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ЮҚУМЛИ ЛАРИНГОТРАХЕИТ

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Аннотация: *Ушбу мақолада товуқларнинг юқумли ларинготрахеит (ЮЛТ) касаллигининг эпизоотологик ва эпидемиологик аҳамияти, тарихи, қўзғатувчисининг биологик хусусиятлари, патогенези, клиник белгилари ҳамда патологоанатомик ўзгаришлари ёритилган. Шунингдек, касалликни лаборатория усуллари орқали аниқлаш, дифференциал диагностика қилиш, иммунитет ҳосил қилиш ва вакцинациянинг аҳамияти кенг баён этилган. ЮЛТнинг паррандачилик хўжаликларида катта иқтисодий зарар келтириши, маҳсулдорликни пасайтириши ва унинг тарқалишини чеклашда ветеринария-санитария талабларига қатъий амал қилиш муҳимлиги таъкидланган.*

Калит сўзлар: *юқумли ларинготрахеит, товуқлар, вирус, диагностика, эпизоотология, патогенез, вакцинация, иммунитет, профилактика, ветеринария.*

Юқумли ларинготрахеит (ЮЛТ) вирус қўзғатадиган контагиоз касаллик бўлиб, асосан товуқларда учрайди ва йўтал, бўғилиш ҳамда конъюнктивит аломатлари билан кечади.

Юқумли ларинготрахеит АҚШ нинг деярли барча вилоятларида тарқалган. У Жанубий Австралия, Канада, Россия, Украина, Белоруссияда қайд қилинган.

Кейинги ўн йил мобайнида бу касаллик Ўзбекистон ҳудудида ҳам тез-тез учраб, паррандачилик фабрикаларига катта иқтисодий зарар етказиб келмоқда.

Тарихий маълумот. Юқумли ларинготрахеитни биринчи бўлиб Мей ва Шетислерлар 1925 йилда трахеаларингит номи билан тасвирлашган. Бич, Керновен, Бодет ва Гулзонлар эса юқумли бронхит номи билан таърифлаб беришган. Бироқ, Зейфрид 1931 йилда ўтказган гистопатологик илмий текширишлари натижасига кўра бу касалликда паррандаларнинг асосан томоқ ва кекирдаги зарарланиши сабабли унга ларинготрахеит деб ном берган ва ҳозирги кунгача шу ном сақланиб қолган.

Собиқ СССРда юқумли ларинготрахеит касаллигини биринчи бўлиб Р. Т. Батаков 1932 йили кўпчилик хорижий муаллифлар қатори юқумли бронхит номи билан ёзган. Кейинчалик 1934 йилда А. П. Куирмуратов ва К. В. Панченко, 1950 йилда О. А. Полякова, 1954 йилда С. Т. Шенников ва Е. А. Петровскаялар касалликни ларинготрахеит номи остида тасвирлаганлар ва ўрганганлар. 1931 йили паррандалар касалликлари бўйича Америка ассоциациясининг махсус комиссияси «юқумли бронхит» номини «юқумли ларинготрахеит» номига алмаштиришни тавсия қилган.

Юқумли ларинготрахеитни Янги Зеландияда Р. Г. Вебстер (1959), Полшада К. Марек (1948) ва Болгарияда С. Т. Жековлар (1961) мукаммал ўрганишган.

Ларинготрахеит касаллигини ўрганишда 1938-1940 йилларда К. М. Полионов, 1944-1950 йиляарда А.А. Ушаков ва бошқалар ўз ҳиссаларини қўшишган. А. А. Полякова (1951) ва С.Т. Шенников (1962-1967) касалликнинг ўткир, ярим ўткир ва сурункали шаклларини ўрганиб, илмий жиҳатдан асослаб бердилар. З. Я. Чистова (1962) юқумли ларинготрахеит вирусини ажратиб олиш учун ўпка, буйрак ва товуқ эмбриони тўқималаридан тайёрлаб ўстирилган ҳужайраларни ишлатган.

А.Я. Фомина (1963) касалликни аниқлаш учун клоакага юқтириш биосинама усулини тавсия қилган. А. Я. Урушадзе (1964) ЮЛТнинг 2 штамммасини 1-2 кунлик жўжанинг буйрагидан тайёрланган ҳужайраларда ўстирди.

Собиқ СССР да биринчи бўлиб Г.А. Дежава (1963) ларинготрахеит касаллигига диагноз қўйиш учун диффузияли преципитация реакциясини қўллайди. В.Н. Сюрин, М.А. Шесточенко, З.Я. Чистова (1964), Б.К. Қўчқоров (1970) ларинготрахеит касаллигига экспресс диагноз қўйиш учун нурланувчи антителолар усулини муваффақиятли қўлладилар.

Товуқларнинг юқумли ларинготрахеит касаллиги паррандачилик соҳасига катта иқтисодий зарар келтиради. Ўлим ўртача 15 фоизни ташкил этади, айрим муаллифлар (С.Г. Шенников, КиурМуратов ва бошқалар) нинг кузатувига кўра 30 фоиз ва ундан ҳам юқори бўлиши мумкин. Бич маълумотига кўра 60 фоизни ташкил қилади.

Юқумли ларинготрахеитга чалинган товуқларнинг тухум бериши кескин камаяди. Ёш товуқлар 4-6 ойлигида бу касалликка чалинса, бирмунча кеч тухумга киради. Бундан ташқари, тузалиш кескин камаяди, бу айниқса боқувдаги ёш паррандаларда кўзга яққол ташланади.

Бич 1930 йилда юқумли ларинготрахеит касаллиги қўзғатувчиси фильтрланувчи вирус эканлигини аниқлади. У ўзида ДНК тутади. Вирус касалланган

паррандалар томоқ экссудатида ва кекирдагида кўп миқдорда учрайди. Айрим ҳолларда жигари ва талоғида ҳам топилиши мумкин.

Товуқларнинг ларинготрахеит касаллиги вируси элементар таначалари электрон микроскоп остида шарсимон шаклда кўринади (Ватрах ва бошқалар).

Касаллик вируси Беркефельд V ва W бактериал фильтрлардан, Е.К. Зейтц пластикасидан ва мембранали ультратлардан бемалол ўта олади.

ЮЛТ вируси 9-12 кунлик товуқ эмбрионининг хорионаллантоис қатламида ва бирламчи ҳамда қайта экиб ўстирилган ҳужайраларда ўстирилади. Зарарлантирилганидан 3-4 кун кейин цитопатологик ўзгаришлар пайдо қилади. Табиий шароитда юқори вирулентли штаммаларидан ташқари паст вирулентли штаммалари ҳам мавжуд. Қўзғатувчининг ташқи муҳитга чидамлилиги унча юқори эмас. Ўювчи ишқор, крезол, хлорли оҳак, формалинли креолин аралашмасининг (3:1) 1м^3 хона ҳавосидаги 15 мл миқдори вирусни дарҳол ўлдиради. А.А. Закомирдин (1963), О.А. Полякованинг (1951) маълумотига кўра товуқ оқсилида, аввалдан суспензияланган вакуум остида қуритилган кекирдак экссудатида вирус 6-9 кун яшай олади. Янги олинган кекирдак экссудатида 10-24° С ҳароратда 2-7 кунгача, музхона ҳароратида 14-86 кунгача ва 50% ли глицеринда 100 кундан кўпроқ сақланади.

Юқумли ларинготрахеит касаллигига товуқларнинг барча зотлари, лекин уларнинг кенг тарқалган зотлари амалий ишчиларнинг кузатувига кўра (М.А. Артемичев, Зубцова ва бошқалар) бу касалликка кам берилувчан бўлади.

Юқумли ларинготрахеитга доимий носоғлом паррандачилик хўжаликларида кўпинча 25-35 кунлик жўжалар чалинади, 20 кунликдан кичиклари бошқалардан ажратиб парвариш қилинганлиги учун одатда касалликка чалинмайди. Вирус сақловчи суспензияни пуркаб сунъий зарарлантирилганда барча ёшдаги жўжалар касалланади. Бундай хўжаликларда катта ёшдаги товуқлар касалликка кам чалинади.

Бич маълумотига кўра ларинготрахеитга товуқлардан ташқари тустовуқлар ҳам мойил бўлар экан. Паррандалардан ўрдаклар, куркалар, сесарка товуқлар, чумчуқлар, кабутарлар, беданалар, зоғчалар ва қарғалар бу касалликка мойил эмас. Вирус сақловчи материални товуқларнинг клоака шиллиқ пардасига суртганда ёки томоқ, кекирдак, кўзи, бурнига юборилганда ҳам касалликни пайдо қилиш мумкин.

ЮЛТ йилнинг ҳар қандай фаслида учраши ва энзоотик кечиши мумкин. Бу касаллик носоғлом хўжаликларда, ёзда ва куз фаслининг бошларида жўжалар орасида, кузда эса ёш товуқлар орасида кузатилади. Бундай хўжаликларда катта

ёшдаги товуқлар юқумли ларинготрахеит билан касалланмайди, чунки улар жўжалигида касалланиб тузалгани учун организмида вирусга қарши антитело бўлади. Касалликнинг келиб чиқишида ва характерли кечишида организмнинг чидамлилиги ва ташқи муҳитнинг роли бениҳоя катта.

Паррандаларни сақлаш ва озиқлантириш шароитларининг бузилиши (намлик, совуқ, дим ҳаво, антисанитария, сифатсиз озиқлантириш, айниқса озуқада витаминлар етишмаслиги ва бошқалар) улар организмининг чидамлилигини пасайтиради ва катта талофатга сабаб бўлади. Касалликнинг асосий манбаи касал ва касалликдан тузалган, лекин организмида узоқ вақт вирус ташиб юрувчи паррандалар ҳисобланади.

