}5169 \cdot 10^{-3}$	$1{,}6566 \cdot 10^{-4}$	$9{,}5656 \cdot 10^{-6}$
80	0,23219	$1{,}2438 \cdot 10^{-3}$	$4{,}1331 \cdot 10^{-5}$	$9{,}1960 \cdot 10^{-7}$
160	0,16426	$4{,}3982 \cdot 10^{-4}$	$1{,}0331 \cdot 10^{-5}$	$1{,}2492 \cdot 10^{-7}$

N ikki baravar ortganda norma $m = 1$ da $2^{0{,}5}$, $m = 2$ da $2^{1{,}5}$ marta kamayadi, ya’ni $\| \ell \| = O\left(h^{m-1/2}\right)$. Profil o‘rtasida bosim eng past: $C_p(0) = -0{,}27415$. $m = 2$ formula $N = 40$ da $9{,}6 \cdot 10^{-6}$ aniqlikni beradi, $m = 1$ formula esa shunga yaqin aniqlikka ($1{,}0 \cdot 10^{-5}$) faqat $N = 160$ da erishadi.

Tekshiruv natijalari. Bayonnomadagi to‘rt tekshiruv quyidagilarni ko‘rsatdi.

1. $N = 10$ va $N = 20$ da algoritm natijasi bilan chiziqli sistemaning to‘g‘ridan-to‘g‘ri yechimi orasidagi farq 10^{-46} dan oshmadi.

2. f_m, I_m uchun analitik ifodalar va test masalalarining aniq yechimlari sonli integrallash bilan 10^{-30} aniqlikda mos keldi.

3. $t = 0{,}5111$, $N = 100;\ 500;\ 1000$ uchun norma qiymatlari avval olingan qiymatlar [11] bilan yaxlitlash aniqligida mos keldi: masalan, $m = 2$, $N = 100$ da $3{,}730126 \cdot 10^{-4}$.

4. Koshi–Shvars bahosi tekshirilgan barcha hollarda bajarildi: amaliy modelda $t = 0$, $N = 40$, $m = 2$ uchun baho $8{,}7 \cdot 10^{-4}$, haqiqiy xatolik $1{,}5 \cdot 10^{-6}$.

Tekshiruv, shuningdek, quyidagi noaniqliklarni aniqladi. Birinchidan, avvalgi matndagi «singulyar nuqta tugun bilan ustma-ust tushsa, shu tugundagi koeffitsiyent nolga teng» degan mulohaza faqat $m = 1$ uchun to‘g‘ri ekani ma’lum bo‘ldi: $m = 2$, $N = 10$, $t = -0{,}4$ da bu koeffitsiyent $-4{,}26 \cdot 10^{-3}$ ga teng. Ikkinchidan, dastlab mo‘ljallangan amaliy masala – ko‘taruvchi kuch masalasining integral tenglamasi – usulning qo‘llanish shartiga mos kelmasligi aniqlandi, chunki uning yechimi profil chetlarida maxsuslikka ega; model qalinlik masalasiga almashtirildi. Uchinchidan, SI tayyorlagan matn loyihasidagi ikkita sonli tasdiq takroriy hisoblashda aniqlashtirildi: masalan, «farq 10^{-47} dan oshmaydi» degan baho $2{,}2 \cdot 10^{-47}$ qiymat olingani uchun 10^{-46} ga tuzatildi. To‘rtinchidan, 15 xonali arifmetikada $m = 2$, $N = 1000$ uchun norma kvadratining faqat 5 ta ishonchli raqami saqlanishi aniqlandi, shuning uchun ko‘p xonali arifmetika tanlandi. Beshinchidan, SI yordamchisi xotiradan keltirgan bibliografik ma’lumotlar alohida belgilandi va birlamchi manbalar bo‘yicha tekshirishga ajratildi.

Muhokama

Hamkorlikda SI yordamchisining hissasi uch yo‘nalishda namoyon bo‘ldi: formulalarni tez keltirib chiqarish, dastur yozish va ko‘p sonli hisoblash tajribalarini bajarish. Masalani splaynlar tilida qayta ifodalash hisobiga $O(N)$ algoritm olindi; mazmunan u Sobolev usuliga ekvivalent, lekin hisoblash uchun qulayroq. Tadqiqotchining hissasi boshqa xarakterda: masala va optimallik mezonini tanlash, talablarni belgilash, amaliy model haqida qaror qabul qilish hamda yakuniy natija uchun javobgarlik.

Asosiy saboq shundaki, ishonchlilik manbai SIning o‘zi emas, balki tekshirish bayonnomasidir. Aniqlangan noaniqliklarning bir qismi SI loyihasida, bir qismi esa inson yozgan

avvalgi matnda bo‘lgan; demak, mustaqil tekshiruv ikkala tomon uchun ham zarur. Hisoblash matematikasida bunday tekshiruv arzon: har bir solishtirish bir necha soniyalik hisoblashni talab qiladi. Bu xulosa YUNESKO tavsiyasidagi inson nazorati tamoyiliga [2] mos keladi va uni aniq amaliy tartib bilan to‘ldiradi.

Tadqiqotning cheklovi – u bitta masala va bitta SI yordamchisi tajribasiga asoslangan; xulosalarni umumlashtirish uchun boshqa sohalardagi masalalarda takrorlash kerak.

Xulosa va tavsiyalar

Sonli usullar bo‘yicha tadqiqotda inson va SI hamkorligi samarali bo‘lishi uchun vazifalar aniq taqsimlanishi va har bir natija mustaqil tekshirilishi lozim. Taklif etilgan sxema bo‘yicha Koshi tipidagi singulyar integrallar uchun optimal kvadratur formulaning $O(N)$ algoritmi olindi, tekshirildi va aerodinamika modeliga qo‘llanildi. Oliy ta’lim uchun quyidagilar tavsiya etiladi:

1. Magistratura va doktoranturaning sonli usullar hamda matematik modellashtirish kurslariga «SI natijalarini tekshirish» mavzusini kiritish: aniq yechim, mustaqil hisoblash va nazariy baho bilan solishtirish.

2. SI yordamida bajarilgan dissertatsiya va maqolalarda tekshirish bayonnomasini hamda natijalarni qayta hisoblaydigan dastur kodini ilova qilishni talab etish.

3. SIdan foydalanilgan bosqichlarni ishda ochiq ko‘rsatish; SI keltirgan bibliografik ma’lumotlarni faqat birlamchi manba bo‘yicha tekshirilgandan so‘ng qo‘llash.

4. Masalaning qo‘yilishi, natijalarni qabul qilish va xulosalar uchun javobgarlikni tadqiqotchida qoldirish.

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MEHNAT XAVFSIZLIGINI TA’MINLASHDA INSON OMILINING O‘RNI VA AHAMIYATI

O‘roqov Azizbek Usmonaliyevich
“Toshkent irrigatsiya va qishloq xo‘jaligini mexanizatsiyalash muhandislari instituti” Milliy tadqiqot universiteti, Yoshlar bilan ishlash, ma’naviyat va ma’rifat bo‘limi uslubchisi
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Annotatsiya. *Mehnat faoliyatidagi baxtsiz hodisalarni tekshirishda inson omili tez-tez tilga olinadi, biroq uning mazmuni ko‘pincha xodimning xatosigacha toraytiriladi. Ushbu maqolada shaxsning individual imkoniyatlari, ish joyidagi talablar, jamoaviy munosabatlar va tashkilot boshqaruviga oid qarorlar mehnat xavfsizligiga qanday o‘zaro ta’sir ko‘rsatishi tahlil qilinadi. Tadqiqotda maqsadli tanlangan 15 ta ilmiy va institutsional manba asosida narrativ adabiyotlar sharhi o‘tkazilib, xalqaro hamda AQShdagi o‘lim bilan yakunlangan ishlab chiqarish hodisalari statistikasi grafik shaklda taqdim etildi. Tahlil xavfsiz xulq-atvor, mehnat talablari, xavfsizlik muhiti, dastlabki ogohlantiruvchi belgilar orqali o‘rganish va xavfni boshqarish choralari iyerarxiyasi yo‘nalishlarida tashkil etildi. Ilmiy manbalarga ko‘ra, bilim va motivatsiya muhim bo‘lsa-da, ular vaqt bosimi, kadrlar ta’minoti, vazifalarni loyihalash, rahbarlik hamda muammolar haqida jazodan qo‘rqmasdan xabar berish imkoniyatidan ajralgan holda ishlamaydi. Tadqiqotlar belgilangan qoidalarga rioya qilishni xavflarni aniqlash va bartaraf etishda faol ishtirok etishdan farqlaydi. Taklif etilgan konseptual yondashuv inson faoliyatini xatoning o‘zi bilan izohlash o‘rniga, umumiy mehnat tizimi doirasida ko‘rib chiqadi. O‘lim statistikasi kasbiy xavf ko‘lamini ko‘rsatadi, ammo inson xatosi sabab bo‘lgan holatlar ulushini aniqlamaydi. Xodimlar ishtiroki, tuzatish choralarining bajarilishi, himoya vositalarining samaradorligi va jarohatlanish ko‘rsatkichlarini birlashtiruvchi baholash mezonlari taklif etiladi. Asosiy xulosa shuki, tashkilotlar mehnat sharoitlarini qayta loyihalash, himoya qatlamlarini mustahkamlash va xodimlar tajribasidan uzluksiz takomillashtirish manbai sifatida foydalanish orqali xavfsiz qarorlar qabul qilinishini qo‘llab-quvvatlashi mumkin. Ushbu modelning sababiy samaradorligi amaliy ish joylarida istiqbolli tadqiqotlar bilan tekshirilishi lozim.*

Kalit so‘zlar: *mehnat xavfsizligi, inson omili, xavfsizlik muhiti, xavflarning oldini olish, xavfsizlikda ishtirok, tashkiliy o‘rganish.*

Kirish

Ish joyidagi hodisa tekshirilganda bayon ko‘pincha zarar ko‘rishga eng yaqin bo‘lgan shaxsdan boshlanadi: texnik ogohlantirishni payqamagan, operator xavfli hududga qo‘l uzatgan yoki haydovchi burilishni noto‘g‘ri baholagan. Bunday ta’riflar fakt jihatidan to‘g‘ri bo‘lishi mumkin, lekin yetarli emas. Ular chalkash signallar, ishlab chiqarish bosimi, yetishmaydigan asboblar yoki murakkab vazifalarni bajarish uchun odatiy tus olgan moslashuvlar haqida deyarli ma’lumot bermaydi. Inson omillari bo‘yicha tadqiqotlar e’tiborni go‘yoki beparvo xodimdan inson imkoniyatlari, uskuna, vazifa va tashkiliy qarorlarning o‘zaro aloqasiga qaratadi (Reason, 2000; Hofmann et al., 2017). Bu yondashuv shaxsiy javobgarlikni inkor etmaydi; aksincha, xodimning tanlov imkoniyatlari ish boshlanishidan oldinoq qisman belgilanishini tan oladi. Kasbiy zarar ko‘lami bu farqni muhim qiladi. Xalqaro mehnat tashkiloti (ILO, 2023) har yili

mehnat bilan bog‘liq taxminan 2,93 million o‘limni, jumladan kasalliklar bilan bog‘liq 2,60 million va baxtsiz hodisalar bilan bog‘liq 330 ming holatni baholagan. Bu raqamlar global yuklamani bildiradi, inson xatosiga to‘g‘ri keladigan ulushni emas; ular xavfsizlik faqat yirik hodisalar emas, balki uzoq muddatli zararli ta’sirlar va kasalliklarni ham qamrab olishini eslatadi.

Ish joyi xavfsizligi rahbariyat nimani amalda mumkin qilishi va hamkasblar nimani maqbul deb bilishiga bog‘liq. Zohar (1980) xavfsizlik muhitini xodimlarning xavfsizlik ustuvorliklari haqidagi umumiy tasavvurlari sifatida izohlagan; Griffin va Neal (2000) esa majburiy ehtiyot choralariga rioya qilishni takomillashtirishda faol qatnashishdan ajratgan. Xodim nazorat ro‘yxatini to‘liq bajarsa ham, amaliyotga mos kelmaydigan tartibni shubha ostiga qo‘yish imkoniyatiga ega bo‘lmasligi mumkin. Aksincha, muammo ko‘targan xodim rasmiy muvofiqlik bahosi o‘zgarmagan holda zararning oldini olishga yordam beradi. Meta-tahlillar xavfsizlik muhiti bilan xavfsiz xulq-atvor o‘rtasidagi bog‘liqlikni ko‘rsatadi, biroq real jarohatlanish bilan munosabat murakkabroq: hodisalarning o‘zi ham xodimlarning ish beruvchi haqidagi bahosini o‘zgartirishi mumkin (Clarke, 2006; Beus et al., 2010). Shuning uchun ijobiy so‘rovnoma yoki o‘quv kampaniyasini xavf kamayganining isboti sifatida talqin qilish noto‘g‘ri. Maqolada inson va tashkiliy sharoitlarning o‘zaro ta’siri, ayblashga asoslangan izohlarning cheklanganligi hamda profilaktikani baholashga xizmat qiladigan kuzatiladigan ko‘rsatkichlar o‘rganiladi. Maqsad — turli sohalarga tatbiq etiladigan konseptual sintez; xodimlar sababchi bo‘lgan hodisalar foizini hisoblash emas.