Вирус организмга тушгандан сўнг нафас олиш йулларидаги шиллиқ пардаларнинг эпителиал ҳужайраларига ёпишади ва яллиғланиш жараёнини келтириб чиқаради, яъни ўша жойларда вирус ривожланиб, қизариш ва шиллиқ парданинг бутун қатламида лимфолейкоцитар инфильтрация пайдо қилади, эпителиал ҳужайралар ишдан чиқади, шиш пайдо бўлади ва ўчоқли қон қуйилишлар кузатилади. Бундай ўзгаришлар одатда вирусни организмга юборгандан 24-72 соат кейин рўй беради. Кейинчалик вирус бузилган қон томир деворидан сўрилиб қонга ўтади ва ички аъзоларга тарқалади. Зейфриднинг маълумотига кўра (1931) вирус бу аъзоларда кўзга кўринадиган ўзгаришлар пайдо қилмайди. Касалликнинг кечиши жараёнида томоқ ва кекирдакнинг зарарланишига фақат ларинготрахеит вируси эмас, балки шиш босими, инфильтрланган ҳужайралар, геморрагия ҳамда секундар инфекциянинг таъсири ҳам сабаб бўлади.

Чуқур патологик ўзгаришлар натижасида ҳосил бўлган казеозли тиқинлар фақат нафас йўлларини торайтириб қолмай, уларни бутунлай қоплаб олади. Оқибатда касал паррандалар бўғилиб ўлади.

Касалликнинг яширин даври бир неча кундан бир ойгача, ўртача 4-10 кун давом этади. Касалликнинг клиник белгилари хилма-хил. Унинг ларинготрахеал ва конъюнктивал шакллари бор. ЮЛТ касаллигининг ларинготрахеал шакли одатда ўткир кечади ва қуйидаги белгилар намоён бўлади: касалликнинг дастлабки пайтида иштаҳа пасаяди ёки батамом йуқолади. Касал товуқ ланж бўлади, кам ҳаракат қилади ва кўзини юмиб ўтиради; бу белгилардан сўнг йўтал бошланади, бўғилади, оғзини очиб ва бўйнини юқорига чўзиб, қийналиб нафас олади. Кекирдакда тўпланган кўп миқдордаги экссудат ҳисобига нафас олганда хириллаш эшитилади. Бу кўпинча кечаси тинч пайтида аниқ эшитилиб туради. Касал парранданинг кекирдагини пайпасланса, кучли оғриқ сезади ва йўталади.

Унинг тумшуғини очиб кузатилса, томоқ, шиллиқ пардасининг кучли қизаргани, шишгани, баъзан қон қуйилганлигини кузатамиз. Кекирдак оралиғида қонли шилимшиқ экссудат тўпланганини кўрамиз. Айримларида творогсимон тиқин кузатилади, у кўпинча томоқ тешигини тўла бекитиб қўйганлиги учун касал товуқ нафаси қисилиб ўлади. Агар ўз вақтида ўша тиқин олиб ташланса, товуқ тузалиб кетади. Касаллик одатда 3-10 кун давом этади, агар касал товуқнинг резистентлиги паст бўлса, ўлади. ЮЛТ касаллигининг конъюнктивал шаклини А. П. Киур-Муратов (1934), кейинчалик С.Т. Шеенников, Е. А. Петровская (1955), Ф. Жордан (1958), Б.М. Савич, А.А. Петрушкин, А.С. Малоховалар(1959) кузатишган ва ўрганишган.

Касалликнинг бу шаклида дастлаб бир ёки иккала кўзнинг шиллиқ пардаси қизаради, кўз шакли ўзгариб, узунчоқ бўлиб қолади, кўзнинг ички бурчаклари бўртиб чиқади, шишади, қовоқлари ҳам шишади ва серозли экссудат оқиб туради, кўпикли суюқлик қоплаб олади. Яллиғланиш жараёни тобора чуқурлашиб, кўзнинг учинчи қовоғини жароҳатлайди ва кўз ёпишиб қолади, ёш оқиб туради, ёруғликдан қўрқиш кузатилади ва касал паррандалар ним қоронғи жойларга беркиниб олади. Конъюнктивит узоқ чўзилса, кўзнинг учинчи қовоғида казеозли масса тўпланади. Айрим касал паррандалар кўр бўлиб қолади. Кўп йиллик кузатувлар натижаларига кўра ларинготрахеит касаллигининг конъюнктивал шакли ёш паррандаларда учрайди ва ларинготрахеал шакл билан бирга кечади. Касалликнинг конъюнктивал шакли кўпинча 30-40 кунлик жўжаларда кузатилади ва томоғи ҳамда кекирдаги кам жароҳатланади.

Касалликнинг ларинготрахеал шаклига чалинган товуқларни ёриб кўрганимизда ўзгаришлар асосан томоқ ва кекирдакда эканлиги аниқланади.

Кўп ҳолларда томоқни казеозли тиқин бекитиб қўяди. Уни олиб ташланса, томоқ шиллиқ пардасининг қизаргани, шишгани, йўғонлашгани ва нотекислигини кўрамиз.

Кекирдак шиллиқ пардасининг қизаргани ва унинг ҳамма қисмларида ёки юқори қисмида қон қуйилишларни, кекирдак йўлида ҳар хил миқдордаги шилимшиқ қоили экссудатларни учратамиз.

Ўпка ва унинг бронхларида сезиларли ўзгаришлар бўлмайди. Оғиз шиллиқ пардасида ёки тил томирининг икки томонида ёпишқоқ парда кузатилади. Бироқ шунга ўхшаш ёпишқоқ пардалар авитаминоз «А» касаллигида ҳам кузатилиши сабабли бу ўзгариш характерли ҳисобланмайди. Айрим ҳолларда ингичка ичак, клоака ва фабрициева халтаси шиллиқ пардасининг катарал-геморрагик

яллиғланиши кузатилади. Камдан-кам ҳолларда томоқ сезиларсиз катталашган бўлади. Бироқ бунга ларинготрахеит сабаб эканлиги ҳанузгача аниқланмаган.

Жигар, юрак ва ўпкада микроскопик ўзгаришлар топилмайди. Ҳалқумни казеозли тиқин беркитиб қўйганлиги сабабли бўғилиб ўлган паррандаларни ёриб кўрилганда юрак эпикардида майда геморрагиялар кўзга ташланади.

ЮЛТ касаллигининг конъюнктивал шаклида патологоанатомик ўзгаришлар хусусан жароҳатланган кўзда кузатилади. Унда кўз шиллиқ пардаси қизарган, шишган, иккала кўз қовоғи, учинчи қовоқ ҳам шишган, конъюнктивал халтада казеозли масса тўпланган, айрим ҳолларда кўз қовоғи хираланган ва кўз соққаси бутунлай зарарланган бўлади.

ЮЛТга диагноз эпизоотологик, клиник ва патологоанатомик маълумотлар асосида қўйилади.

35 кунликдан 7-8 ойликгача товуқларнинг касалланиши, касалликни эпизоотик шаклда кечиши, тез тарқалиши, нафас олишнинг бузилиши, яъни йўтал, бўғилиш, томоқ ва кекирдак шиллиқ пардаларининг геморрагик ва катарал яллиғланиши ҳамда ўпка, бронхлар ва бошқа ички аъзоларда деярли ўзгариш бўлмаслиги бу касалликка диагноз қўйишда катта аҳамият касб этади.

Агар юқоридаги усуллар билан диагноз қўйишнинг иложи бўлмаса, лаборатория текшириш усулларини қўллашга тўғри келади. Бунда келтирилган патологик материал бактериологик усуллар ёрдамида текширилиб, бактериал касалликлар истисно қилинади. Сўнгра патологик материалдан 1:5 еки 1:8 нисбатда суспензия тайёрланиб, 30-90 кунлик жўжалар зарарсизлантирилади ва кузатув олиб борилади. Қолган суспензия бактериал фильтрдан ўтказилиб, тозалиги текширилади ва 9-11 кунлик товуқ эмбрионининг хориоаллантоис қатламига юборилади. Агар текшириладиган материалда ЮЛТ вируси бўлса, фильтрланмаган намуна билан кекирдаги зарарлантирилган жўжаларда 3-5 кундан сўнг касаллик аломатлари пайдо бўлади.

Клоакаси зарарлантирилган жўжаларда 3-5-кунлари клоака шиллиқ пардасида қизариш, шиш ва серозли шиллиқ суюқлик ажралиб туриш ҳоллари кузатилади. Зарарланган товуқ эмбрионининг хориоаллантоис пардасида характерли оқ-кулранг тугунчалар пайдо бўлади. ЮЛТга диагноз қўйиш учун касалликка мойил 60 кунлик жўжаларда биосинама ўтказилади.

Унинг усуллари О.А. Полякова (1951), С.Т. Шенников, Е.А. Петровская (1954) ва А.Я. Фоминаларнинг (1963) илмий ишларида батафсил кўрсатилган. С.Т. Шенниковнинг кўрсатишича, ядродаги крипта таначаларини жўжаларни ингратрахеал зарарлантирилгандан 1-5 кун кейин учратиш мумкин. Бироқ

Сюрин (1966) ядроаро крипта таначаларини юқумли ларинготрахеит касаллигининг муҳим кўрсаткичи деб ҳисобламайди, чунки шунга ўхшаш ҳолат чечак, сохта ўлат ва бошқа касалликларда ҳам учраши мумкин. Ҳозирги вақтда товуқларнинг юқумли ларинготрахеит касаллигига ретроспектив диагноз қўйиш учун нейтраллаш, гелда диффузияли преципитация серологик реакциялари муваффақият билан қўлланилмоқда. Ф.М. Бернет 1936 йилда товуқ эмбрионида нейтраллаш реакциясини қўйишни тавсия қилган.

Собиқ Иттифоқда товуқларнинг юқумли ларинготрахеит касаллигига диагноз қўйиш учун диффузияли преципитация реакциясини биринчи бўлиб 1963 йили Лежава қўллаган. 1965 йилда М.Г. Прокофьева ва В.Ф.Бабкиналар ЮЛТ касаллигига диагноз қўйиш учун гемагглютинацияни тўхтатиш реакциясини тавсия қилишган.

Б.К. Қўчқоров (1971) товуқларнинг ЮЛТ вируси антигенини нурланувчи антителолар усули ёрдамида аниқлашни ва бу касалликка ушбу реакция орқали диагноз қўйишни исботлаб берган. Бу усул ниҳоятда юқори специфик экспресс усуллар қаторига киради.

Товуқларнинг юқумли ларинготрахеит касаллигига диагноз қуйишда қуйидаги юқумли ва юқумсиз касалликларни ҳисобга олиш керак.

Ўлат (Нъюкасла касаллиги) эпизоотик кечади, ўлим юқори, ошқозон пардасида узуксимон қон қуйилиш, геморрагия, ичак шиллиқ пардаларининг яраланиши ва ҳамма аъзоларда вирус бўлиши.

Чечак, ЮЛТ дан хусусий терининг жароҳатланиши билан фарқ қилади. Юқумли тумовдан фарқли ўлароқ ЮЛТ да бурундан сувсимон суюқлик оқиб, ҳалқум ва кекирдакнинг жароҳатланиши кузатилмайди.

Юқумли бронхит касаллиги табиий шароитда 1 ойликча бўлган жўжаларда учрайди ва ўпка ҳамда бронхларнинг жароҳатланиши билан кечади. Вирусни деярли ҳамма аъзолардан ажратиш мумкин.

ЮЛТни юқорида кўрсатилган касалликлардан ташқари, авитаминоз «А» сурункали респиратор касалликлар ва сурункали пастереллёз касаллигидан фарқлаш керак.

ЮЛТ касаллигининг олдини олиш мақсадида эмлаш учун касал товуқнинг кекирдак суюқлигидан тайёрланган вирус сақловчи материал ишлатилган. Бироқ бундай материал таркибида вирусдан ташқари юқумли касалликларнинг патоген микроблари ҳам бўлганлиги сабабли ўз ўрнини амалиётдан топа олмади, чунки эмлашдан кейин ҳам касаллик келиб чиққан.

Бодет ва Гузон (1933), Бич бир қатор муаллифлар билан вирус сақловчи материални товуқларнинг клоака шиллиқ пардасига артиш йули билан эмлаш усулини тавсия қилишган.

Собиқ СССРда 1951-1953 йилларда С.Т. Шенников ва Е. А. Петровскаялар томонидан товуқ эмбрионида ўстирилган вирусдан тайёрланган вакцина ларинготрахеитга қарши синаб кўрилган. Бунда эмланган товуқлар организмида иммунитет ҳосил бўлган ва вакцина касалликни бартараф эта олган. Бироқ 4-5 кунликдан ёш касал паррандаларда яхши наф бермаган. Бу ҳолат янги вакцина яратишни тақозо этади ва олимлар ўлдирилган ва аттенуацияланган вирус штаммаларидан хавфсиз вакцина тайёрладилар. Бу вакцинани клоаканинг шиллиқ пардасига махсус шиша таёқча ёрдамида 0,02-0,03 мл миқдорда ишқалаш йўли билан эмланган.

Эмланган жўжаларда иммунитет 10-14 кундан сўнг пайдо бўлиб, ривожланиш давринининг охиригача давом этади.

1971-1972 йилларда А. А. Дмитрева юқумли ларинготрахеит касаллиганинг олдини олиш мақсадида янги экспериментал ВНИИБП вакцинасини яратди. Бу вакцина юқори иммунологик хусусиятга эга ва хавфсиз вакцина бўлиб, ҳозирги кунгача республикамизнинг барча паррандачилик фабрикаларида муваффақиятли қўлланиб келмоқда.

ЮЛТ касаллигининг олдини олиш учун носоғлом хўжаликка паррандалар олиб келмаслик, емиш, тўшама, ривожлантиришда қўлланиладиган предметлар ва асбоб-ускуналарни киритмаслик чораларини кўриш лозим.

ЮЛТ касаллигига қарши курашишда паррандаларни тўғри парвариш қилиш, яъни қуруқ сақлаш, тозаликка риоя қилиш, паррандахоналар ҳароратини нормал ушлаб туриш каби омиллар аҳамияти беқиёсдир. Бундан ташқари, озиқлантиришни тўғри олиб бориш, яъни рационга организм учун керакли оқсил, углевод, минерал ва витаминларга бой озуқаларни киритиш керак. Она товуқларнинг яшаш шароитини яхшилаш ва сифатли озуқалар билан боқиш улардан талабга жавоб берадиган инкубацион тухумлар олишни ва очиб чиққан жўжаларнинг нормал соғлом ривожланишини таъминлайди. Агар хўжаликда, фермада, парранда фабрикасида ларинготрахеит касаллиги пайдо бўлса, карантин эълон қилинади. Зудлик билан касалликнинг тарқалиб кетмаслик ва уни бартараф қилиш тадбирлари кўрилади.

Эпизоотик ҳолат ва хўжалик шароитини ҳисобга олиб, ларинготрахеит касаллигини йуқотиш қуйидаги усуллар билан олиб борилади:

а) соғлом хўжаликларга касалликни тарқатиб юбормаслик учун ветеринария-санитария қоидаларига қатъий риоя қилган ҳолда касал, касалликка шубҳа қилинган ёки носоғлом паррандахоналардаги барча паррандалар гўштга сўйилади;

б) носоғлом ва касалликка хавфли хўжаликлардаги барча шартли соғлом паррандалар ларинготрахеитга қарши вакцина билан эмланади. Улар паррандаларни парвариш қилиш муддатининг охиригача ажратилган ҳолда сақланади. Агар юқоридаги усуллар билан ларинготрахеит касаллигидан соғломлаштиришнинг иложи бўлмаса, 1-2 ойга жўжа очишни тўхтатилади. Бу давр оралиғида инкубатория, носоғлом хўжалик ҳудуди ва паррандахоналар тозалаб дезинфекция қилинади. Бу шароитларда ўстириладиган янги, соғлом паррандалар умрининг охиригача касал паррандалар, носоғлом хўжалик билан бевосита ёки билвосита контактда бўлмаслигини таъминлаш керак. Агар жўжа очиришни тўхтатишнинг иложи бўлмаса, 25-30 кунликдан бошлаб барча паррандалар эмланади. Бу чора самарали ҳисобланиб, деярли барча жўжаларни ларинготрахеитга чалинишдан муҳофаза қилади. Паррандачилик хўжалиги соғломлашгач, чеклаш 30 кундан кейин бекор қилинади.

Хулоса:

Юқумли ларинготрахеит товуқларда учрайдиган юқори контагиоз вирусли касалликлардан бири бўлиб, нафас олиш йўллари ва кўз шиллиқ пардаларида оғир яллиғланиш жараёнларини келтириб чиқаради. Касаллик паррандачилик хўжаликларида юқори иқтисодий зарарга сабаб бўлиб, ўлим кўрсаткичининг ошиши, тухум маҳсулдорлигининг пасайиши ва ёш паррандаларнинг ривожланишдан қолиши билан намоён бўлади.

ЮЛТга ташхис қўйишда эпизоотологик маълумотлар, клиник белгилари, патологоанатомик ўзгаришлар ҳамда вирусологик ва серологик лаборатория текширувлари муҳим аҳамиятга эга. Касалликни Ньюкасл касаллиги, юқумли бронхит, чечак, юқумли тумов ва бошқа респиратор касалликлардан аниқ фарқлай билиш самарали ташхис қўйишнинг асосий шартларидан ҳисобланади.

Касалликнинг олдини олишда биохавфсизлик қоидаларига қатъий риоя қилиш, паррандаларни тўғри парваришлаш ва тўйимли озиқлантириш, санитария-гигиена тадбирларини мунтазам амалга ошириш, носоғлом хўжаликларда карантин чораларини жорий этиш ҳамда хавфли ҳудудларда режали вакцинация ўтказиш энг самарали чоралар ҳисобланади.

Хулоса қилиб айтганда, юқумли ларинготрахеитга қарши курашишда эрта диагностика, замонавий вакцинация дастурлари, ветеринария-санитария

назорати ва фермаларда биохавфсизлик талабларини тўлиқ таъминлаш касаллик тарқалишининг олдини олиш ҳамда паррандачилик тармоғининг барқарор ривожланишини таъминлашда ҳал қилувчи аҳамиятга эга.

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ЗНАЧЕНИЕ ИНТРАРЕНАЛЬНОЙ ГЕМОДИНАМИКИ В АНТЕНАТАЛЬНОЙ ДИАГНОСТИКЕ ОБСТРУКТИВНЫХ УРОПАТИЙ

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Аннотация: Врожденные обструктивные уропатии занимают ведущее место в структуре пренатальной заболеваемости и являются частой причиной развития хронической почечной недостаточности у детей. Рутинная оценка размеров лоханки плода дает высокий процент ложноположительных результатов. Данное исследование демонстрирует, что комплексный анализ морфометрии, амниометрии и 3D-допплерометрии интраренального кровотока позволяет с высокой точностью дифференцировать истинную органическую патологию от транзиторных состояний для выбора верной тактики перинатального ведения.

Ключевые слова: врожденные обструктивные уропатии, пренатальная диагностика, допплерометрия, почечная паренхима, индекс амниотической жидкости.