Tadqiqot metodlari

Maqolada tizimli sharh yoki dastlabki dala tadqiqoti emas, balki integrativ narrativ sharh va konseptual sintez qo‘llanildi. Maqsadli tanlangan 15 manba inson xatosi, xavfsizlik muhiti, xodim motivatsiyasi, o‘qitish, mehnat talablari, jamoaviy o‘rganish, tashkiliy boshqaruv va kasbiy jarohatlanish statistikasiga bag‘ishlangan. Ulardan 11 tasi taqrizdan o‘tgan tadqiqot yoki sharh, to‘rttasi esa institutsional nashr: ILO hisoboti, ISO 45001 standarti, AQSh Mehnat xavfsizligi va salomatligi milliy instituti (NIOSH) tavsiyalari hamda AQSh Mehnat statistikasi byurosining (BLS) o‘limli jarohatlar haqidagi xabarnomasi. Ilmiy manbalar 1980–2017-yillarni qamrab oladi; institutsional hujjatlar esa keyingi siyosiy va tavsifiy kontekstni beradi. Tanlashda mehnat xavfsizligi mexanizmlariga bevosita aloqadorlik ustuvor bo‘ldi, ammo bu to‘liq va takror ishlab bo‘ladigan ma’lumotlar bazasi qidiruvi emas. Protokol ro‘yxatdan o‘tkazilgani, tadqiqot sifatining formal baholari yoki meta-tahliliy ta’sir o‘lchovlari da’vo qilinmaydi.

Har bir manba to‘rt darajada tahlil qilindi: shaxsning tayyorgarligi, vazifa xususiyatlari, jamoa ichidagi munosabatlar va boshqaruv tizimlari. Da’volar o‘lchangan assotsiatsiyalar, taklif etilgan sababiy mexanizmlar va kasbiy tavsiyalar sifatida farqlandi. Bunday farqlash zarur: jamoa ko‘proq xavfga yaqin hodisa haqida xabar bergani xavflar ko‘payganini isbotlamaydi; jarohatlar soni esa hodisa ortidagi motivlarni aniqlamaydi. Tadqiqotlar bo‘yicha tushunchalar taqqoslandi, takrorlanuvchi mavzular uchta original diagrammada umumlashtirildi va kelgusida tekshirish uchun baholash indikatorlari ishlab chiqildi. Ikki diagramma e’lon qilingan statistikani qayta tasvirlaydi: ILOning global kasbiy o‘limlarni umumiy sabablarga ajratgan baholari hamda BLSning AQShda 2024-yildagi o‘limli ishlab chiqarish jarohatlarini hodisa turiga ajratgan ma’lumotlari. Ularning populyatsiyasi va tasnifi farqli, shuning uchun grafiklar tavsifiy bo‘lib, qiyosiy yoki sababiy emas. Ushbu maqola doirasida so‘rov, intervyu yoki kuzatuv o‘tkazilmadi.

Natijalar

Ko‘rib chiqilgan adabiyotlarning asosiy xulosasi shuki, xavfsiz faoliyatni faqat bilim yoki motivatsiya bilan izohlab bo‘lmaydi. 1-rasm o‘zaro bog‘liq to‘rt ta’sirni birlashtiradi: shaxs tayyorgarligi, vazifaning amaliy talablari, ishchi guruhning ijtimoiy muhiti va tashkilotdagi nazorat choralari loyihasi. Tajribali xodim xavfni anglab tursa ham, oson yetiladigan o‘chirish moslamasiga ega bo‘lmasligi, zid ko‘rsatmalar olishi yoki ishlab chiqarishni to‘xtatgani uchun tanqid kutishi mumkin. Bunday sharoitda hodisaga eng yaqin xulq-atvor uzoq jarayonning bir qismi, uning to‘liq izohi emas. Model tekshiruvchilarga sababiy sharoitlarni ikki yo‘nalishda kuzatishni tavsiya qiladi: boshqaruv qarorlaridan real ish amaliyotigacha va xodimlar moslashuvlaridan ularni zarur qilgan sharoitlargacha. Bu dalillarning taklif etilgan talqini bo‘lib, sinovdan o‘tgan bashorat modeli emas.

1-rasm

Inson omillarining integratsiyalashgan konseptual modeli



Izoh. Mazkur maqola uchun ishlab chiqilgan original konseptual sintez. Strelkalar statistik baholangan yo‘llarni emas, taxminiy o‘zaro munosabatlarni bildiradi.

O‘qitish muhim, biroq u real ish vazifasiga bog‘langanda samaraliroq bo‘ladi. Griffin va Neal (2000) xavfsizlik bo‘yicha bilim va motivatsiyani qoidalarga rioya qilish hamda faol ishtirok bilan bog‘lagan; Christian va boshqalar (2009) meta-tahlili shaxsiy va vaziyatga oid omillarni birgalikda ko‘rishni qo‘llab-quvvatlagan. Burke va boshqalar (2006) faol ishtirokni talab qiladigan ta’lim usullari passiv shakllarga nisbatan bilim olish va xavfsizlik natijalarida yaxshiroq bo‘lishi mumkinligini aniqlagan. Bu ma’ruza yoki imzo qo‘yilgan davomat varaqasi bilan cheklanmasdan, amaliy ko‘rsatmalar, ssenariyli mashqlar va mazmunli fikr-mulohazalarni afzal ko‘rishga asos beradi. Biroq eng yaxshi o‘qitish ham ochiq harakatlanuvchi detalni yo‘qota olmaydi yoki bajarib bo‘lmaydigan jadvalni real qila olmaydi. Shu sababli 1-jadvalda o‘qitish ish yuklamasi, xavfsizlik muhiti, jamoa fikrini bildirish imkoniyati va uskunaviy himoya bilan bir qatorda ko‘rsatiladi. Asosiy savol xodimga nima qilish aytilganida emas, balki muhit unga buni izchil bajarish imkonini berishidadir.

1-jadval

Inson omillarining dalillarga asoslangan yo‘nalishlari va amaliy ahamiyati

Yo‘nalish	Tegishli dalillar	Profilaktik ahamiyati
Vazifa talablari va resurslar	Yuqori talablar ruhiy toliqish bilan bog‘liq; resurslar faol ishtirokni qo‘llab-quvvatlaydi (Nahrgang et al., 2011).	Ish yuklamasini moslashtirish, qulay vositalar va mustaqillik berish.

Yo‘nalish	Tegishli dalillar	Profilaktik ahamiyati
Bilim va motivatsiya	Ikkalasi ham qoidalarga rioya qilish va ishtirokni izohlaydi (Griffin & Neal, 2000).	Aniq ko‘rsatmalarni faol mashqlar bilan birlashtirish.
Xavfsizlik muhiti	Muhit xulq-atvor bilan bog‘liq, jarohatlar bilan aloqa esa tadqiqot dizayniga bog‘liq (Clarke, 2006; Beus et al., 2010).	Ishlab chiqarish bosimi xavfsizlik talablariga putur yetkazayotganini tekshirish.
Jamoa fikri va o‘rganish	Psixologik xavfsizlik o‘rganish xulq-atvori bilan bog‘liq (Edmondson, 1999).	Xavfga yaqin hodisalar va xavotirlarga konstruktiv javob berish.
Himoya to‘siqlarini loyihalash	Tizimli izohlar himoyaga urg‘u beradi; iyerarxiya yuqori darajadagi choralarni afzal ko‘radi (Reason, 2000; NIOSH, 2024).	Hushyorlikka tayanishdan oldin xavfni yo‘qotish yoki muhandislik yo‘li bilan cheklash.

Izoh. Tanlangan manbalarning interpretativ sintezi. Jadval bandlari taqqoslanadigan ta’sir kattaliklarini emas, mexanizmlarni ifodalaydi.

Ikkinchi qonuniyat kundalik talablar qoidalar doim mavjud deb hisoblaydigan diqqat resurslarini qanday kamaytirishi bilan bog‘liq. Nahrgang va boshqalar (2011) yuqori ish talablari va xavfli sharoitlarning ruhiy toliqish bilan, resurslar va ishga jalb etilishning esa xavfsizlik natijalari bilan aloqalarini aniqlagan. Charchoq, noaniq smena topshirish, takroriy chalg‘ishlar va xodimlar yetishmasligi tartibni bilgan taqdirda ham ish sifatini pasaytirishi mumkin. Ijtimoiy darajada Edmondson (1999) psixologik xavfsizlikni jamoaning o‘rganish xulq-atvori bilan bog‘lagan. Mazkur tadqiqot avariyalar kamayishini bevosita o‘lchamagan, ammo nima uchun bir korxonada xodimlar noaniqlik yoki xavfga yaqin hodisani ochiq aytishi, boshqasida esa sukut saqlashini tushuntirishi mumkin. 2-rasm bu g‘oyani o‘rganish sikliga aylantiradi: signalni aniqlash, odamlarni darhol himoyalash, kontekstni o‘rganish, mehnat tizimini o‘zgartirish va o‘zgarish haqiqatan ishlashini tekshirish. Javobsiz qolgan xabar ushbu siklning biror bosqichini to‘liq yakunlamaydi.

2-rasm

Dastlabki ogohlantirish signallari va xavfga yaqin hodisalardan o‘rganish sikli

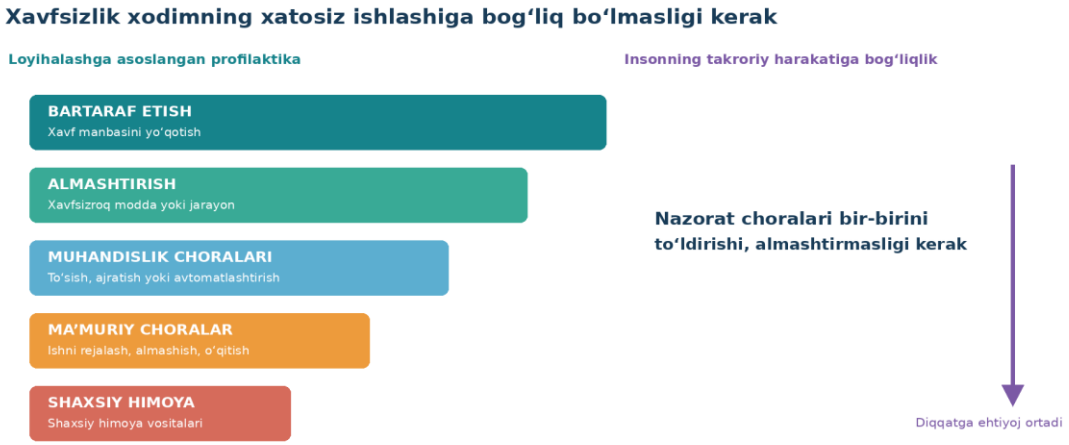


Izoh. Tashkiliy o‘rganish va tizimli baxtsiz hodisa tahlili sinteziga asoslangan original amaliy model (Edmondson, 1999; Reason, 2000).

Rasmiy tartib bilan amalda bajariladigan ish o‘rtasidagi munosabat ham alohida e’tiborni talab qiladi. Standartlashtirish oqibati og‘ir bo‘lishi mumkin bo‘lgan vazifalarda, ayniqsa xodimlar tez muvofiqlashishi yoki kam uchraydigan hodisalarga javob berishi kerak bo‘lganda zarur. Biroq ish jarayonini kuzatmasdan yozilgan yo‘riqnomalar ideal uskuna, uzluksiz vaqt va mukammal axborotni nazarda tutishi mumkin. Natijada qoidaga faqat qog‘ozda amal qilinadi. Neal va Griffin (2006) xavfsizlik muhiti, motivatsiya, xulq-atvor va guruhdagi hodisalar o‘rtasida vaqt bo‘yicha kechikkan bog‘lanishlarni aniqlab, boshqaruv ustuvorliklari va xodimlar xatti-harakati birga rivojlanishini ko‘rsatgan. Amaliyotda xodimlar tartiblarni sinashda qatnashishi, rahbarlar majburiy bosqichlarni aniq belgilashi, kutilmagan vaziyat esa yashirincha improvizatsiya qilish o‘rniga xavfni qayta baholashga olib kelishi kerak. Maqsad cheksiz erkinlik ham, mexanik itoat ham emas; yozma usul bilan undan foydalaniladigan haqiqiy sharoitlar o‘rtasidagi ishonchli bog‘lanishdir (Hofmann et al., 2017; Reason, 2000).