Введение: Аномалии развития мочевыделительной системы составляют до 30% всех пороков, выявляемых антенатально. Традиционная диагностика, опирающаяся только на выявление пиелоэктазии, часто приводит к необоснованным тревогам и гиперопеке, так как истинная обструкция, требующая хирургической коррекции, подтверждается лишь в пятой части случаев. В связи с этим поиск надежных функциональных предикторов состояния почек плода, таких как оценка интраренального кровотока и состояния паренхимы, приобретает особую актуальность.

Основная часть: Проведено комплексное УЗИ 146 беременных на сроках 22–36 недель. Сформированы две группы: основная (n=61, плоды с подтвержденными обструктивными уропатиями) и контрольная (n=85, норма или транзиторная пиелоэктазия).

Морфометрический анализ выявил, что в основной группе продольный размер почки был достоверно больше (медиана 52,0 мм против 40,0 мм в контроле), как и переднезадний размер лоханки (30,0 мм против 17,0 мм). Однако это увеличение сопровождалось критическим истончением почечной паренхимы: в

основной группе ее толщина составила всего 2,3 мм, тогда как в контрольной — 6,15 мм ($p < 0,017$).

Оценка интраренальной гемодинамики (3D Power Doppler) показала выраженную депрессию кровотока при истинной обструкции. В основной группе индексы васкуляризации (VI), кровотока (FI) и перфузии (VFI) были достоверно снижены. Так, медиана индекса перфузии (VFI) при патологии составила 5,569 против 9,450 в контроле ($p < 0,017$). Дополнительным маркером патологии стало снижение индекса амниотической жидкости в основной группе (10,05 см против 14,71 см в контроле).

Заключение: Истинная обструктивная уропатия плода характеризуется не только дилатацией чашечно-лоханочной системы, но и критическим истончением функциональной ткани почки на фоне достоверного снижения интраренального кровотока. Комплексная оценка структурных изменений паренхимы, индексов объемного кровотока и объема околоплодных вод позволяет еще на антенатальном этапе с высокой точностью подтвердить патологию, избежав гипердиагностики при транзиторных расширениях лоханки, не требующих хирургического вмешательства.

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INKLYUZIV SINFLARDA SAMARALI O‘QITISH STRATEGIYALARI

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Annotatsiya: Ushbu tezis alohida ta'lim ehtiyojlariga ega bo‘lgan va oddiy rivojlanayotgan bolalar birgalikda ta'lim oladigan inklyuziv sinflarda qo‘llaniladigan samarali o‘qitish strategiyalarini o‘rganadi. Tadqiqot inklyuziv ta'lim moslashuvchan o‘qitish usullari, individuallashtirilgan yordam hamda ijobiy ta'lim muhitini talab qilishini ta'kidlaydi. Samarali o‘qitish strategiyalari barcha o‘quvchilarning dars jarayonida faol ishtirok etishiga yordam beradi hamda ularning akademik va ijtimoiy natijalarini yaxshilaydi.

ЭФФЕКТИВНЫЕ СТРАТЕГИИ ОБУЧЕНИЯ В ИНКЛЮЗИВНЫХ КЛАССАХ

Аннотация: Данная работа посвящена изучению эффективных стратегий обучения, применяемых в инклюзивных классах, где совместно обучаются дети с особыми образовательными потребностями и их сверстники без таких потребностей. В исследовании подчеркивается, что инклюзивное образование требует гибких методов обучения, индивидуального подхода и создания благоприятной образовательной среды. Эффективные педагогические стратегии способствуют активному участию всех учащихся в образовательном процессе и улучшают их академические и социальные результаты.

EFFECTIVE TEACHING STRATEGIES IN INCLUSIVE CLASSROOMS

Abstract: This thesis examines effective teaching strategies used in inclusive classrooms where children with and without special educational needs learn together. The study emphasizes that inclusive education requires flexible teaching methods, individualized support, and a positive learning environment. Effective instructional strategies help all learners participate actively in classroom activities and improve their academic and social outcomes.

Keywords: inclusive education, teaching strategies, inclusive classroom, differentiated instruction, special educational needs, active learning.

Inclusive education has become one of the most important directions in modern educational systems. The main purpose of inclusive education is to provide equal learning opportunities for all children regardless of their physical, intellectual, sensory, or emotional differences. In an inclusive classroom, students have diverse abilities, learning styles, and educational needs. Therefore, teachers need to apply effective teaching strategies that support every learner.

Traditional teaching methods are often insufficient in inclusive settings because they do not always consider individual differences. Modern inclusive pedagogy focuses on student-centered learning, active participation, and differentiated instruction. Teachers are expected to create conditions in which each child feels accepted, respected, and motivated to learn.

One of the most effective strategies in inclusive classrooms is **differentiated instruction**. This approach allows teachers to adapt teaching materials, tasks, and assessment methods according to students' abilities and learning needs. For example, some students may receive simplified texts, visual supports, or additional time to complete assignments, while others work with more advanced tasks.

Another important strategy is the use of **visual and interactive methods**. Pictures, charts, graphic organizers, videos, real objects, and digital presentations help students understand information more easily. Visual materials are especially beneficial for children with language difficulties, intellectual disabilities, or attention problems.

Cooperative learning is also widely used in inclusive classrooms. Group activities encourage communication, peer support, and social interaction among students. When children work together, they learn to respect differences, help one another, and develop teamwork skills. Research shows that cooperative learning improves both academic achievement and social adaptation.

Teachers should also provide **individualized support**. Some students may need additional explanations, repeated instructions, physical guidance, or assistive technologies. Close observation of students' progress helps teachers identify difficulties early and provide timely assistance.

A positive and emotionally supportive classroom climate is essential for effective inclusion. Teachers should use encouraging language, recognize students' efforts, and avoid negative comparisons. Classroom rules must promote respect, cooperation, and equal participation.

Assessment in inclusive classrooms should be flexible and continuous. In addition to written tests, teachers can use oral presentations, projects, portfolios, practical tasks, and classroom observations. Such varied assessment methods allow students to

demonstrate their knowledge in different ways. Successful inclusion also depends on collaboration among teachers, special educators, psychologists, speech therapists, and parents. Regular communication helps ensure that educational goals and support strategies are consistent across school and home environments. Despite these effective strategies, teachers may face challenges such as large class sizes, limited resources, insufficient training, and lack of specialized materials. Continuous professional development and institutional support are therefore necessary for improving inclusive teaching practices.

In conclusion, effective teaching strategies play a crucial role in the success of inclusive classrooms. Differentiated instruction, visual and interactive methods, cooperative learning, individualized support, and flexible assessment help meet the diverse needs of students. These strategies not only improve academic achievement but also promote social inclusion, self-confidence, and positive relationships among learners. For inclusive education to be truly effective, teachers must continuously develop their professional skills and create supportive learning environments where every child can succeed.

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КАЧЕСТВА ЖИЗНИ БОЛЬНЫХ КОЛОРЕКТАЛЬНОГО РАКА

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Аннотация: Качество жизни является одним из ключевых критериев оценки эффективности лечения пациентов с колоректальным раком и отражает не только клиническое состояние больного, но и его физическое, психологическое и социальное функционирование. Развитие заболевания, характер противоопухолевого лечения, хирургическое вмешательство и возможные осложнения способны существенно изменять повседневную активность и эмоциональное состояние пациентов. В данной работе рассматриваются основные факторы, определяющие качество жизни больных колоректальным раком на различных этапах заболевания и лечения. Особое внимание уделено влиянию локализации и распространённости опухолевого процесса, хирургического лечения, химиотерапии, лучевой терапии, наличия кишечной дисфункции, болевого синдрома, утомляемости и нарушений питания на физическое и психосоциальное состояние пациентов. Отдельное значение имеет оценка качества жизни с использованием стандартизированных опросников, позволяющих объективизировать субъективные жалобы и отслеживать динамику состояния больного. Комплексный анализ качества жизни способствует более полной оценке результатов лечения и позволяет индивидуализировать медицинскую и реабилитационную помощь.

Ключевые слова: колоректальный рак, качество жизни, онкологические пациенты, физическое функционирование, психологическое состояние, социальная адаптация, хирургическое лечение, химиотерапия, реабилитация, кишечная дисфункция, болевой синдром, оценка качества жизни.

Колоректальный рак является заболеванием, которое оказывает значительное влияние не только на продолжительность жизни пациентов, но и на её качество. Современные методы диагностики и лечения позволяют повысить общую выживаемость больных, однако хирургическое вмешательство,

лекарственная и лучевая терапия могут сопровождаться функциональными нарушениями и побочными эффектами. Поэтому оценка качества жизни рассматривается как важный компонент комплексного ведения пациентов с колоректальным раком. Качество жизни онкологического пациента представляет собой многокомпонентную характеристику, включающую физическое, эмоциональное, когнитивное и социальное функционирование, а также субъективную оценку общего состояния здоровья. У пациентов с колоректальным раком на данные показатели одновременно воздействуют как само заболевание, так и методы его лечения. Выраженность нарушений зависит от стадии опухолевого процесса, локализации новообразования, возраста пациента, наличия сопутствующих заболеваний, характера хирургического вмешательства и последующего противоопухолевого лечения. Одним из наиболее значимых факторов снижения качества жизни является нарушение функции кишечника. После хирургического лечения у части пациентов могут наблюдаться учащённая дефекация, императивные позывы, недержание кала, запоры или диарея. Особенно выраженные функциональные изменения могут возникать после операций на дистальных отделах кишечника. У пациентов с колостомой дополнительные трудности могут быть связаны с необходимостью постоянного ухода за стомой, изменением привычного образа жизни и формированием психологического дискомфорта. Существенное влияние на физическое состояние оказывает болевой синдром. Хроническая или периодическая боль может ограничивать двигательную активность, нарушать сон, снижать работоспособность и способствовать развитию эмоционального напряжения. Кроме того, у больных нередко отмечаются повышенная утомляемость, снижение аппетита, потеря массы тела и нарушения пищевого поведения. Совокупность этих факторов приводит к уменьшению повседневной активности и снижению способности пациента выполнять привычные социальные и профессиональные функции. Противоопухолевое лечение также оказывает существенное влияние на качество жизни. Химиотерапия может сопровождаться тошнотой, рвотой, общей слабостью, изменением вкусовых ощущений, снижением аппетита, периферической нейропатией и другими нежелательными явлениями. Лучевая терапия, особенно при лечении опухолей тазовой локализации, может приводить к нарушениям функции кишечника и мочеполовой системы. Поэтому при оценке результатов лечения необходимо учитывать не только его онкологическую эффективность, но и степень влияния

терапии на повседневную жизнь пациента. Не менее важным компонентом является психологическое состояние больных.

ЗАКЛЮЧЕНИЕ

Качество жизни является важным интегральным показателем состояния пациентов с колоректальным раком и должно рассматриваться как один из основных критериев оценки результатов противоопухолевого лечения. Влияние заболевания на физическое, психологическое и социальное функционирование может сохраняться не только в период активного лечения, но и после завершения основного курса терапии. На качество жизни пациентов существенно влияют локализация и стадия опухолевого процесса, объём хирургического вмешательства, наличие кишечной дисфункции, стомы, болевого синдрома, утомляемости, нарушений питания, а также токсичность химиотерапии и лучевой терапии. Одновременно значимую роль играют тревожность, страх рецидива, изменение образа тела и снижение социальной активности. Использование стандартизированных инструментов оценки, включая EORTC QLQ-C30 и специализированный модуль EORTC QLQ-CR29, позволяет систематически оценивать субъективное состояние пациента, выявлять наиболее выраженные нарушения и отслеживать их динамику на различных этапах лечения. Полученные результаты могут использоваться для индивидуального подбора реабилитационных мероприятий. Таким образом, включение оценки качества жизни в систему комплексного наблюдения за пациентами с колоректальным раком способствует более полной оценке эффективности лечения. Персонализированный подход, предусматривающий медицинскую, нутритивную, физическую и психологическую поддержку, позволяет уменьшить негативные последствия заболевания, повысить функциональную самостоятельность пациентов и улучшить их социальную адаптацию.

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SYNTHESIS, PROPERTIES AND APPLICATIONS OF AGRICULTURAL HYDROGEL

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Abstract. In this research work, agricultural hydrogels were synthesized that maintain soil moisture in agriculture and save water and mineral resources. Hydrogels were synthesized based on starch phosphates, vinyl monomers, urea and natural minerals. The degree of swelling and water retention times of the resulting hydrogel in distilled water and at different pH environments were studied. Also, the physicochemical properties of the synthesized polymer hydrogels were examined using infrared (IR) spectroscopy. The results of the study showed that the natural minerals added during the synthesis of the hydrogel - perlite and apatite - increased its water absorption capacity by 20% and extended the water retention time by 15%. Also, due to moisture retention around the root zone, it reduced total water consumption by 30-35%.

Keywords: hydrogels, natural minerals, modified polysaccharides, urea, water absorption.

Introduction

Today, the rapid growth of the world's population, climate change, the expansion of arid regions, and the depletion of fresh water have made the rational use of water in agriculture and ensuring food security one of the most urgent global problems. A large part of the water used in irrigated agriculture is lost as a result of evaporation, penetration into the deep soil layer, and surface runoff. At the same time, most of the mineral fertilizers are not fully absorbed by plants due to leaching from the soil or conversion into volatile compounds [1-2]. As a result, the efficiency of water and fertilizer use decreases, productivity decreases, and ecological pollution of soil and water bodies is observed. Therefore, the creation of environmentally friendly materials that retain water for a long time, release nutrients in a controlled manner, and are environmentally friendly is one of the urgent issues [3]. Agricultural hydrogels with high water absorption capacity play an important role in solving these problems. Hydrogels have a three-dimensional spatial polymer network, which can absorb

hundreds or even thousands of times more water than their own mass and retain it for a long time. When introduced into the soil, they absorb water during irrigation or precipitation and then gradually release it according to the needs of plant roots. Therefore, hydrogels play an important role in increasing the moisture capacity of the soil, reducing the number of irrigations, preventing fertilizer leaching, and increasing productivity [4]. Currently, superabsorbent hydrogels widely used in industry are synthesized mainly on the basis of polyacrylate, polyacrylamide, and other petroleum products. Despite the high biodegradability of such materials, their biodegradation takes decades, in some cases they can produce toxic decomposition products, and remain in the soil for a long time. In addition, the cost of synthetic raw materials is relatively high, which limits their wide-scale application in agricultural practice [5]. Therefore, there is a need for a new generation of hydrogels based on renewable, biodegradable and environmentally friendly natural polysaccharides. Among natural polysaccharides, starch is distinguished by its low cost, widespread availability, renewable, biodegradable and non-toxic properties. The large number of hydroxyl groups in the starch molecule allows it to undergo various chemical modifications and undergo polymerization reactions with vinyl monomers. However, the low water resistance, insufficient mechanical strength and rapid degradation of natural starch limit its use as a superabsorbent material. Therefore, many scientific studies have been conducted to improve its physicochemical properties through chemical modification of starch, in particular, phosphating, acetylation, carboxymethylation and oxidation. In particular, starch phosphates are characterized by high hydrophilicity, good thermal stability and high activity in polymerization reactions [6]. In recent years, much scientific research has been carried out to further improve the functional properties of hydrogels by adding natural mineral fillers to their composition. Minerals such as zeolite, bentonite, montmorillonite, kaolin, perlite and apatite have the property of strengthening the polymer matrix, increasing porosity, improving water retention capacity and adsorbing fertilizer ions. Perlite has a highly porous structure, which creates additional water channels in the hydrogel and promotes rapid water absorption. Apatite, as a natural calcium phosphate mineral, not only mechanically strengthens the hydrogel, but also acts as a source of phosphorus [7]. As a result, such hydrogels have the ability to simultaneously store moisture for a long time and gradually release nutrients. In addition, natural minerals reduce the cost of the finished product and increase its environmental safety by partially reducing the amount of expensive monomers in the polymer.

Experimental part. 10 grams of starch phosphate were placed in a three-necked flask, 90 ml of distilled water was added to it, and the mixture was stirred at 70 °C for 30 minutes using a magnetic stirrer. This formed a homogeneous dispersion of starch phosphate. Then, the system was cooled to 30 °C, and nitrogen gas was introduced for 15 minutes to remove oxygen from the solution. In a separate container, 18 g of acrylic acid was diluted with 20 ml of distilled water and stirred in an ice bath. Then, 8.4 g of potassium hydroxide (KOH) was dissolved in 20 ml of distilled water and added dropwise to the acrylic acid solution. As a result, 60% of the acrylic acid was neutralized, forming potassium acrylate. The solution temperature was not exceeded 30 °C during the neutralization. 9 g of acrylamide and 3 g of urea were added to the neutralized acrylic acid solution and mixed until all components were completely dissolved. The prepared monomer solution was slowly added dropwise to the starch phosphate dispersion and the system was stirred at 350 rpm for 20 minutes. Then, 1.5 grams of perlite and apatite, pre-washed, dried at 90 °C for 5 hours and crushed to a particle size of less than 100 μm, were mixed in 20 ml of distilled water for 15 minutes. The resulting mineral suspension was added to the reaction mixture and stirred for another 15 minutes to evenly distribute the minerals in the polymer medium. In the next step, 0.06 g of N,N′-methylenebisacrylamide (MBA) was dissolved in 10 ml of distilled water and added to the reaction system. Then 0.20 g of potassium persulfate (KPS) was dissolved in 5 ml of distilled water and introduced into the mixture as an initiator. After the addition of the initiator, the reaction medium was immediately heated to 65 ± 2 °C and the free radical polymerization reaction was carried out for 3 hours under a nitrogen atmosphere. The IR spectrum of the synthesized hydrogel was studied in the range of 4000–500 cm^{-1}. The absorption bands observed in the spectrum confirm the reaction of the organic polymer matrix and mineral components in the hydrogel. The broad absorption bands observed in the regions of 3356.14 and 3280.92 cm^{-1} correspond to the valence vibrations of the hydroxyl (–OH) groups in starch phosphate and the amine ($–NH_2$) groups in acrylamide and urea. The broad and intense appearance of this band indicates the formation of strong intermolecular hydrogen bonds between the polymer chains and the functional groups on the surface of the mineral particles. The intense absorption bands observed at 1687.71 and 1639.49 cm^{-1} are attributed to the deformation vibrations of the carbonyl (C=O) molecules in acrylamide and urea. At the same time, the observation of the vinyl (C=C) bond characteristic of acrylamide and acrylic acid indicates that the monomers have almost completely reacted during the copolymerization process and a three-dimensional polymer network has been formed. The absorption bands in the 1556.27 and 1508.33

cm^{-1} regions are associated with the asymmetric stretching vibrations of the carboxylate ($–COO^-$) groups and amide II (N–H deformation and C–N stretching vibration). The joint observation of the 1556 and 1396 cm^{-1} bands indicates that a significant part of the –COOH groups in the poly(acrylic acid) chains have been converted to the $–COO^-$ form. This confirms that partial neutralization of acrylic acid results in the formation of ionized carboxylate groups in the polymer. These ionized groups increase the electrostatic repulsion force within the polymer network, providing the hydrogel with high water absorption properties.