3-rasm

Nazorat choralarini tanlash va inson diqqatiga tushadigan yuk

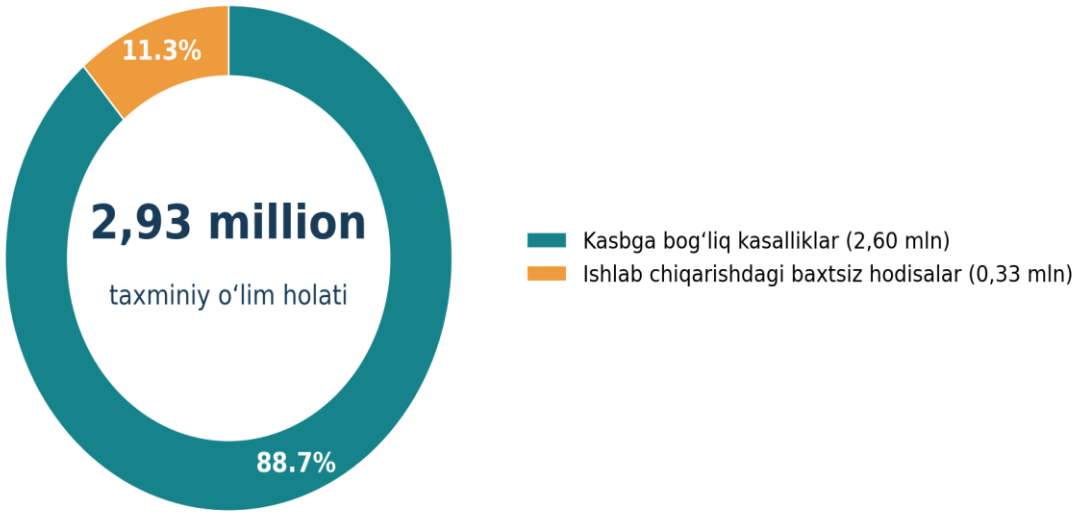


Izoh. NIOSH (2024) xavfni boshqarish choralari iyerarxiyasiga asoslangan original sifatli tasvir. Rangli yo‘laklar kengligi bezak vazifasini bajaradi va o‘lchangan samaradorlikni anglatmaydi.

Bu natijalar doimiy hushyorlikka bog‘liq bo‘lmagan nazorat choralarining ahamiyatini kuchaytiradi. NIOSH (2024) iyerarxiyasida xavfni yo‘qotish, almashtirish va muhandislik choralari ma’muriy qoidalar hamda shaxsiy himoya vositalaridan yuqorida turadi. Bu Reason (2000) ta’riflagan ko‘p qatlamli himoya konsepsiyasiga mos: xato yuz bersa ham, ta’sir bartaraf etilgan yoki mustahkam to‘siqlar saqlangan bo‘lsa, jarohat yuz bermasligi mumkin. 3-rasm ushbu tamoyilni sifat jihatdan ko‘rsatadi. Rangli tasmalar samaradorlik bahosi emas va ulardan xavf kamayishining raqamli qiymatini hisoblash mumkin emas. Masalan, texnik xizmat ko‘rsatish nuqtasini ko‘chirish yoki himoyalangan kirish yo‘lini yaratish har smenada noqulay joyga qo‘l uzatmaslikni eslatishdan ishonchliroq bo‘lishi mumkin. Inson mahorati baribir zarur, lekin yaxshi loyihalash xavfsizlikning mukammal xotira, tezkor hukm yoki ayni vaqtdagi javobga qaramligini kamaytiradi.

4-rasm

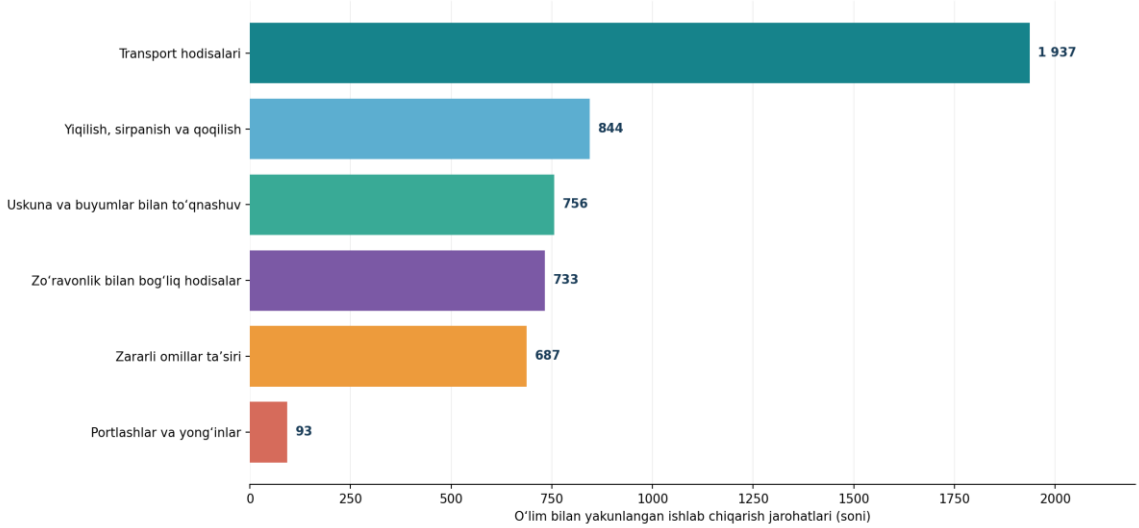
Jahonda mehnat bilan bog‘liq yillik o‘limlarning asosiy sabablar bo‘yicha bahosi



Izoh. ILO (2023) ma’lumotlari asosida qayta chizilgan: mehnat bilan bog‘liq kasalliklardan taxminan 2,60 million va baxtsiz hodisalardan 0,33 million o‘lim. Foizlar yaxlitlangan sonlardan hisoblangan. Baholar butun dunyoga tegishli va inson xatosi ulushi bilan tenglashtirilmasligi kerak.

5-rasm

AQShda 2024-yilda hodisa turlari bo‘yicha o‘lim bilan yakunlangan kasbiy jarohatlar



Izoh. BLS (2026)ning o‘limli kasbiy jarohatlar ro‘yxati, 2-jadvali asosida tayyorlangan original vizualizatsiya. Tanlangan oltita hodisa guruhi (5 050 holat) ko‘rsatilgan; e’lon qilingan umumiy son 5 070. Hodisa turi insoniy sababni belgilamaydi.

Ikkala grafik kasbiy zararning jiddiyligi va xilma-xilligini tavsiflaydi, biroq aybni alohida xodimlarga yuklamaydi. 4-rasmda ILO (2023)ning yillik global o‘lim bahosi keltirilgan bo‘lib, unda kasbiy kasalliklar baxtsiz hodisalardan ancha katta ulushni tashkil etadi. 5-rasm BLS (2026)ning 2024-yil AQShdagi o‘limli kasbiy jarohatlari tasnifiga asoslangan; tanlangan oltita guruh ichida transport hodisalari eng katta ulushga ega. Hech bir ma’lumotlar to‘plami

e’tiborsizlik yoki xavfli qarorlar sabab bo‘lgan holatlarning ishonchli ulushini bermaydi. Hodisa tasnifi nima yuz berganini ko‘rsatadi; inson omillari tahlili esa zararli ta’sir, himoya to‘siqlari, vazifa talablari va tashkiliy qarorlar qanday hissa qo‘shganini aniqlaydi. Maxrajlar va geografik qamrovning farqliligi grafiklarni bevosita solishtirishga ham yo‘l qo‘ymaydi.

2-jadval

Inson omiliga asoslangan xavfsizlik dasturini baholash uchun taklif etilgan ko‘rsatkichlar

Ko‘rsatkich	Operatsion ta’rif	Talqindagi ehtiyot chorasi
Tasdiqlangan yuqori xavfli choralar	Mustaqil tekshiruvda samarali deb topilgan choralar ÷ yakunlanishi kerak bo‘lgan choralar.	Ma’muriy yopishni xavf bartaraf etilishi deb hisoblamaslik.
Xodimlar ishtiroki	Har chorakda xavf kuzatuvi yoki qayta loyihalash ko‘rigida qatnashgan jamoalar ulushi.	Xodimlarni nomigagina hisobot topshirishga majburlamaslik.
Ishni to‘xtatish imkoniyati	Tanlangan xodimlardan ishni to‘xtatish tartibini tushuntirib va ko‘rsatib bera oladiganlari ulushi.	Rahbarlarning haqiqiy javobi bilan solishtirish.
Takroriy xavf ta’siri	Qayta tekshiruvda saqlanib qolgan, oldin aniqlangan yuqori darajali xavflar soni.	Tekshiruv ko‘lami va mezonlarini izchil saqlash.
Xavfga yaqin hodisalardan o‘rganish	Xabardan javobgacha bo‘lgan vaqt va tuzatish sifatining mustaqil bahosi.	Faqat hisobotlar soni turlicha talqin qilinadi.
Jarohatlanish va kasallanish natijalari	Belgilangan davrda taqqoslanadigan ta’sir maxrajiga nisbatan tegishli hodisalar darajasi.	Hisobotdagi o‘zgarishlar, holatlar tarkibi va kichik sonlarni hisobga olish.

Izoh. Ko‘rsatkichlar kelgusida validatsiya qilish uchun taklif etilgan bo‘lib, sinovdan o‘tgan o‘lchov vositasi emas; joriy etishdan oldin ta’riflar moslashtirilishi kerak.

2-jadval sintez natijalarini ish beruvchi tekshirishi va yaxshilashi mumkin bo‘lgan indikatorlarga aylantiradi. Asosiy urg‘u tuzatish choralarining sifatiga, ishni to‘xtatish tartibidan foydalanish imkoniyatiga, yuqori darajali xavflarning saqlanib qolishiga va xavfga yaqin hodisalar yuzasidan berilgan fikr-mulohazalarning foydasiga qaratilgan. Hisobotlar soni o‘zicha ikki ma’noli: ko‘payish xavfning ortishi, ishonchning oshishi yoki har ikkisini bildirishi mumkin. Faraziy misolda texnik xizmat xodimi tushib ketgan asbobni olish uchun ishlayotgan uskuna ortiga qo‘l uzatadi. Qayta o‘qitish harakatga ta’sir qilishi mumkin, ammo chuqurroq tahlil uskuna joylashuvi, asbobni olish moslamalari, energiyadan ajratish tartibi, vaqt bosimi va to‘xtatishni so‘ragan xodimga rahbar munosabatini o‘rganadi. Kirish sharoitini o‘zgartirish, asboblarni mahkamlash va energiyadan ajratishni tekshirish turli xodimlar almashganda ham mavjud bo‘ladigan sharoitlarga ta’sir qiladi. Bu misol kuzatilgan ma’lumot emas, tushuntiruvchi vaziyatdir. U xodimga qoida eslatilganini qayd etishdan ko‘ra xavf haqiqatan bartaraf etilganini tekshirish nega mazmunliroq ekanini ko‘rsatadi.

Muhokama

Tahlil xavfsizlik boshqaruvi uchun boshlang‘ich savolni o‘zgartirish zarurligini ko‘rsatadi. Ish beruvchi faqat xodim qoidaga amal qilgan-qilmaganini emas, balki mavjud asboblar, vaqt, axborot va vakolatlar bilan unga amal qilish amalda mumkin bo‘lgan-bo‘lmaganini ham so‘rashi kerak. Bunday yondashuv javobgarlikni saqlagan holda, keyingi

natijani bilish asosida oldindan kutiladigan moslashuvni yakka axloqiy nuqson deb baholashdan saqlaydi. Ayblashga yo‘naltirilgan tekshiruvlar ko‘pincha erta yakunlanadi, konstruktiv o‘zgarish kerak bo‘lgan joyda takroriy o‘qitishga murojaat qiladi va tizimdagi zaifliklarni ochadigan xabarlarni kamaytiradi. Xodimlar rahbarga e’tiroz bildirish yoki tashkilot sukut bilan qabul qilib kelgan qisqa yo‘lni tasvirlashga jur’at qilolmaganda bu ayniqsa zararli. Samarali javob ish tizimini o‘rganishi va shu bilan birga xato, xavfli moslashuv va ishlaydigan himoya choralariga ataylab rioya qilmaslikni oqilona farqlashi lozim. Maqsad — hodisani mutanosib tushunish va ishtirokchilar almashgandan keyin ham foyda beradigan tuzatishni joriy qilish.

Resurslari cheklangan ish beruvchilar uchun rivojlanish qimmat monitoring dasturidan boshlanishi shart emas. Takrorlanuvchi bitta yuqori xavfli vazifani tanlash kifoya. Rahbarlar va xodimlar vazifa qanday bajarilishini kuzatib, uzilishlar va zid talablarni aniqlashi, yozma tartibni real amaliyot bilan taqqoslashi hamda zararli ta’sirni bartaraf etadigan yoki to‘siqlarni kuchaytiradigan oz sonli o‘zgarishlarni tanlashi mumkin. Har bir choraga mas’ul shaxs, yakunlash muddati va o‘rnatilgandan keyingi mustaqil tekshiruv kerak; blankani yopish xavfni bartaraf etish bilan bir xil emas. O‘lchashga ham shu yondashuv tatbiq etiladi. Jarohatlanish darajasi zarur, ammo kichik jamoalarda keskin o‘zgarishi mumkin; xavfga yaqin hodisalar haqidagi xabarlar kamayishi esa qo‘rquv yoki hisobotdan charchashni bildirishi mumkin. Ta’sirni tekshirish, xodimlar ishtiroki, sinovdan o‘tgan ishni to‘xtatish tartiblari va tasdiqlangan tuzatish choralari kombinatsiyasi ko‘proq axborot beradi. ISO 45001 ishtirok va uzluksiz takomillashtirish uchun boshqaruv asosini yaratadi, biroq sertifikatning o‘zi kundalik ish xavfsizlashganini isbotlamaydi (ISO, 2018).