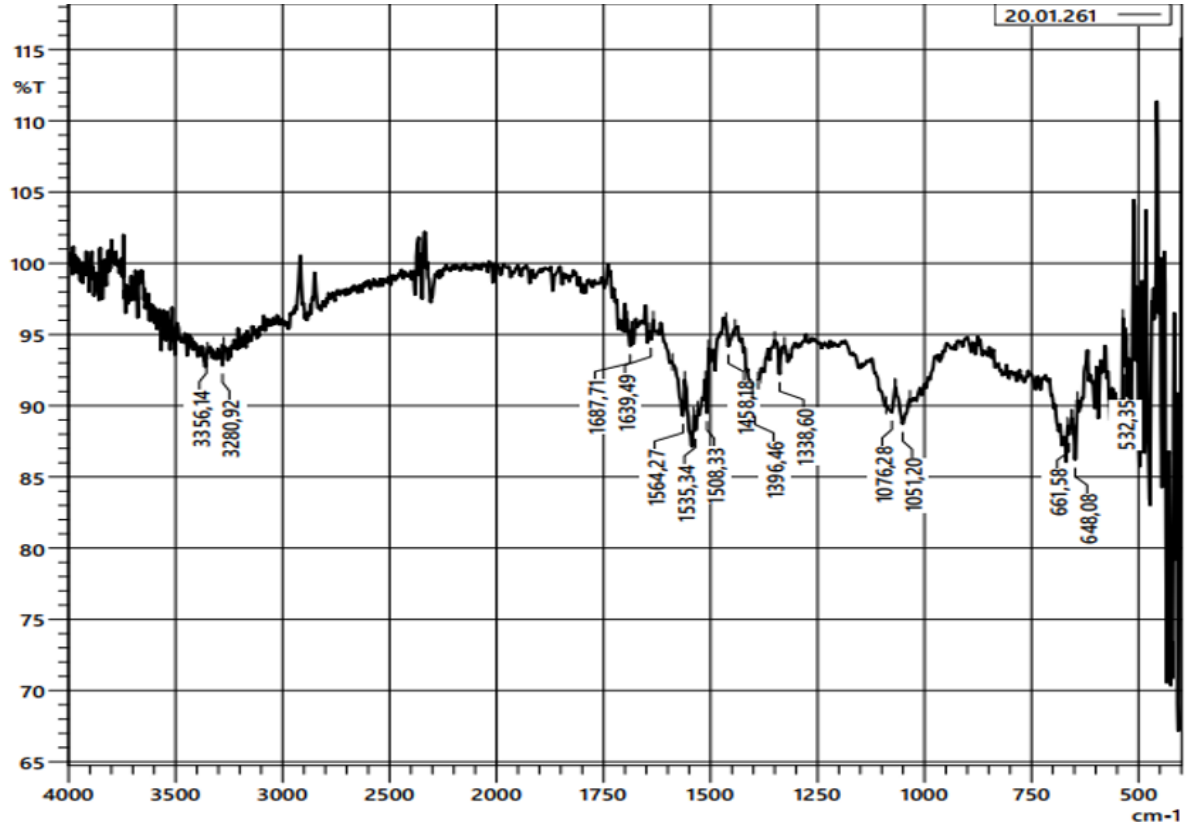


Figure 1. IR of superabsorbent hydrogel starch phosphate-(acrylic acid-acrylamide)/urea/perlite/apatite.

The appearance of the absorption band at 1338.60 cm^{-1} is associated with the vibrations of the C–N and N–H groups in acrylamide and urea, confirming the presence of cross-links between the polymer chains formed by N,N′-methylenebisacrylamide. The vibrations of the Si–O–Si bonds in perlite were also observed in this region, which led to the broadening and increase in intensity of the band. This indicates the successful immobilization of perlite particles into the polymer matrix and the presence of strong physicochemical interactions between the organic and mineral phases. The IR results confirm the successful synthesis of the starch phosphate-(acrylic acid-acrylamide)/urea/perlite/apatite-based hydrogel.

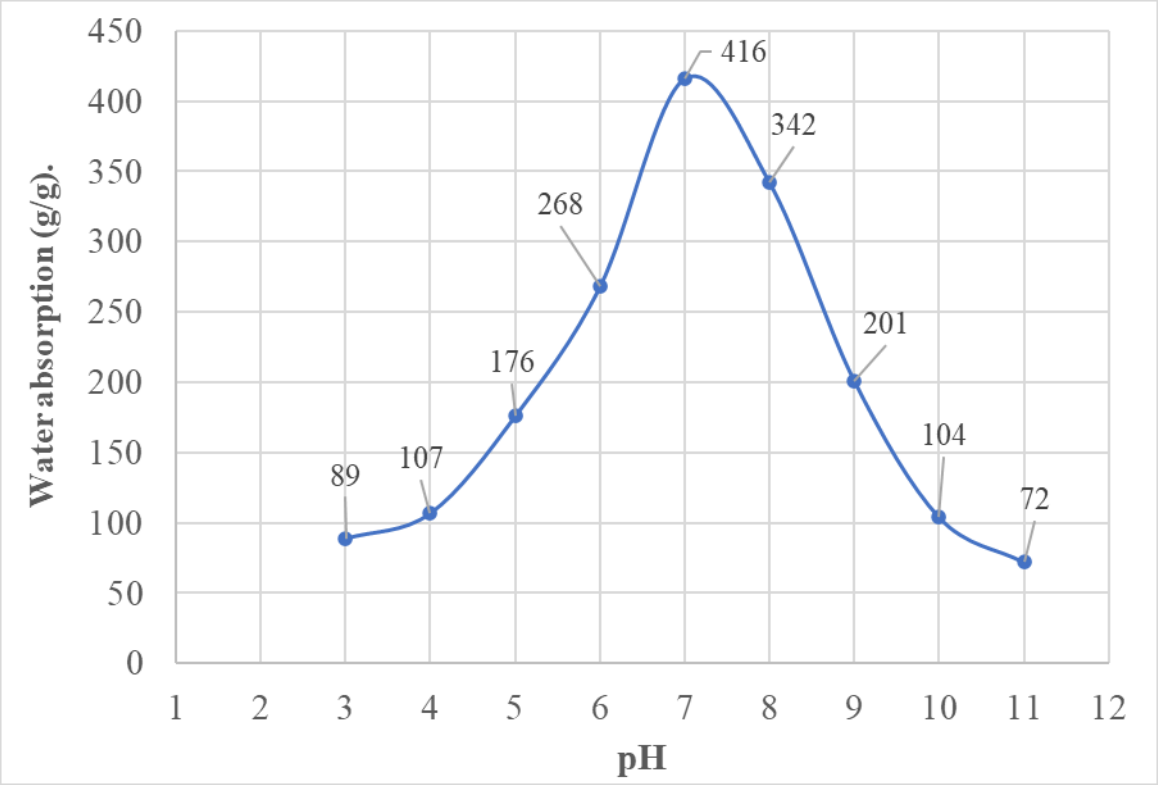


Figure 2. Analysis of the water absorption properties of the hydrogel in different pH environments.

The results showed that the hydrogel is a pH-sensitive material. As can be seen from the graph, the permeability of the hydrogel initially increases with increasing pH, reaches a high value in a neutral environment, and then decreases sharply.

Conclusions.

IR spectral analysis confirmed the successful completion of the copolymerization process and the presence of interactions between the polymer matrix and mineral particles. This distribution of mineral components created a microstructure favorable for the diffusion of water molecules into the polymer network. In addition, the hydrogel exhibited pH-sensitive properties, achieved maximum water absorption in a neutral environment, and maintained high operational stability during repeated swelling-drying cycles. These properties allow the material to be used in agriculture as a superabsorbent material to maintain soil moisture, save water, and increase the water storage capacity of saline and arid soils.

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INNOVATSION PEDAGOGIK TEXNOLOGIYALAR ASOSIDA BO‘LAJAK BOSHLANG‘ICH SINF O‘QITUVCHILARINING KASBIY KOMPETENSIYALARINI RIVOJLANTIRISH METODIKASINI TAKOMILLASHTIRISH

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Annotatsiya. *Mazkur tezisda innovatsion pedagogik texnologiyalar asosida bo‘lajak boshlang‘ich sinf o‘qituvchilarining kasbiy kompetensiyalarini rivojlantirish metodikasini takomillashtirish masalalari yoritilgan. Zamonaviy pedagogik texnologiyalar, kompetensiyaviy yondashuv va raqamli ta’lim vositalarining bo‘lajak pedagoglarning kasbiy tayyorgarligini oshirishdagi o‘rni tahlil qilingan. Shuningdek, interfaol metodlar va amaliy mashg‘ulotlarni ta’lim jarayoniga integratsiya qilishning samaradorligi asoslab berilgan.*

Kalit so‘zlar: *innovatsion pedagogik texnologiyalar, kasbiy kompetensiya, boshlang‘ich ta’lim, bo‘lajak o‘qituvchi, kompetensiyaviy yondashuv, interfaol metodlar, raqamli ta’lim, pedagogik mahorat.*

Bugungi kunda dunyo ta’lim tizimida yuz berayotgan jadal o‘zgarishlar, raqamli transformatsiya jarayonlari va innovatsion iqtisodiyotning rivojlanishi pedagog kadrlarni tayyorlash mazmuni hamda sifatiga yangi talablarni qo‘ymoqda. Ta’limning asosiy maqsadi endilikda faqat nazariy bilimlarni o‘rgatish bilan cheklanmay, balki ta’lim oluvchilarda XXI asr kompetensiyalarini shakllantirish, ularni mustaqil fikrlaydigan, ijodkor, tashabbuskor va zamonaviy texnologiyalarni samarali qo‘llay oladigan mutaxassis sifatida tayyorlashdan iboratdir. Ushbu vazifalarni amalga oshirishda pedagog kadrlarning kasbiy kompetensiyasi hal qiluvchi omil hisoblanadi.
Boshlang‘ich ta’lim uzluksiz ta’lim tizimining eng muhim bosqichi bo‘lib, aynan shu davrda o‘quvchilarning bilim olishga bo‘lgan qiziqishi, mustaqil fikrlash qobiliyati, muloqot madaniyati va shaxsiy fazilatlari shakllanadi. Shu sababli boshlang‘ich sinf o‘qituvchisining kasbiy mahorati, metodik tayyorgarligi va innovatsion faoliyatga tayyorligi ta’lim sifatini belgilovchi asosiy omillardan biri sanaladi. Zamonaviy boshlang‘ich sinf o‘qituvchisi pedagogik jarayonni samarali tashkil etish bilan bir qatorda, o‘quvchilarning individual xususiyatlarini hisobga olgan holda innovatsion

pedagogik texnologiyalarni qo‘llay olishi, raqamli ta’lim vositalaridan unumli foydalanishi va ta’lim jarayonini kompetensiyaviy yondashuv asosida tashkil eta olishi zarur.

Mamlakatimizda ta’lim sohasini tubdan isloh qilish, pedagog kadrlar tayyorlash sifatini xalqaro standartlar darajasiga olib chiqish hamda oliy ta’lim tizimini modernizatsiya qilish bo‘yicha keng ko‘lamli islohotlar amalga oshirilmoqda. Pedagogika oliy ta’lim muassasalari oldiga zamonaviy pedagogik texnologiyalarni puxta egallagan, kasbiy kompetensiyalari rivojlangan, kreativ va raqobatbardosh mutaxassislarni tayyorlash vazifasi qo‘yilgan. Bu esa bo‘lajak boshlang‘ich sinf o‘qituvchilarining kasbiy kompetensiyalarini rivojlantirish metodikasini takomillashtirishni taqozo etadi.

Kasbiy kompetensiya pedagogning nazariy bilimlari, amaliy ko‘nikmalari, kasbiy qadriyatlari, kommunikativ madaniyati, pedagogik tafakkuri va innovatsion faoliyatni amalga oshirish qobiliyatining uyg‘unlashgan tizimi hisoblanadi. Boshlang‘ich sinf o‘qituvchisi uchun mazkur kompetensiyalarni shakllantirish ayniqsa muhim, chunki u ta’limning dastlabki bosqichida o‘quvchilarning intellektual va shaxsiy rivojlanishiga bevosita ta’sir ko‘rsatadi. Shu bois pedagoglarni tayyorlash jarayonida kasbiy kompetensiyalarni rivojlantirishga yo‘naltirilgan zamonaviy metodikalarni ishlab chiqish va amaliyotga tatbiq etish dolzarb ilmiy-amaliy masala hisoblanadi.

Innovatsion pedagogik texnologiyalar ta’lim jarayonining mazmuni, shakli va metodlarini yangilashga xizmat qiluvchi samarali vosita sifatida e’tirof etiladi. Xususan, interfaol ta’lim metodlari, loyiha asosida o‘qitish (Project Based Learning), muammoli ta’lim (Problem Based Learning), hamkorlikda o‘qitish, mikrodars (Microteaching), raqamli ta’lim platformalari, elektron portfolio va sun’iy intellekt elementlaridan foydalanish bo‘lajak pedagoglarning kasbiy tayyorgarligini sezilarli darajada oshiradi. Ushbu texnologiyalar talabalarda mustaqil ta’lim olish, tanqidiy va kreativ fikrlash, muammolarni tahlil qilish, jamoada ishlash hamda pedagogik qarorlar qabul qilish kompetensiyalarini shakllantirishga xizmat qiladi.

Bo‘lajak boshlang‘ich sinf o‘qituvchilarining kasbiy kompetensiyalarini rivojlantirish faqat auditoriya mashg‘ulotlari bilan cheklanib qolmaydi. Ushbu jarayon nazariy ta’lim, pedagogik amaliyot, ilmiy-tadqiqot faoliyati, mustaqil ta’lim va raqamli ta’lim muhitining uzviy integratsiyasini talab etadi. Ayniqsa, pedagogik amaliyot davomida innovatsion texnologiyalarni qo‘llash talabalarning nazariy bilimlarini real ta’lim jarayonida sinovdan o‘tkazish, metodik mahoratini rivojlantirish va kasbiy faoliyatga moslashuvini ta’minlashda muhim ahamiyat kasb etadi.

Bugungi kunda pedagogik oliy ta’lim muassasalarida innovatsion pedagogik texnologiyalardan foydalanish bo‘yicha qator ilmiy tadqiqotlar amalga oshirilayotgan bo‘lsa-da, ularni aynan bo‘lajak boshlang‘ich sinf o‘qituvchilarining kasbiy kompetensiyalarini kompleks rivojlantirish metodikasi bilan uyg‘unlashtirish masalalari yetarli darajada o‘rganilmagan. Shuningdek, innovatsion pedagogik texnologiyalarni kasbiy kompetensiyalarni shakllantirishning mazmuni, bosqichlari, metodlari va baholash mezonlari bilan integratsiyalash bo‘yicha ilmiy asoslangan tavsiyalarga ehtiyoj mavjud.

Shu nuqtai nazardan, innovatsion pedagogik texnologiyalar asosida bo‘lajak boshlang‘ich sinf o‘qituvchilarining kasbiy kompetensiyalarini rivojlantirish metodikasini takomillashtirish pedagogika nazariyasi va amaliyotining dolzarb yo‘nalishlaridan biri hisoblanadi. Mazkur tadqiqotning maqsadi innovatsion pedagogik texnologiyalarning kasbiy kompetensiyalarni rivojlantirishdagi imkoniyatlarini tahlil qilish, ularni pedagogik ta’lim jarayoniga samarali integratsiyalash hamda bo‘lajak boshlang‘ich sinf o‘qituvchilarining kasbiy tayyorgarligini takomillashtirish bo‘yicha ilmiy-amaliy tavsiyalar ishlab chiqishdan iborat.

Bo‘lajak boshlang‘ich sinf o‘qituvchilarining kasbiy kompetensiyalarini rivojlantirish masalasi pedagogika fanining ustuvor tadqiqot yo‘nalishlaridan biri hisoblanadi. Jahon pedagogika ilmida kasbiy kompetensiyani shakllantirish, innovatsion pedagogik texnologiyalarni ta’lim jarayoniga integratsiyalash hamda bo‘lajak pedagoglarning kasbiy tayyorgarligini takomillashtirishga oid ko‘plab ilmiy izlanishlar olib borilgan. Ushbu tadqiqotlar pedagogik ta’limning mazmunini yangilash, ta’lim sifati va samaradorligini oshirish hamda zamonaviy o‘qituvchining kasbiy faoliyatiga qo‘yiladigan talablarni aniqlashda muhim nazariy asos bo‘lib xizmat qiladi.

Kasbiy kompetensiya tushunchasi dastlab xorijiy pedagogika va psixologiya fanlarida shakllangan bo‘lib, u mutaxassisning kasbiy faoliyatni samarali amalga oshirish uchun zarur bo‘lgan bilim, ko‘nikma, malaka, shaxsiy sifat va qadriyatlar majmui sifatida talqin etiladi. Zamonaviy ilmiy qarashlarda kompetensiya nafaqat nazariy bilimlarni egallash, balki ularni amaliy faoliyatda qo‘llay olish, muammoli vaziyatlarni tahlil qilish, mustaqil qaror qabul qilish va o‘z faoliyatini refleksiya qilish qobiliyatini ham qamrab oladi.

Xorijiy olimlar tomonidan olib borilgan tadqiqotlarda bo‘lajak o‘qituvchilarning kasbiy kompetensiyalarini rivojlantirishning nazariy asoslari keng yoritilgan. Jumladan, J. Dewey ta’limni hayot bilan uzviy bog‘lash, o‘quvchini faol subyekt sifatida shakllantirish va tajribaga asoslangan o‘qitish g‘oyalarini ilgari surgan. Uning fikricha, pedagogning kasbiy rivojlanishi real pedagogik vaziyatlarda faol ishtirok

etish orqali amalga oshadi. Ushbu yondashuv bugungi kunda loyiha asosida o‘qitish, muammoli ta’lim va amaliy mashg‘ulotlarni tashkil etishda o‘z aksini topmoqda.

L.S. Vigotskiy tomonidan ishlab chiqilgan ijtimoiy-madaniy rivojlanish nazariyasi ham bo‘lajak pedagoglarni tayyorlashda muhim metodologik asos hisoblanadi. Olim ta’lim jarayonida hamkorlik, muloqot va refleksiv faoliyatning ustuvorligini asoslab bergan. Uning "yaqin rivojlanish zonasi" konsepsiyasi bo‘lajak o‘qituvchilarning kasbiy kompetensiyalarini bosqichma-bosqich rivojlantirishda ilmiy asos vazifasini bajaradi.

A.V. Xutorskoy kompetensiyaviy yondashuvni zamonaviy ta’limning asosiy paradigmasi sifatida baholab, pedagogni kasbiy vazifalarni mustaqil hal eta oladigan, kreativ fikrlovchi va innovatsion faoliyat yurita oladigan mutaxassis sifatida tavsiflaydi. Uning ilmiy qarashlariga ko‘ra, pedagogik ta’lim natijasi talabaning egallagan bilimlari bilan emas, balki ularni amaliy faoliyatda samarali qo‘llash darajasi bilan belgilanadi.