To‘plangan indikatorlar sonidan ko‘ra ularning ishonchliligi muhimroq. Xodimlar fikr bildirishga taklif etilish bilan unga amaliy javob berilishini tez farqlaydi. Hal qilinmagan bitta xavf bo‘yicha qisqa oylik muhokama va rejalashtirilgan o‘zgarishlar haqida ochiq fikr-mulohaza hech qanday qarorga ta’sir qilmaydigan chiroyli paneldan ko‘proq o‘rganishga olib kelishi mumkin. Rahbariyat rag‘batlarni ham tekshirishi lozim: menejerlar qayd etilgan jarohatlar soni juda kam bo‘lgani uchun mukofotlansa, tashkilot beixtiyor sukutni rag‘batlantirishi mumkin. Bu masalalar maqolaning cheklovlarini ham ko‘rsatadi. O‘n besh manba maqsadli tanlangan, ularning dizaynlari va kasbiy sohalari farqli, dalillarning katta qismi sinovdan o‘tgan sababiy ta’sir emas, bog‘liqlikni ifodalaydi. Psixologik xavfsizlik tadqiqotlari muhim, ammo har bir sohada jarohatlanish kamayishini bashorat qiladi deb bo‘lmaydi. Xuddi shuningdek, original rasmlar va taklif etilgan ko‘rsatkichlar tekshirish vositalari bo‘lib, validatsiya qilingan shkalalar yoki ta’sir baholari emas.

Kelgusi tadqiqotlar mazkur modelni o‘xshash ish bo‘linmalarida xodimlar ishtirokidagi qayta loyihalash orqali sinab ko‘rishi, choralar rejalashtirilgandek joriy etilganini qayd etishi va vaqt davomida xavf ta’siri, xodimlarning fikr bildirish imkoniyati hamda xavfga yaqin hodisalarni baholashi mumkin. Intervyular indikator nima sababdan o‘zgarganini tushuntiradi; takroriy o‘lchash esa bir martalik o‘quvdan keyingi so‘rovdan ishonchliroq. Shartnoma asosidagi xodimlar va ishni to‘xtatish vakolati cheklangan ishchilarga alohida e’tibor berish zarur, chunki ularning muammolari rasmiy qaydlarda kamroq ko‘rinishi mumkin. Asosiy xulosa ehtiyotkor: inson diqqati va mahorati ajralmas, biroq ular yagona himoya bo‘lmasligi kerak. Ish beruvchilar ishning real bajarilishini o‘rgansa, oldindan kutiladigan xatolarni yuzaga keltiradigan sharoitlarni yo‘qotsa va jiddiy hodisa ro‘y berishidan avval ogohlantirishlarga javob bersa, mehnat xavfsizligi yaxshilanadi.

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GERMANIYA VA JANUBIY KAREYADA OLIY TA’LIMNI MOLIYALASHTIRISH SIYOSATI

Qurbonov Baxromjon Baxtiyor o‘g‘li
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Annotatsiya. *Mazkur maqolada Germaniya va Janubiy Koreyada oliy ta’limni moliyalashtirish siyosatining o‘ziga xos xususiyatlari, asosiy moliyaviy manbalari va ta’lim tizimini rivojlantirish mexanizmlari tahlil qilingan. Germaniyada davlat va hududiy hukumatlar tomonidan moliyalashtirish, ilmiy grantlar hamda universitetlar va sanoat korxonalari o‘rtasidagi hamkorlik masalalari yoritilgan. Janubiy Koreyada esa davlat grantlari, talabalar kontrakt to‘lovlari, ilmiy tadqiqotlarni qo‘llab-quvvatlash dasturlari va xususiy sektor ishtirokining ahamiyati ko‘rib chiqilgan. Shuningdek, har ikki mamlakat tajribasi asosida oliy ta’limni moliyalashtirishda davlat ko‘magi, ilmiy salohiyatni rivojlantirish, innovatsiyalarni rag‘batlantirish va moliyaviy resurslardan samarali foydalanishning ahamiyati ochib berilgan.*

Kalit so‘zlar: *oliy ta’lim, moliyalashtirish siyosati, Germaniya, Janubiy Koreya, davlat budjeti, davlat grantlari, kontrakt to‘lovlari, ilmiy tadqiqotlar, xususiy sektor, universitetlar, sanoat hamkorligi, innovatsiyalar, inson kapitali, moliyaviy barqarorlik, natijaga asoslangan moliyalashtirish.*

Bugungi kunda oliy ta’lim tizimini samarali moliyalashtirish mamlakatlarning iqtisodiy rivojlanishi, inson kapitalini yuksaltirish va ilmiy-innovatsion salohiyatini oshirishning muhim omillaridan biri hisoblanadi. Oliy ta’lim muassasalarining barqaror faoliyati, ta’lim sifatini oshirish va ilmiy tadqiqotlarni rivojlantirish ko‘p jihatdan moliyaviy resurslarning shakllanishi hamda ulardan samarali foydalanishga bog‘liq. Shu sababli turli mamlakatlarda oliy ta’limni moliyalashtirishning o‘ziga xos mexanizmlari va ustuvor yo‘nalishlari shakllangan.

Germaniya va Janubiy Koreya oliy ta’limni moliyalashtirish siyosati jihatidan o‘ziga xos tajribaga ega mamlakatlar hisoblanadi. Germaniyada davlat tomonidan moliyaviy qo‘llab-quvvatlash, ilmiy grantlar va universitetlarning sanoat korxonalari bilan hamkorligiga katta e’tibor qaratilsa, Janubiy Koreyada davlat grantlari, kontrakt to‘lovlari, ilmiy tadqiqotlar va xususiy sektor ishtirokiga asoslangan aralash moliyalashtirish mexanizmlari muhim o‘rin tutadi. Mazkur mamlakatlar tajribasini o‘rganish oliy ta’limni moliyalashtirishda turli yondashuvlarning afzalliklarini aniqlash va ularning ta’lim sifati hamda ilmiy rivojlanishga ta’sirini baholash imkonini beradi.

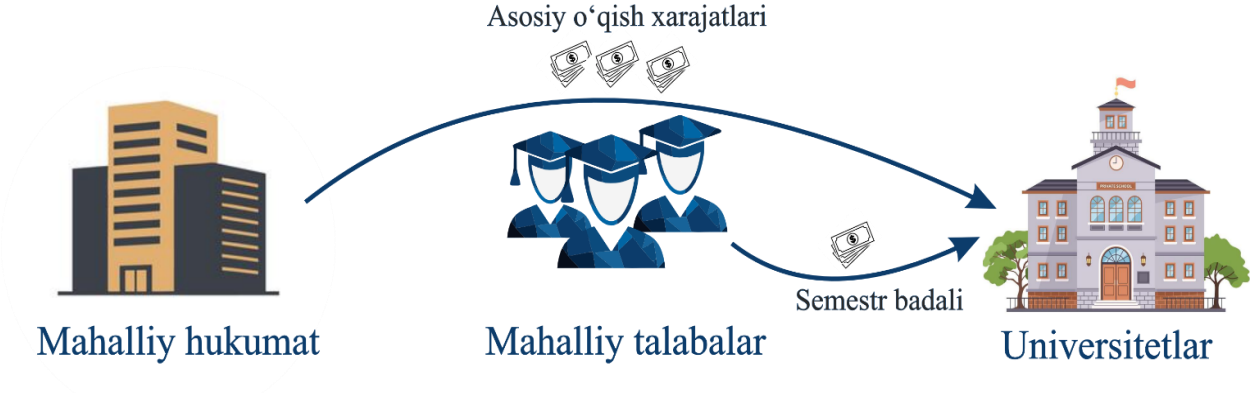
Germaniya oliy ta’lim tizimi Yevropadagi eng yirik va institutsional jihatdan barqaror tizimlardan biri hisoblanadi. Mamlakatda universitetlar faoliyati asosan davlat tomonidan qo‘llab-quvvatlanadi va oliy ta’lim ijtimoiy rivojlanish hamda iqtisodiy taraqqiyotning muhim omili sifatida qaraladi. Germaniya oliy ta’lim tizimining moliyalashtirish modeli tarixan davlat ishtiroki ustuvor bo‘lgan tizim sifatida shakllangan. Universitetlar federal hukumat va yer hukumatlari tomonidan moliyalashtiriladi, ilmiy tadqiqotlar esa alohida grantlar va ilmiy fondlar orqali qo‘llab-quvvatlanadi. Natijada oliy ta’lim muassasalari barqaror moliyaviy asosga ega bo‘lib, ilmiy faoliyatni rivojlantirish uchun zarur resurslarga ega bo‘ladi.

Germaniyada oliy ta’limni moliyalashtirish tizimining asosiy xususiyatlaridan biri davlat va hududiy hukumatlari o‘rtasidagi vakolatlarning taqsimlanganligidir. Mamlakat federativ

tuzilishga ega bo‘lgani sababli oliy ta’lim siyosatini amalga oshirishda mahalliy hukumatlari muhim rol o‘ynaydi. Universitetlarning asosiy operatsion xarajatlari, professor-o‘qituvchilar mehnatiga haq to‘lash, o‘quv jarayonini tashkil etish va infratuzilmani rivojlantirish uchun zarur mablag‘lar asosan yer hukumatlari tomonidan ajratiladi. Federal hukumat esa ko‘proq ilmiy tadqiqotlarni qo‘llab-quvvatlash, innovatsion loyihalarni moliyalashtirish va yirik ilmiy dasturlarni amalga oshirish orqali universitetlar faoliyatida ishtirok etadi.

Davlat moliyalashtirishi Germaniya universitetlari budjetining asosiy qismini tashkil etadi. Masalan Technical University of Munich yoki Humboldt University of Berlin kabi yirik universitetlarning budjetida davlat mablag‘larining ulushi juda yuqori. Mahalliy hukumatlari tomonidan ajratiladigan mablag‘lar universitetlarning barqaror faoliyatini ta’minlashga xizmat qiladi. Bu mablag‘lar professor-o‘qituvchilar maoshi, laboratoriyalar faoliyati, kutubxonalar, ilmiy markazlar va boshqa infratuzilma xarajatlarini qoplash uchun ishlatiladi.

Germaniyada oliy ta’lim tizimining muhim jihatlaridan biri kontrakt to‘lovlarining mavjud emasligi yoki juda past darajada bo‘lishidir. 2000-yillarning boshlarida ayrim mahaliy hukumatlari universitetlarda kontrakt to‘lovlarini joriy etishga harakat qilgan. Biroq bu qaror jamiyatda keng muhokamalarga sabab bo‘lgan va ko‘plab hududlarda kontrakt tizimi bekor qilingan. Hozirgi vaqtda Germaniyada mahalliy talabalar uchun oliy ta’lim deyarli bepul hisoblanadi. Talabalar odatda faqat semestr badali to‘laydi, u transport xizmatlari yoki talabalar infratuzilmasini moliyalashtirishga yo‘naltiriladi(1-rasm). Bunday siyosat oliy ta’limga kirish imkoniyatlarini kengaytirish va ijtimoiy tenglikni ta’minlashga qaratilgan.



1-rasm. Germaniyada mahalliy talabalarni moliyalashtirish[87].

Germaniya oliy ta’lim tizimida ilmiy tadqiqotlarni moliyalashtirish alohida tizim orqali amalga oshiriladi. Universitetlar ilmiy loyihalarni amalga oshirish uchun turli ilmiy fondlar va grant dasturlaridan foydalanadi. German Research Foundation (Deutsche Forschungsgemeinschaft – DFG) mamlakatdagi eng yirik ilmiy grant tashkilotlaridan biri hisoblanadi. Ushbu fond fundamental tadqiqotlarni qo‘llab-quvvatlash uchun universitetlar va ilmiy markazlarga grantlar ajratadi. Ko‘plab universitetlar ilmiy loyihalarini aynan DFG grantlari orqali moliyalashtiradi.

Ilmiy tadqiqotlarni rivojlantirish maqsadida Germaniyada yirik davlat dasturlari ham amalga oshiriladi. Ulardan biri “Excellence Initiative” dasturi hisoblanadi. Ushbu dastur universitetlarning ilmiy salohiyatini oshirish va global ilmiy raqobatda ularning o‘rnini mustahkamlashga qaratilgan. Dastur doirasida eng yuqori ilmiy natijalar ko‘rsatgan universitetlarga katta miqdorda grantlar ajratiladi. Technical University of Munich, Ludwig

[87] Muallif tomonida tayyorlandi

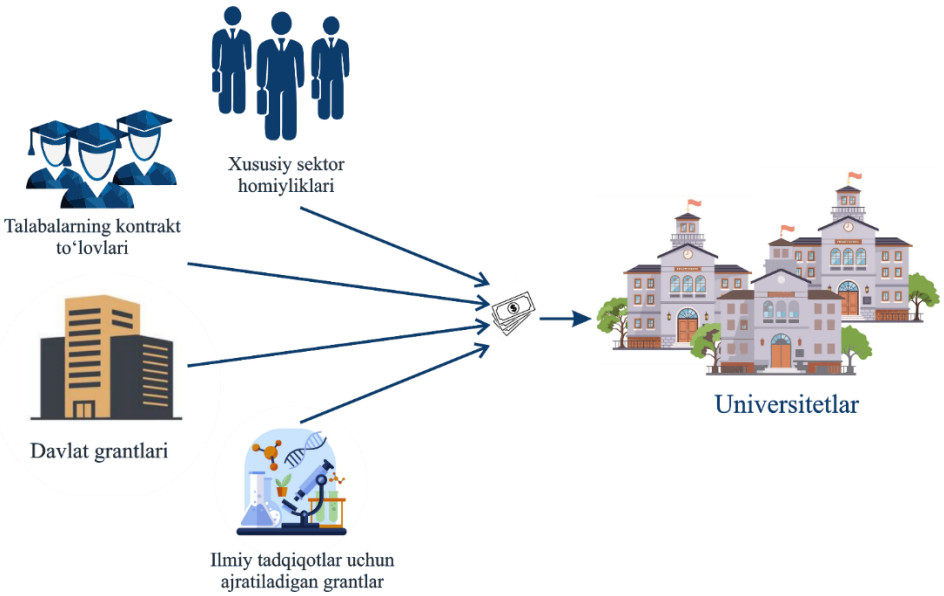
Maximilian University of Munich va Heidelberg University kabi universitetlar ushbu dastur doirasida katta miqdordagi ilmiy grantlarga ega bo‘lgan.

Germaniya oliy ta’lim tizimining yana bir muhim elementi universitetlar va sanoat korxonalari o‘rtasidagi hamkorlikdir. Universitetlar ilmiy tadqiqotlarni amalga oshirishda sanoat sektori bilan faol hamkorlik qiladi. Bu hamkorlik ilmiy natijalarni amaliy ishlab chiqarish jarayonlariga joriy etish imkonini beradi. Germaniyada Fraunhofer jamiyati ilmiy tadqiqotlarni sanoat bilan integratsiya qilishda muhim rol o‘ynaydi. Fraunhofer institutlari universitetlar bilan hamkorlikda innovatsion texnologiyalarni ishlab chiqish va ularni sanoatda qo‘llash bo‘yicha loyihalarni amalga oshiradi. Max Planck jamiyati ham Germaniyada ilmiy tadqiqotlarni rivojlantirishda muhim rol o‘ynaydi. Max Planck institutlari fundamental ilmiy tadqiqotlarga ixtisoslashgan bo‘lib, ko‘plab universitetlar bilan hamkorlikda ilmiy loyihalarni amalga oshiradi[88]. Ushbu institutlar davlat tomonidan moliyalashtiriladi va Germaniyada ilmiy innovatsiyalar rivojlanishining muhim markazlari hisoblanadi.

Germaniya oliy ta’lim tizimining moliyalashtirish modeli universitetlar, ilmiy institutlar va sanoat sektori o‘rtasidagi hamkorlikka asoslanadi. Davlat mablag‘lari universitetlarning asosiy faoliyatini moliyalashtiradi, ilmiy grantlar esa tadqiqot faoliyatini rivojlantirishga xizmat qiladi. Sanoat korxonalari bilan hamkorlik esa ilmiy natijalarni amaliyotga joriy etish imkoniyatlarini kengaytiradi. Umuman olganda, Germaniyada oliy ta’limni moliyalashtirish siyosati davlat tomonidan faol qo‘llab-quvvatlanadigan tizim sifatida shakllangan. Davlat mablag‘larining yuqori ulushi universitetlarning barqaror faoliyat yuritishini ta’minlaydi. Ilmiy grantlar va tadqiqot fondlari ilmiy faoliyatni rivojlantirishga xizmat qiladi. Universitetlar va sanoat sektori o‘rtasidagi hamkorlik esa innovatsion rivojlanish uchun muhim sharoit yaratadi. Mazkur tizim Germaniya universitetlarining global ilmiy maydonda yuqori raqobatbardoshlikka ega bo‘lishiga yordam beradi.

Janubiy Koreya oliy ta’lim tizimi qisqa vaqt ichida jadal rivojlangan tizimlardan biri sifatida e’tirof etiladi. Mamlakat iqtisodiy rivojlanish strategiyasida inson kapitali va ilmiy salohiyatni oshirish muhim o‘rin egallaydi. Oliy ta’lim tizimini moliyalashtirish davlat siyosatining ustuvor yo‘nalishlaridan biri hisoblanadi. Janubiy Koreyada oliy ta’lim muassasalari davlat grantlari, talabalarning kontrakt to‘lovlari, ilmiy tadqiqotlar uchun ajratiladigan grantlar hamda xususiy sektor bilan hamkorlik orqali moliyalashtiriladi(2-rasm). Ushbu tizim davlat tomonidan strategik boshqariladigan aralash moliyalashtirish modeliga asoslanadi.

[88] https://www.mpg.de/en/about



2-rasm. Janubiy Koreya oliy ta’lim tizimini moliyalashtirish manbalari[89].

Janubiy Koreyada oliy ta’lim tizimi tarkibida xususiy universitetlarning ulushi yuqori hisoblanadi. Mamlakatdagi universitetlarning katta qismi xususiy sektor tomonidan tashkil etilgan. Kontrakt to‘lovlari universitetlarning moliyaviy resurslarida muhim o‘rin tutadi. Talabalarning kontrakt to‘lovlari o‘quv jarayonini tashkil etish, professor-o‘qituvchilar faoliyatini moliyalashtirish hamda universitet infratuzilmasini rivojlantirish uchun asosiy manbalardan biri hisoblanadi. Biroq davlat ham oliy ta’lim tizimini faol qo‘llab-quvvatlaydi va universitetlarning ilmiy hamda innovatsion faoliyatini moliyalashtirish uchun katta miqdorda grantlar ajratadi. Davlat tomonidan ajratiladigan mablag‘lar ko‘pincha maqsadli dasturlar orqali taqsimlanadi. Ushbu dasturlar universitetlarning ilmiy salohiyatini oshirish, innovatsion tadqiqotlarni rivojlantirish hamda xalqaro ilmiy hamkorlikni kengaytirishga qaratilgan. Janubiy Koreyada oliy ta’lim tizimida natijaga asoslangan moliyalashtirish mexanizmlari keng qo‘llaniladi. Universitetlarning ilmiy natijalari, tadqiqot loyihalari va innovatsion faoliyati davlat grantlarini taqsimlashda muhim mezonlardan biri hisoblanadi.

Janubiy Koreyada ilmiy tadqiqotlarni moliyalashtirishda muhim rol o‘ynaydigan dasturlardan biri Brain Korea 21 (BK21) dasturidir. Ushbu dastur universitetlarning ilmiy salohiyatini oshirish hamda doktorantura ta’limini rivojlantirishga qaratilgan. BK21 dasturi doirasida universitetlar ilmiy loyihalar uchun grantlar oladi va bu mablag‘lar ilmiy tadqiqotlarni moliyalashtirishga yo‘naltiriladi. Seoul National University, Korea Advanced Institute of Science and Technology (KAIST) hamda Yonsei University kabi yetakchi universitetlar ushbu dastur orqali katta miqdorda grantlarga ega bo‘lgan. Janubiy Koreyada davlat tomonidan qo‘llab-quvvatlanadigan yana bir muhim mexanizm innovatsion tadqiqotlarni moliyalashtirish bilan bog‘liq. Universitetlar texnologik rivojlanish va sanoat innovatsiyalarini qo‘llab-quvvatlash maqsadida davlat grantlaridan foydalanadi. Bu grantlar ko‘pincha yangi texnologiyalarni ishlab chiqish, ilmiy laboratoriyalarni modernizatsiya qilish hamda innovatsion startap loyihalarni rivojlantirish uchun ajratiladi. Universitetlar va texnologik kompaniyalar o‘rtasidagi hamkorlik ushbu jarayonda muhim rol o‘ynaydi.

[89] Muallif tomonidan tayyorlandi

Universitetlar va sanoat sektori o‘rtasidagi hamkorlik Janubiy Koreya oliy ta’lim tizimining muhim xususiyatlaridan biridir. Ko‘plab texnologik kompaniyalar universitetlar bilan birgalikda ilmiy tadqiqotlar olib boradi. Samsung, Hyundai yoki LG kabi yirik kompaniyalar universitetlar bilan qo‘shma tadqiqot markazlari tashkil etgan. Bu markazlar innovatsion texnologiyalarni ishlab chiqish hamda ilmiy tadqiqot natijalarini sanoat ishlab chiqarishiga joriy etish bilan shug‘ullanadi. Janubiy Koreyada universitetlar moliyalashtirilishida ilmiy natijalarning ahamiyati katta. Universitetlar davlat grantlari olish uchun ilmiy tadqiqotlar natijalarini oshirishga intiladi. Ilmiy maqolalar soni, xalqaro hamkorlik loyihalari, patentlar hamda innovatsion ishlanmalar moliyalashtirish hajmiga bevosita ta’sir qiladi. Natijada universitetlar ilmiy faoliyatni rivojlantirishga alohida e’tibor qaratadi. Talabalarni moliyaviy qo‘llab-quvvatlash tizimi ham Janubiy Koreya oliy ta’lim tizimining muhim elementlaridan biri hisoblanadi. Davlat turli stipendiya va grant dasturlari orqali talabalarning ta’lim olish imkoniyatlarini kengaytiradi. Kam ta’minlangan oilalardan chiqqan talabalar uchun maxsus stipendiyalar ajratiladi. Bunday mexanizmlar oliy ta’limga kirish imkoniyatlarini kengaytirishga xizmat qiladi. Janubiy Koreyada oliy ta’limni moliyalashtirish siyosati davlat strategiyasi bilan chambarchas bog‘langan. Ta’lim tizimi iqtisodiy rivojlanish va texnologik taraqqiyotning muhim omili sifatida qaraladi. Universitetlar ilmiy tadqiqotlar va innovatsion ishlanmalar orqali iqtisodiyot rivojlanishiga bevosita hissa qo‘shadi.

Janubiy Koreyada oliy ta’limni moliyalashtirish tizimi davlat grantlari, kontrakt to‘lovlari, ilmiy tadqiqotlar uchun ajratiladigan grantlar hamda xususiy sektor bilan hamkorlik asosida shakllangan. Bunday tizim universitetlarning ilmiy salohiyatini oshirishga, innovatsion tadqiqotlarni rivojlantirishga hamda mamlakatning texnologik taraqqiyotini ta’minlashga xizmat qiladi. Yuqoridagi tahlillar AQSH, Yevropa mamlakatlari, Germaniya hamda Janubiy Koreya tajribasi asosida oliy ta’limni moliyalashtirish tizimlarining turli institutsional shakllari shakllanganini ko‘rsatadi. Ushbu tizimlar moliyalashtirish manbalari, resurslarni taqsimlash mexanizmlari hamda rag‘batlantiruvchi instrumentlar bo‘yicha farqlansada, ularning umumiy maqsadi oliy ta’lim tizimining barqaror faoliyatini ta’minlash, ilmiy tadqiqotlarni rivojlantirish hamda ta’lim natijalarining iqtisodiy samaradorligini oshirishdan iborat.

Yuqoridagi malumotlar shuni ko‘rsatadiki ayrim mamlakatlarda davlat moliyalashtirishi ustuvor bo‘lgan model ustunlik qiladi, boshqa mamlakatlarda esa bozor mexanizmlari va xususiy sektor ishtiroki muhim rol o‘ynaydi. Ko‘plab rivojlangan mamlakatlarda oliy ta’limni moliyalashtirish tizimi bir nechta mexanizmlarning kombinatsiyasi asosida shakllanib, davlat qo‘llab-quvvatlashi, natijadorlikka asoslangan moliyalashtirish, talaba to‘lovlari va ilmiy grantlar o‘rtasidagi muvozanatni ta’minlashga intilmoqda. Mazkur tajribalar asosida oliy ta’limni moliyalashtirish modellarini ijtimoiy tenglik va iqtisodiy samaradorlik mezonlari nuqtai nazaridan qiyosiy baholash zarurati yuzaga keladi.

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SUN’IY INTELLEKT ASOSIDA ALOHIDA TA’LIM EHTIYOJLARI BO‘LGAN BOLALAR UCHUN INDIVIDUAL TA’LIMNI TASHKIL ETISH METODIKASI

D.A. Dadaboyeva

Annotatsiya. *Mazkur maqolada sun’iy intellekt texnologiyalari asosida alohida ta’lim ehtiyojlari bo‘lgan bolalar uchun individual ta’limni tashkil etishning pedagogik imkoniyatlari va metodik asoslari yoritilgan. Ta’lim jarayonida sun’iy intellekt vositalaridan foydalanish orqali bolalarning individual xususiyatlari, ta’lim olish imkoniyatlari va rivojlanish ehtiyojlarini hisobga olish masalalari tahlil qilingan. Shuningdek, moslashtirilgan o‘quv materiallarini ishlab chiqish, ta’lim topshiriqlarini individuallashtirish hamda pedagogik qo‘llab-quvvatlash samaradorligini oshirishda sun’iy intellektning ahamiyati asoslangan. Maqolada maxsus va inklyuziv ta’lim amaliyotida sun’iy intellektdan foydalanishning istiqbollari hamda mavjud muammolar yuzasidan ilmiy-metodik tavsiyalar bayon etilgan.*

Kalit so‘zlar: *sun’iy intellekt, maxsus pedagogika, alohida ta’lim ehtiyojlari, individual ta’lim, inklyuziv ta’lim, raqamli texnologiyalar, ta’limni individuallashtirish, moslashtirilgan ta’lim, pedagogik qo‘llab-quvvatlash.*

Kirish. Bugungi kunda ta’lim tizimida raqamli texnologiyalarni keng joriy etish, ta’lim oluvchilarning individual xususiyatlarini hisobga olish hamda sifatli ta’lim olish imkoniyatlarini kengaytirish dolzarb pedagogik vazifalardan biri hisoblanadi. Ayniqsa, alohida ta’lim ehtiyojlari bo‘lgan bolalarning ta’lim olish huquqini ta’minlash, ularning imkoniyatlariga mos o‘quv muhitini yaratish va individual rivojlanishini qo‘llab-quvvatlash maxsus pedagogika sohasida alohida ahamiyat kasb etadi. Mazkur jarayonda sun’iy intellekt texnologiyalaridan foydalanish ta’limni individuallashtirishning yangi imkoniyatlarini yuzaga keltirmoqda. O‘zbekiston Respublikasida ta’lim sohasini raqamlashtirish, inklyuziv ta’limni rivojlantirish va alohida ta’lim ehtiyojlari bo‘lgan bolalar uchun teng imkoniyatlar yaratishga qaratilgan islohotlar amalga oshirilmoqda. Jumladan, O‘zbekiston Respublikasining “Ta’lim to‘g‘risida”gi Qonunida inklyuziv ta’lim tushunchasi va uni tashkil etishning huquqiy asoslari belgilangan [1]. Shuningdek, O‘zbekiston Respublikasi Prezidentining 2020-yil 13-oktabrdagi PQ-4860-son qarori bilan tasdiqlangan alohida ta’lim ehtiyojlari bo‘lgan bolalarga ta’lim-tarbiya berish tizimini takomillashtirishga doir konsepsiya ushbu yo‘nalishdagi muhim huquqiy hujjatlardan biri hisoblanadi [2]. Mazkur hujjatlar alohida ta’lim ehtiyojlari bo‘lgan bolalar uchun qulay ta’lim sharoitlarini yaratish va ta’lim sifatini oshirish masalalarining dolzarbligini belgilaydi.

Sun’iy intellekt texnologiyalari ta’lim oluvchilarning o‘zlashtirish darajasi, individual ehtiyojlari va o‘quv faoliyatidagi qiyinchiliklarini hisobga olgan holda ta’lim materiallarini moslashtirish imkonini beradi. Xususan, intellektual ta’lim tizimlari, nutqni matnga aylantirish dasturlari, matnni ovozli shaklda o‘qib beruvchi vositalar hamda moslashtirilgan raqamli topshiriqlar alohida ta’lim ehtiyojlari bo‘lgan bolalarning o‘quv faoliyatida qo‘llab-quvvatlovchi vosita bo‘lib xizmat qilishi mumkin. Biroq bunday texnologiyalardan foydalanish bolaning individual xususiyatlarini hisobga olish, pedagogik nazoratni ta’minlash va shaxsiy ma’lumotlarni himoya qilish talablariga rioya etishni ham taqozo etadi.

YUNESKO tomonidan ishlab chiqilgan sun’iy intellekt va ta’limga oid tavsiyalarda ushbu texnologiyalardan foydalanishda inson manfaatlari, tenglik, inklyuzivlik va axloqiy tamoyillarga rioya etish muhimligi ta’kidlanadi [3]. Ushbu yondashuv alohida ta’lim ehtiyojlari bo‘lgan bolalar bilan ishlashda ayniqsa muhimdir. Chunki sun’iy intellekt vositalari ta’lim jarayonini qo‘llab-quvvatlashi mumkin bo‘lsa-da, ular pedagogning kasbiy faoliyati, individual yondashuvi va bevosita muloqotining o‘rnini to‘liq bosa olmaydi.

Shu nuqtayi nazardan, sun’iy intellekt asosida alohida ta’lim ehtiyojlari bo‘lgan bolalar uchun individual ta’limni tashkil etish metodikasini takomillashtirish zamonaviy maxsus pedagogikaning dolzarb ilmiy-amaliy yo‘nalishlaridan biri hisoblanadi. Mazkur yo‘nalishni tadqiq etish orqali bolalarning individual imkoniyatlariga mos ta’lim mazmunini shakllantirish, o‘quv topshiriqlarini moslashtirish va pedagogik qo‘llab-quvvatlash samaradorligini oshirish imkoniyatlarini aniqlash mumkin.

Asosiy qism. Zamonaviy ta’lim tizimida har bir bolaning individual xususiyatlari, qobiliyatlari, qiziqishlari va ta’lim olish ehtiyojlarini hisobga olish muhim pedagogik tamoyillardan biri hisoblanadi. Ayniqsa, alohida ta’lim ehtiyojlari bo‘lgan bolalar bilan ishlashda ta’lim mazmunini moslashtirish, individual yondashuvni ta’minlash va har bir bolaning rivojlanish imkoniyatlarini hisobga olish muhim ahamiyat kasb etadi. UNESCO tomonidan ishlab chiqilgan inklyuziv ta’limga oid tavsiyalarda ham barcha ta’lim oluvchilar uchun teng imkoniyatlar yaratish va ta’limdagi to‘siqlarni bartaraf etish zarurligi ta’kidlanadi [4].

Sun’iy intellekt texnologiyalari mazkur vazifalarni amalga oshirishda qo‘shimcha imkoniyatlar yaratadi. Ushbu texnologiyalar yordamida o‘quv materiallarini turli shakllarda taqdim etish, topshiriqlarning murakkablik darajasini o‘zgartirish, o‘quv faoliyati natijalarini tahlil qilish hamda bolaga mos ta’lim resurslarini tavsiya etish mumkin. UNESCOning sun’iy intellektdan ta’lim va tadqiqotlarda foydalanishga oid qo‘llanmasida ushbu texnologiyalardan foydalanishda pedagogik maqsad, inson nazorati va ta’lim oluvchilarning manfaatlarini ustuvor qo‘yish lozimligi ko‘rsatilgan [3].

Masalan, matnni ovozli shaklda o‘qib beruvchi dasturlar ko‘rishida yoki o‘qish jarayonida qiyinchiliklari bo‘lgan bolalarni qo‘llab-quvvatlashi mumkin. Nutqni matnga aylantirish vositalari esa eshitishida nuqsoni bo‘lgan ayrim bolalar uchun axborotni qabul qilishni yengillashtiradi. Bunday texnologiyalar yordamchi vositalar sifatida bolaning ta’lim jarayonidagi ishtirokini kengaytirishi mumkin. Shu bilan birga, ularning samaradorligi bolaning individual ehtiyojlari, vositaning texnik imkoniyatlari va pedagogik qo‘llab-quvvatlash sifatiga bog‘liq [3; 5]. Sun’iy intellekt asosida individual ta’limni tashkil etish faqat texnik vositalardan foydalanish bilan cheklanmaydi. Bu jarayon pedagogik maqsadlarni belgilash, bolaning ta’lim ehtiyojlarini aniqlash, tegishli texnologiyani tanlash, ta’lim topshiriqlarini moslashtirish va erishilgan natijalarni baholash kabi o‘zaro bog‘liq bosqichlarni qamrab oladi. Shu sababli sun’iy intellektni maxsus pedagogik faoliyatga tatbiq etishda texnologik imkoniyatlar bilan bir qatorda pedagogik, psixologik va axloqiy omillar ham hisobga olinishi lozim [3; 5]. Sun’iy intellekt asosida individual ta’limni tashkil etish metodikasini ishlab chiqishda bolaning individual ta’lim ehtiyojlarini aniqlash, moslashtirilgan o‘quv mazmunini shakllantirish, texnologik vositalarni tanlash va ta’lim natijalarini muntazam baholashga e’tibor qaratish lozim. Mazkur jarayonni shartli ravishda bir-biri bilan uzviy bog‘langan to‘rtta bosqich asosida tashkil etish mumkin. Birinchi bosqich — individual ta’lim ehtiyojlarini aniqlash. Ushbu bosqichda bolaning mavjud bilim va ko‘nikmalari, axborotni qabul qilish xususiyatlari, muloqot imkoniyatlari, qiziqishlari hamda o‘quv faoliyatida duch keladigan qiyinchiliklari o‘rganiladi. Bunda pedagog, psixolog,

maxsus pedagog va zarur hollarda boshqa mutaxassislarning hamkorligi muhim ahamiyatga ega. Sun’iy intellekt vositalari o‘quv topshiriqlari natijalarini tizimlashtirish yoki bolaning ta’lim jarayonidagi rivojlanish dinamikasini kuzatishda yordamchi vosita sifatida qo‘llanishi mumkin. Biroq bolaning rivojlanish darajasi yoki tashxisini faqat avtomatlashtirilgan tizim xulosalari asosida belgilash mumkin emas [3; 5].

Ikkinchi bosqich — individual ta’lim mazmunini moslashtirish. Bu bosqichda aniqlangan ehtiyojlardan kelib chiqib, o‘quv materiallari, topshiriqlar, taqdimot shakllari va mashg‘ulotlar sur’ati moslashtiriladi. Masalan, murakkab matnlar soddalashtirilgan shaklda berilishi, ko‘rgazmali materiallar bilan to‘ldirilishi yoki topshiriqlar kichik bosqichlarga ajratilishi mumkin. Sun’iy intellektga asoslangan vositalar matnni soddalashtirish, tasviriy materiallar uchun tavsif yaratish va bir mavzu bo‘yicha turli darajadagi mashqlarni tayyorlashda yordam beradi. Bunda yaratilgan materiallarning ilmiy aniqligi, yoshga muvofiqligi va pedagogik jihatdan to‘g‘riligi mutaxassis tomonidan tekshirilishi zarur [3; 5].

Uchinchi bosqich — sun’iy intellekt vositalarini ta’lim jarayoniga integratsiyalash. Ushbu bosqichda bolaning ehtiyojlariga mos raqamli vositalar tanlanadi va ular mashg‘ulotlar mazmuniga maqsadli ravishda kiritiladi. Jumladan, matnni ovozli shaklda taqdim etish, nutqni matnga aylantirish, subtitr yaratish, vizual ko‘rsatmalar tayyorlash va interaktiv topshiriqlardan foydalanish mumkin. Ayrim bolalar uchun vizual jadval va ketma-ket ko‘rsatmalar taqdim etish o‘quv faoliyatini tushunishni yengillashtiradi. Bunda texnologik vositalar bolaning ta’lim olish imkoniyatlarini kengaytirish va ta’limdagi to‘siqlarni kamaytirishga xizmat qilishi kerak [4; 5].

To‘rtinchi bosqich — ta’lim natijalarini monitoring qilish va metodikani takomillashtirish. Bu bosqichda bolaning bilim, ko‘nikma va malakalaridagi o‘zgarishlar, topshiriqlarni mustaqil bajarish darajasi, ta’lim jarayonidagi faolligi va qo‘llab-quvvatlashga bo‘lgan ehtiyoji baholanadi. Sun’iy intellekt vositalari natijalarni tizimlashtirish va rivojlanish dinamikasini ko‘rsatishda yordam berishi mumkin. Olingan ma’lumotlar asosida pedagog individual ta’lim rejasiga tegishli o‘zgartirishlar kiritadi. Baholashda bolaning boshqa bolalar bilan natijalarini solishtirishdan ko‘ra, uning shaxsiy rivojlanish dinamikasiga e’tibor qaratish maqsadga muvofiq [3; 5]. Shunday qilib, mazkur metodika individual ehtiyojlarni aniqlashdan boshlab ta’lim mazmunini moslashtirish, tegishli texnologiyalarni qo‘llash va natijalarni tahlil qilishgacha bo‘lgan uzluksiz pedagogik jarayonni ifodalaydi.

Xulosa. Sun’iy intellekt texnologiyalari katta imkoniyatlarga ega bo‘lishiga qaramay, ularni maxsus ta’limga joriy etishda ayrim muammolar ham mavjud. Ulardan biri — barcha raqamli vositalarning ham alohida ta’lim ehtiyojlari bo‘lgan bolalar uchun birdek mos emasligidir. Ayrim dasturlar maxsus imkoniyatlarni qo‘llab-quvvatlamasligi, ona tilidagi materiallarni yetarli darajada qayta ishlamasligi yoki foydalanuvchining ehtiyojlariga mos kelmaydigan tavsiyalar berishi mumkin. Shu sababli texnologiyalarni tanlashda ulardan foydalanish qulayligi, funksional imkoniyatlari va ta’lim maqsadlariga muvofiqligi baholanishi zarur.

Mazkur muammolarni bartaraf etish uchun, birinchidan, alohida ta’lim ehtiyojlari bo‘lgan bolalarning xususiyatlariga mos, foydalanish uchun qulay va xavfsiz raqamli vositalarni tanlash; ikkinchidan, pedagoglarning sun’iy intellekt bo‘yicha kasbiy kompetensiyalarini rivojlantirish; uchinchidan, shaxsiy ma’lumotlarni himoya qilish va texnologiyalardan axloqiy foydalanish talablariga rioya etish; to‘rtinchidan, sun’iy intellekt vositalarining ta’lim natijalariga ta’sirini muntazam tahlil qilish zarur. Umuman olganda, sun’iy intellekt asosida individual ta’limni tashkil etish maxsus pedagogika amaliyotini takomillashtirish uchun muhim imkoniyatlarni

taqdim etadi. Biroq ushbu imkoniyatlardan samarali foydalanish texnologik vositalarni shunchaki joriy etish bilan emas, balki ularni pedagogik maqsadlar, bolaning individual ehtiyojlari va ta’limning insonparvarlik tamoyillari bilan uyg‘unlashtirish orqali ta’minlanadi.

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Mundarija / Contents

1-sho‘ba

1 **Abduraxmanova Azoda Djo‘rayevna, Solixov Murod Botir o‘g‘li,** MEHNATNI MUHOFAZA QILISHNI O‘QITISH JARAYONIDA SUN’IY INTELLEKT TEXNOLOGIYALARIDAN FOYDALANISH IMKONIYATLARI 5

2 **Ashurova Mohigul Sodiq qizi,** OILAVIY NODAVLAT MAKTABGACHA TA’LIM TASHKILOTLARIDA MAKTABGACHA YOSHDAGI BOLALARGA VAQT HAQIDAGI TASAVVURLARNI SHAKILLANTIRISH 9

3 **Abdullayeva Gulruxsoroy Azamatjon qizi,** O‘ZBEK VA INGLIZ MEDIADISKURSIDA AYOLLAR NUTQIGA XOS KOLLOKATSIYALAR LINGVOPRAGMATIKASI 12

4 **Bai Mingyuan,** AI-EMPOWERED TEACHING REFORM OF THE PROCUREMENT AND NEGOTIATION COURSE FROM THE PERSPECTIVE OF "UNDERGRADUATE EDUCATION FIRST AND FOUR RETURNS" 16

5 **Begmatova Sokhiba Mustafoyevna,** READING LITERARY TEXTS IN THE AGE OF ARTIFICIAL INTELLIGENCE: THE RELATIONSHIP BETWEEN TRADITIONAL AND DIGITAL INTERPRETATION 20

6 **Bakiyeva Durdona Baxtiyarovna,** FILOLOGIK TA’LIM YO‘NALISHI TALABALARINING INGLIZ TILIDA AKADEMIK YOZUV KOMPETENSIYASINI RIVOJLANTIRISHDA GENERATIV SUN’IY INTELELKT TEXNOLOGIYALARINING IMKONIYATLARIDAN FOYDALANISH 24

7 **Bekchonova Shoira Bazarbayevna,** RAQAMLI TA’LIM MUHITIDA SUN’IY INTELLEKT TEXNOLOGIYALARIDAN FOYDALANISH ORQALI KIBERPEDAGOGIK KOMPETENSIYANI TAKOMILLASHTIRISH 28

8 **Bobonorova Qundizxan Quralbay qizi,** SUN’IY INTELLEKT BILAN HAMKORLIKDA MENEJMENT TALABALARINING EKONOMETRIK KOMPETENTLIGINI INDIVIDUAL TA’LIM TRAYEKTORIYASI ASOSIDA RIVOJLANTIRISH 34

9 **Bozorov Vahobiddin Nuriddinovich,** BO‘LAJAK O‘QITUVCHILARDA O‘QUV-BILUV MOTIVLARINI SHAKLLANTIRISH MUAMMOSI- TA’LIMNING AJRALMAS QISMI SIFATIDA 38

10 **Egamberdiyeva Farangiz Jaxongir qizi,** THE ORIGIN OF THE KOREAN LANGUAGE AND ITS RECOGNITION AS A LANGUAGE 43

11 **Ергашева Эльвира Владимировна,** ИНТЕРАКТИВНЫЕ ТЕХНОЛОГИИ И ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ В РАЗВИТИИ РЕЧЕВОЙ КОМПЕТЕНЦИИ УЧАЩИХСЯ 5-Х КЛАССОВ (НА ПРИМЕРЕ ШКОЛ С УЗБЕКСКИМ ЯЗЫКОМ ОБУЧЕНИЯ) 47

12 **Shukhrat Shernazarovich Eshankulov,** INTEGRATING AI AND DIGITAL TECHNOLOGIES IN HIGHER EDUCATION: A MULTI-DIMENSIONAL SYNTHESIS OF PEDAGOGICAL FRAMEWORKS, STUDENT ENGAGEMENT, AND ETHICAL IMPERATIVES 51

13 **Fayzulloyeva Sadoqat Furqat qizi,** STEAM ZAMONAVIY TA’LIM METODOLOGIYASI KOMPETENSIYALARNI RIVOJLANISHINING AHAMIYATI 55

14 **Файзиева Зарина Рауф кизи,** РАЗРАБОТКА СИСТЕМЫ ПРОБЛЕМНЫХ ЗАДАНИЙ ДЛЯ ФОРМИРОВАНИЯ РЕЧЕЭТИКЕТНЫХ И КОММУНИКАТИВНО-ПРАГМАТИЧЕСКИХ УМЕНИЙ БУДУЩИХ УЧИТЕЛЕЙ РУССКОГО ЯЗЫКА 58

15 **G‘aybullayev Quvonchbek G‘olibjon O‘g‘li,** OLIY TA’LIMDA QADRYATLI MUHITNI SHAKLLANTIRISH MEXANIZIMLARI 66

16 **Kazakova Dilnoza Qobil qizi,** O‘QUVCHILARDA VITAGEN FAOLIYATINI TAKOMILLASHTIRISHNING METODIK TUZILMASI 70

17 **Karimova Sidora Baxtiyorovna,** OLIY TA’LIM TIZIMINI RIVOJLANTIRISHDA SUN’IY INTELLEKTNING O‘RNI 74

18 **Khayriniso Bakhtiyarovna Ganiyeva,** THE ROLE OF ARTIFICIAL INTELLIGENCE IN LANGUAGE LEARNING 78

19 **Khayriniso Bakhtiyarovna Ganiyeva,** DIGITAL HUMANITIES BASED COMPUTATIONAL ANALYSIS OF LINGUISTIC EVOLUTION 82

20 **G‘aybullayev Quvonchbek G‘olibjon o‘g‘li,** OLIY TA’LIM MUASSASALARIDA MENTORLIK FAOLIYATI VOSITASIDA TALABALARNING QADRIYATLI TARBIYASINI TAKOMILLASHTIRISH 86

21 **Jumabekov Ziyovuddin Xazratqul o‘g‘li,** FARZANDLAR O‘RTASIDA HASAD HISSINI O‘RGANISHDA TADQIQOTNING METODOLOGIK ASOSI VA METODIKALAR TASNIFI 89

22 **Zulfiya Khabirova,** METHODOLOGY FOR TEACHING THE ESP COURSE USING AI-BASED SOFTWARE 92

23 **Khatamov Farkhod Bakhodirovich,** DEVELOPING AN EXPANDED LEARNING ENVIRONMENT IN TESOL THROUGH GENERATIVE ARTIFICIAL INTELLIGENCE: INFORMATION INTEGRATION AND INTERACTIVE LEARNING 98

24 **Kudiyarova Gauxar Iyambergenovna,** SUN’IY INTELLEKT ASRIDA BO‘LAJAK PEDAGOGNING BOSHQARUVCHILIK QOBILIYATI: TO‘RT XALQARO TADQIQOT NATIJALARI ASOSIDA NAZARIY-METODIK SINTEZ 105

25 **Mohamadreza Jafary, Gulnora Nasirova,** HUMAN AND ARTIFICIAL INTELLIGENCE COLLABORATION IN PLURILINGUAL HIGHER EDUCATION: A CONCEPTUAL FRAMEWORK FOR RESPONSIBLE LANGUAGE LEARNING IN UZBEKISTAN 109

26 **Миркамалов Фуркатжон Рихсиевич, Миркамалов Кудрат Фуркатович,** НЕКОТОРЫЕ АСПЕКТЫ ОРГАНИЗАЦИИ САМОСТОЯТЕЛЬНОЙ РАБОТЫ СТУДЕНТОВ ПРИ ИЗУЧЕНИИ ДИСЦИПЛИНЫ «АНАТОМИЯ И ФИЗИОЛОГИЯ» 117

27 **Муллаахунова Нилуфар Мухаматумановна,** ТЕХНОЛОГИЯ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА В ОБУЧЕНИИ РУССКОМУ ЯЗЫКУ: СОТРУДНИЧЕСТВО ПЕДАГОГА И ИСКУССТВЕННОГО ИНТЕЛЛЕКТА 124

28 **S.S. Mirzoyeva,** ZAMONAVIY TA’LIMDA RAQAMLI TEXNOLOGIYALARINING AHAMIYATI 132

29 **Murodova Dilnavoz Nizomovna,** THE ROLE OF ARTIFICIAL INTELLIGENCE IN TEACHING LITERATURE IN HIGHER EDUCATION 136

30 **Mamatov Dilmurad Narmuradovich, Bekchonova Shoira Bazarbayevna,** OLIY TA’LIMDA SUN’IY INTELLEKT VA RAQAMLI PEDAGOGIK TEXNOLOGIYALARDAN FOYDALANISHNING KIBERPEDAGOGIK MODELI 142

31 **Nazarova Sayyora Anvarovna,** XITOY TILINI O‘QITISHDA SUN’IY INTELLEKTDAN ETIK FOYDALANISH: MADANIYATLARARO KOMMUNIKATIV KOMPETENSIYANI RIVOJLANTIRISH TAJRIBA 146

32 **Ortiqova Dildora Begmirzayevna,** O‘ZBEK ADABIYOTI TA’LIMIDA TALABALARNING O‘QUV-BILISH MOTIVATSIYASINI FAOLLASHTIRISH METODIKASI 151

33 **Pardayeva Zulaykho Yusubjonovna,** PSYCHOLOGICAL CHARACTERISTICS OF DEVELOPING ENGLISH SPEAKING SKILLS THROUGH DIGITAL TECHNOLOGIES IN COMPUTER ENGINEERING CONTEXT 159

34 **Polvonova Yulduzxon Saparboyevna,** BLENDED LEARNING MUHITIDA SUN’IY INTELLEKT VA RAQAMLI TA’LIM TEXNOLOGIYALARIDAN FOYDALANISHNING PEDAGOGIK MODELI 164

35 **Raxmatullayeva Dilshada Maratovna,** XITOY TILINI O‘QITISHDA SUN’IY INTELLEKT TEXNOLOGIYALARIDAN FOYDALANISHNING FONETIK KOMPETENSIYANI SHAKLLANTIRISHDAGI METODIK IMKONIYATLARI 169

36 **Razoqova Hosilaoy,** BO‘LAJAK TARBIYACHILARNING MALAKAVIY PEDAGOGIK AMALIYOTINI 4+2 TARTIBIDA TASHKIL ETISHDA INNOVATSION PEDAGOGIK TEXNOLOGIYALAR VA METODIK TA’MINOTNI TAKOMILLASHTIRISH 174

37 **Reymova Erkinay Atabaevna,** MIKROBIOLOGIYA FANIDAN LABORATORIYA MASHG‘ULOTLARINI TASHKIL ETISHDA RAQAMLI VA INNOVATSION TEXNOLOGIYALARNING AHAMIYATI 178

38 **Saparova Gulmira Baxtiyorovna,** FIZIKANI O‘QITISH METODIKASINI RAQAMLI TEXNOLOGIYALAR ASOSIDA TAKOMILLASHTIRISH 183

39 **Satimboyeva Onorxon Anvarjon qizi,** INGLIZ TILI TALAFFUZINING NUTQ AKTLARIGA ASOSAN FONOPRAGMATIK XUSUSIYATLARI 187

40 **Sattorov Abdumalik Abduraxmon o‘g‘li,** OLIY TA’LIMDA INSON VA SUN’IY INTELLEKT HAMKORLIGI ASOSIDA MUSTAQIL TA’LIMNI TASHKIL ETISH 196

41 **Sultonova Marvarid Abdulvohid qizi,** XALQARO TEXNIK STANDARTLAR TILIDA MODAL FE'LLARNING QO‘LLANISH XUSUSIYATLARI VA ULARNI O‘ZLASHTIRISHDAGI TIPOLOGIK QIYINCHILIKLAR 203

42 **Shamsuvaliyeva E.A.,** INGLIZ TILINI O‘QITISHDA CHATGPT VA BOSHQA SUN’IY INTELLEKT VOSITALARIDAN SAMARALI FOYDALANISH 208

43 **Tosheva Maftuna O‘tkirovna,** GERMENEVTIK KOMPETENSIYANING MOHIYATI 211

44 **Temirova Malika Rustamovna,** OLIY TA’LIMDA SUN’IY INTELLEKT VA RAQAMLI TA’LIM TEXNOLOGIYALARI ASOSIDA IKKINCHI TILNI O‘QITISHNING INNOVATSION YONDASHUVLARI 215

45 **Utkir Utanov Qurbonovich, Xaydarov Xurshid Ismatovich,** UMUMTA’LIM MAKTABLARI O‘QITUVCHILARINING PEDAGOGIK VAZIYATLARNI PROGNOZLASH KOMPETENSIYASINI RIVOJLANTIRISH METODIKASI 218

46 **Urinova Madinabonz,** DEVELOPING JOURNALISM STUDENTS' CREATIVE WRITING COMPETENCIES ON THE BASIS OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES 222

2-sho‘ba

47 **Fayzullayeva Barno Bahodirovna,** ELEKTROMAGNIT MOSLASHUV MUAMMOSI 227

48 **Karimova Gulshanoy Akmaljon qizi, Zokirov Sanjar Ikromjon o‘g‘li,** SUN’IY INTELLEKT VA GIBRID MASHINALI O‘QITISH ALGORITMLARI ASOSIDA XODIMLAR MEHNAT SAMARADORLIGINI BAHOLASHNING INNOVATSION TEXNOLOGIYASI 230

49 **Muqimov Shahzodbek Ixtiyor o‘g‘li,** KOMPYUTER TARMOQLARI FANINI O‘QITISHDA VIRTUAL LABORATORIYALARNI YAGONA DASTURIY-DIDAKTIK MUHITGA INTEGRATSIYALASH 234

50 **Nazirova Elmira Shodmonovna, Xalimjanov Abduqunduz Raximjon o‘g‘li,** O‘ZBEKISTON VILOYATLARI KESIMIDA QAYTA TIKLANADIGAN ENERGIYA OBYEKTLARI UCHUN SUN’IY INTELLEKT ASOSIDAGI OPTIMAL NUQTALARNI ANIQLASH VA ISSIQLIK XARITALARI ALGORITMINI ISHLAB CHIQISH 237

51 **O‘roqova Zulayho Erdor qizi,** RAQAMLI TRANSFORMATSIYA DAVRIDA O‘ZBEKISTON OLIY TA’LIMIDA MUHANDIS KADRLARINI AXBOROT-KOMMUNIKATIV KOMPETENTLIGINI RIVOJLANTIRISH MASALALARI 247

52 **Parmonov Shaxzod Abdumajit o‘g‘li,** SUN’IY INTELLEKT VA RAQAMLI TA’LIM TEXNOLOGIYALARI ASOSIDA ENERGETIKA MUHANDISLIGI TALABALARI AXBOROT-MODELLASHTIRISH KO‘NIKMALARINI RIVOJLANTIRISH METODIKASI 250

53 **Savriyev Shamshod Shuxrat o‘g‘li,** BO‘LAJAK MUHANDISLARDA ENERGIYA TEJAMKORLIGI VA SAMARADORLIGINI TA’MINLASH KOMPETENTLIGINING TARKIBIY TUZILMASI VA UNI RAQAMLI TA’LIM MUHITIDA RIVOJLANTIRISH MUAMMOLARI 255

54 **Салихова Дилафруз Хамидулла кизи,** ПЛАНИРОВАНИЕ СИСТЕМ ЗАРЯДНЫХ СТАНЦИЙ ЭЛЕКТРОМОБИЛЕЙ, ПОДКЛЮЧЁННЫХ К СЕТИ 260

55 **Sultonova Maxbubaxon Odilovna,** SOTALI ALOQA BAZAVIY STANSIYALARINING QAYTA TIKLANUVCHI ENERGIYA MANBALARI ASOSIDAGI ELEKTR TA’MINOTI 266

3-sho‘ba

56 **Abdullaeva Sitorabonu Xasanjon kizi,** ARTIFICIAL INTELLIGENCE IN ARCHITECTURAL DESIGN: GENERATING AND EVALUATING ALTERNATIVE DESIGN SOLUTIONS 274

57 **Boltayev Nurali Shiramatovich,** AGRAR OLIY TA’LIM TASHKILOTLARIDA KADRLAR TAYYORLASHNING TAHLILI 282

58 **Djurayeva Dilnoza Fazliddin qizi,** EKOLOGIYA VA SUV RESURSLARINI BOSHQARISHDA RAQAMLI INNOVATSIYALAR – SUN’IY INTELLEKT TEXNOLOGIYALARI 288

59 **Faxriddin Kasimov Shadmankulovich, Mirzaev Sayibdjan,** EKOLOGIYA VA ATROF-MUHIT MUHOFAZASI MUTAXASSISLARINI TAYYORLASHDA SUN’IY INTELLEKTDAN FOYDALANISH 294

60 **Muhammad Ramzan ALI, Muhammad Sharjeel Aziz, Muhammad Younis,** FOSTERING ENVIRONMENTAL SUSTAINABILITY THROUGH GREEN HUMAN RESOURCE MANAGEMENT, GREEN LEADERSHIP, AND WORK ENGAGEMENT: EXAMINING THE EMERGING ROLE OF ARTIFICIAL INTELLIGENCE 304

61 **Shokirov Bahodir Ismoilovich, Ruzimov Ulugbek,** HUMAN-AI COLLABORATION IN ESP SIMULATIONS FOR ARCHITECTURE STUDENTS: A BAD-MODEL FRAMEWORK FOR REFLECTIVE DEBRIEFING 327

62 **Teshayeva Dilnoza Chori qizi,** TALABALARDA EKOLOGIK MAS’ULIYATNI RIVOJLANTIRISHNING PEDAGOGIK ASOSLARI VA DOLZARB MASALALARI 335

63 **Zaripov Toxirjon Yusufboy o‘g‘li,** AQLLI TURIZM (SMART TOURISM) KONSEPSIYASI: INSON-SUN'IY INTELLEKT HAMKORLIGI ORQALI HUDUDIY BARQAROR RIVOJLANISHNI TA'MINLASH 341

4-sho‘ba

64 **Abdumajitova Shaxrizoda Shuxrat qizi,** TRANSFORMATION OF CORRUPTION IN THE ERA OF DIGITAL TECHNOLOGIES
(ANALYSIS OF NEW FORMS AND RISKS) 346

65 **Abdurasulova Nilufar Sobir kizi,** THE ROLE OF ARTIFICIAL INTELLIGENCE IN IT BUSINESS DEVELOPMENT 352

66 **Botirov Zoir Nuriddin o‘g‘li,** IJODIY FAOLIYATNING IJTIMOIY PSIXOLOGIK ASOSLAR 355

67 **Ganiyeva Barno Ilhomovna, Rasuleva Dilafruz Erkin qizi,** KUTUBXONA MUTAXASSISLARI UCHUN SUN’IY INTELLEKT SAVODXONLIGI: XORIJIY YONDASHUVLARNING QIYOSIY TAHLILI 358

68 **Ilxomova Gulnoza Zayniddin qizi,** BIZNES MICE TURIZMI MUTAXASSISLARINI TAYYORLASHDA SUN’IY INTELLEKT RESURSLARIDAN FOYDALANISHNING ILMIY-METODIK ASOSLARI 364

69 **Ibragimova Zilola Shuxratovna,** NEYROMARKETING VA SUN’IY INTELLEKT TEXNOLOGIYALARINING ISTE’MOLCHI XULQ-ATVORINI SHAKLLANTIRISHDAGI ROLI: XALQARO TAJRIBA VA O‘ZBEKISTON UCHUN ISTIQBOLLAR 371

70 **Isokova Aziza Alisher kizi,** STRATEGIC ANALYSIS OF ARTEL ELECTRONICS: STRENGTHENING COMPETITIVE ADVANTAGE AND SUPPORTING INTERNATIONAL EXPANSION 376

71 **Мадалиев Хуршид Абдуллаевич,** JUST IN TIME (JIT) ТИЗИМИ НИ ЎЗБЕКИСТОН АМАЛИЁТИДА ҚЎЛЛАШ ЗАРУРАТИ 381

72 **Мадалиев Хуршид Абдуллаевич,** ЛОГИСТИКАНИ РИВОЖЛАНТИРИШДА СУНЪИЙ ИНТЕЛЛЕКТ ТЕХНОЛОГИЯЛАРИДАН ФОЙДАЛАНИШ 387

73 **Marupov Abdushukurbek Alijonovich,** BUXGALTERIYA HISOBI TA’LIMIDA AKSIYADORLIK JAMIYATLARI MOLIYAVIY NATIJALARINI MHXS ASOSIDA TALQIN QILISH: INSON VA SUN’IY INTELLEKT HAMKORLIGIGA ASOSLANGAN KEYS MODELI 395

74 **Marupov Abdushukurbek Alijonovich,** AVTOMOBIL SANOATI AKSIYADORLIK JAMIYATLARIDA MOLIYAVIY NATIJALARNI QIYOSIY TAHLIL QILISHDA INSON VA SUN’IY INTELLEKT HAMKORLIGI: “UZAUTO MOTORS” AJ VA “O‘Z-SEMYUNG KO” AJ QK MISOLIDA 399

75 **Ruziyeva Gulinoz Fatilloyevna,** TALABALARDA IQTISODIY TAFAKKURNI RIVOJLANTIRISHNING PEDAGOGIK-PSIXOLOGIK ASOSLARI VA RAQAMLI TA’LIM MUHITIDA SHARQ MEROSINI INTEGRATSIYALASH IMKONIYATLARI 404

76 **Saidaxmedova Nodira Ilxomovna, Eshqulova Xilola Shoyimqul qizi,** QISHLOQ XO‘JALIGI XIZMATLARI BOZORIDA IQTISODIY MUNOSABATLARNI TAKOMILLASHTIRISH MEXANIZMLARI 410

77 **Saidova Nigina Sirodjiddin kizi,** ARTIFICIAL INTELLIGENCE AND DIGITAL DIPLOMACY: NEW OPPORTUNITIES IN DEVELOPING UZBEKISTAN’S NATIONAL BRAND 418

78 **Toshtemirova Mohichehra G‘olibjon qizi, tadqiqotchi,** GENERATIV SUN’IY INTELLEKT ASRIDA LIBOS DIZAYNI TA’LIMI: KREATIV GOMOGENIZATSIYADAN MUVOZANATLI “HUMAN-AI COLLABORATION” MODELIGA O‘TISH 421

79 **Ummatkulova Nigora Umarqulovna,** O‘SMIRLARNING MANTIQIY FIKRLASHI VA INTELLEKTUAL QOBILIYATLARINING RIVOJLANISHIDA OILA-MAKTAB HAMKORLIGINING PSIXOLOGIK XUSUSIYATLARI 424

80 **Urazbayeva Ilmira Konisbayevna,** RAQAMLI MOLIYAVIY XIZMATLARNING MINTAQAVIY IQTISODIY RIVOJLANISHDAGI O‘RNI 428

81 **Dr Gyanti Thakur,** LEVERAGING GENERATIVE ARTIFICIAL INTELLIGENCE AND LSTM-BASED PREDICTIVE MODELS TO ENHANCE HOSPITAL QUALITY OF CARE 431

82 **Qo‘chqorov Baxodir Maxkamovich,** UNIVERSITET BOSHQARUVINI RAQAMLI TRANSFORMATSIYALASHDA INSTITUTSIONAL TAYYORGARLIK OMILLARI 436

83 **Ahmedova Nilufar Farxodovna, Mamatqulova Dildora Farhodovna,** SUN'IY INTELLEKTDAN FOYDALANISHDAGI YUTUQLAR VA MUAMMOLAR 440

84 **Абдуллаева Одинахон Гайратжон кизи,** ПРОАКТИВНЫЕ МЕХАНИЗМЫ УПРАВЛЕНИЯ СОЦИАЛЬНО-ЭКОНОМИЧЕСКИМ РАЗВИТИЕМ РЕГИОНОВ УЗБЕКИСТАНА 445

85 **Iskandarov Botir Qurbonovich,** RAQAMLI TA’LIM MUHITIDA SUN’IY INTELLEKT TEXNOLOGIYALARIDAN FOYDALANIB TALABALARNING KASBIY KOMPETENTLIGINI RIVOJLANTIRISH: METODIK IMKONIYATLAR, TAMOYILLAR VA QARAMA-QARSHILIKLAR 451

86 **Ziyotov Mirobid Ergashovich,** HUDUDIY MOLIYAVIY VA SOLIQ SALOHIYATINING O‘ZARO BOG‘LIQLIGI VA UNI BAHOLASH YONDASHUVLARI 456

87 **Зикриллаев Н.Ф. Абдкрахманов Б.А. Кушиев Г.А. Казаков Т.О.,** ИССЛЕДОВАНИЕ ВЛИЯНИЯ УСЛОВИЙ ДИФФУЗИОННОГО ЛЕГИРОВАНИЯ НА МАГНИТНОЕ УПОРЯДОЧЕНИЕ КРЕМНИЯ, ЛЕГИРОВАННОГО Mn И Ge 462

88 **Ilhomova Sadoqat Ulug‘bek qizi,** BO‘LAJAK MATEMATIKA O‘QITUVCHILARINI INNOVATSION FAOLIYATGA TAYYORLASHDA RAQAMLI TEXNOLOGIYALARDAN FOYDALANISHNING AMALIY AHAMIYATI 465

89 **Mamatova Xilola Muxiddinovna,** OLIY TA’LIM RAHBARLARINING KOMMUNIKATIV KREATIVLIGINI DIAGNOSTIKA QILISH VA MONITORING MEZONLARI 474

90 **Aliyev Shoxjaxon Eshdavlatovich,** SONLI USULLAR BO‘YICHA ILMIY TADQIQOTDA INSON VA SUN’IY INTELLEKT HAMKORLIGI: KOSHI TIPIDAGI SINGULYAR INTEGRALLAR UCHUN OPTIMAL KVADRATUR FORMULA MISOLIDA 479

91 **O‘roqov Azizbek Usmonaliyevich,** MEHNAT XAVFSIZLIGINI TA’MINLASHDA INSON OMILINING O‘RNI VA AHAMIYATI 485

92 **Qurbonov Baxromjon Baxtiyor o‘g‘li,** GERMANIYA VA JANUBIY KAREYADA OLIY TA’LIMNI MOLIYALASHTIRISH SIYOSATI 494

93 **D.A. Dadaboyeva,** SUN’IY INTELLEKT ASOSIDA ALOHIDA TA’LIM EHTIYOJLARI BO‘LGAN BOLALAR UCHUN INDIVIDUAL TA’LIMNI TASHKIL ETISH METODIKASI 500

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www.scientists.uz, info@scientists.uz, +998933549654, +998993319654