So‘nggi yillarda innovatsion pedagogik texnologiyalarni ta’lim jarayoniga joriy etish masalalari ham keng tadqiq qilinmoqda. Xususan, loyiha asosida o‘qitish (Project Based Learning), muammoli ta’lim (Problem Based Learning), hamkorlikda o‘qitish (Collaborative Learning), teskari sinf (Flipped Classroom), mikrodars (Microteaching), elektron portfolio va raqamli ta’lim platformalaridan foydalanish bo‘lajak o‘qituvchilarning kasbiy kompetensiyalarini rivojlantirishning samarali vositalari sifatida e’tirof etilgan. Ushbu texnologiyalar talabalarning mustaqil ta’lim olish, ijodiy fikrlash, axborotni tahlil qilish va zamonaviy pedagogik muammolarni hal etish ko‘nikmalarini rivojlantirishga xizmat qiladi.

UNESCO tomonidan ishlab chiqilgan pedagoglar uchun axborot-kommunikatsiya texnologiyalari kompetensiyalari bo‘yicha tavsiyalar zamonaviy pedagogning raqamli kompetensiyasini shakllantirishga alohida e’tibor qaratadi. Mazkur hujjatga ko‘ra, pedagog o‘quv jarayonida raqamli texnologiyalarni maqsadli qo‘llashi, ta’lim resurslarini yaratishi, elektron ta’lim muhitini tashkil etishi va innovatsion pedagogik yondashuvlarni amaliyotga tatbiq eta olishi zarur.

O‘zbekiston pedagog olimlari tomonidan ham innovatsion pedagogik texnologiyalarni joriy etish va bo‘lajak pedagoglarning kasbiy kompetensiyalarini rivojlantirish masalalari keng tadqiq etilgan. N. Saidahmedov pedagogik texnologiyalarni ta’lim samaradorligini oshirishning muhim omili sifatida baholab, interfaol metodlarning afzalliklarini ilmiy jihatdan asoslab bergan. R. Ishmuhamedov ta’limda innovatsion texnologiyalarni qo‘llash orqali talabalarning mustaqil fikrlashini rivojlantirish, ularni ijodiy faoliyatga yo‘naltirish va kasbiy tayyorgarlik sifatini oshirish mumkinligini

ta’kidlaydi. B.X. Xodjayev esa kompetensiyaviy yondashuv asosida pedagog kadrlarni tayyorlashning nazariy va amaliy jihatlarini yoritib, bo‘lajak o‘qituvchilarning kasbiy kompetensiyalarini rivojlantirishda shaxsga yo‘naltirilgan ta’limning ustuvorligini asoslaydi.

Tahlil qilingan ilmiy manbalar shuni ko‘rsatadiki, innovatsion pedagogik texnologiyalarni ta’lim jarayoniga joriy etish bo‘yicha ko‘plab ilmiy tadqiqotlar amalga oshirilgan bo‘lsa-da, ularni aynan bo‘lajak boshlang‘ich sinf o‘qituvchilarining kasbiy kompetensiyalarini rivojlantirish metodikasi bilan kompleks bog‘liq holda o‘rganishga qaratilgan tadqiqotlar yetarli darajada emas. Xususan, kasbiy kompetensiyalarni shakllantirishning mazmuni, bosqichlari, innovatsion metodlari, baholash mezonlari va pedagogik shart-sharoitlarini yagona metodik tizim sifatida ishlab chiqish masalalari qo‘shimcha ilmiy izlanishlarni talab qiladi.

Shu bois innovatsion pedagogik texnologiyalar asosida bo‘lajak boshlang‘ich sinf o‘qituvchilarining kasbiy kompetensiyalarini rivojlantirish metodikasini takomillashtirish, ta’limning nazariy va amaliy jihatlarini uyg‘unlashtirish, zamonaviy pedagogik texnologiyalarni kasbiy tayyorgarlik jarayoniga samarali integratsiya qilish hamda pedagoglarning raqobatbardoshligini oshirish bugungi pedagogika fanining dolzarb ilmiy yo‘nalishlaridan biri hisoblanadi.

Tadqiqot jarayonida bo‘lajak boshlang‘ich sinf o‘qituvchilarining kasbiy kompetensiyalarini rivojlantirishda innovatsion pedagogik texnologiyalarning imkoniyatlari nazariy va amaliy jihatdan tahlil qilindi. Tahlillar shuni ko‘rsatdiki, an’anaviy ta’lim metodlari talabalarda zarur kasbiy kompetensiyalarni to‘liq shakllantirish imkonini bermaydi. Natijada talabalar nazariy bilimlarga ega bo‘lsalar-da, ularni amaliy pedagogik faoliyatda qo‘llash, pedagogik vaziyatlarni tahlil qilish, zamonaviy axborot texnologiyalaridan foydalanish va mustaqil qaror qabul qilishda ayrim qiyinchiliklarga duch keladilar.

Shu bois tadqiqot doirasida innovatsion pedagogik texnologiyalar asosida bo‘lajak boshlang‘ich sinf o‘qituvchilarining kasbiy kompetensiyalarini rivojlantirishning metodik modeli ishlab chiqildi. Mazkur model bo‘lajak pedagoglarni tayyorlash jarayonining maqsadi, mazmuni, metodlari, vositalari va natijalarini yagona tizim asosida tashkil etishga xizmat qiladi.

Taklif etilgan metodik model beshta o‘zaro bog‘liq komponentdan iborat:

- ✓ **Maqsadli komponent** – bo‘lajak boshlang‘ich sinf o‘qituvchilarida zamonaviy kasbiy kompetensiyalarni shakllantirish hamda ularni innovatsion pedagogik faoliyatga tayyorlash.

✓ **Mazmuniy komponent** – pedagogika, psixologiya, metodika, axborot-kommunikatsiya texnologiyalari va pedagogik innovatsiyalar bo‘yicha bilimlarni integratsiyalash.

✓ **Texnologik komponent** – interfaol metodlar, loyiha asosida o‘qitish (Project Based Learning), muammoli ta’lim (Problem Based Learning), mikrodars (Microteaching), raqamli ta’lim platformalari va elektron portfolio texnologiyalarini qo‘llash.

✓ **Diagnostik komponent** – talabalarning kasbiy kompetensiyalarini muntazam monitoring qilish, refleksiya va o‘z-o‘zini baholash mexanizmlarini joriy etish.

✓ **Natijaviy komponent** – zamonaviy pedagogik faoliyatni samarali tashkil eta oladigan, kreativ fikrlovchi va raqobatbardosh boshlang‘ich sinf o‘qituvchisini shakllantirish.

Mazkur modelni amaliyotga joriy etishda ta’lim jarayoni bosqichma-bosqich tashkil etilishi tavsiya etiladi. Dastlab talabalar kasbiy qiziqishlari va mavjud kompetensiyalari diagnostika qilinadi. Keyingi bosqichda innovatsion pedagogik texnologiyalar asosida o‘quv mashg‘ulotlari tashkil etilib, ularda muammoli vaziyatlarni tahlil qilish, kichik guruhlarda ishlash, loyiha tayyorlash va mikrodarslar o‘tkazishga alohida e’tibor qaratiladi. Yakuniy bosqichda esa pedagogik amaliyot, elektron portfolio va refleksiya orqali egallangan kompetensiyalar baholanadi.

Tadqiqot natijalari innovatsion pedagogik texnologiyalardan tizimli foydalanish quyidagi kasbiy kompetensiyalarni samarali rivojlantirishini ko‘rsatdi:

- pedagogik kompetensiya;
- metodik kompetensiya;
- kommunikativ kompetensiya;
- raqamli kompetensiya;
- kreativ kompetensiya;
- refleksiv kompetensiya;
- tadqiqotchilik kompetensiyasi;
- ijtimoiy hamkorlik kompetensiyasi.

Ushbu kompetensiyalarning rivojlanishi talabalarning pedagogik faoliyatga bo‘lgan qiziqishini kuchaytiradi, ularning kasbiy motivatsiyasini oshiradi hamda mustaqil ta’lim olish ko‘nikmalarini shakllantiradi. Ayniqsa, loyiha asosida o‘qitish va mikrodars texnologiyasi talabalarni darsni rejalashtirish, ta’lim metodlarini tanlash, o‘quvchilar faoliyatini boshqarish va ta’lim natijalarini baholash bo‘yicha muhim amaliy tajriba bilan ta’minlaydi.

Raqamli ta’lim vositalarining qo‘llanilishi ham bo‘lajak o‘qituvchilarning kasbiy rivojlanishiga sezilarli ta’sir ko‘rsatadi. Moodle, Google Classroom, Microsoft Teams, Quizizz, Kahoot, Padlet va Canva kabi platformalar orqali talabalarda axborotni izlash, qayta ishlash, elektron ta’lim resurslarini yaratish va masofaviy ta’limni tashkil etish ko‘nikmalari rivojlanadi. Bu esa ularning raqamli kompetensiyasini mustahkamlash bilan bir qatorda zamonaviy maktab sharoitida samarali faoliyat yuritish imkoniyatlarini kengaytiradi.

Tahlillar shuni ko‘rsatdiki, innovatsion pedagogik texnologiyalar asosida tashkil etilgan ta’lim jarayoni talabalarning dars mashg‘ulotlaridagi faolligini oshiradi, kasbiy muammolarni mustaqil hal etish ko‘nikmalarini rivojlantiradi hamda ijodiy fikrlash qobiliyatini shakllantiradi. Shuningdek, refleksiv faoliyat va elektron portfolio yordamida talabalar o‘z kasbiy rivojlanishini tahlil qilish, mavjud kamchiliklarni aniqlash va ularni bartaraf etish imkoniyatiga ega bo‘ladilar.

Tadqiqot natijalari asosida bo‘lajak boshlang‘ich sinf o‘qituvchilarining kasbiy kompetensiyalarini rivojlantirish samaradorligini oshirish uchun quyidagi pedagogik shart-sharoitlar muhim ekanligi aniqlandi:

- ✓ innovatsion pedagogik texnologiyalarni o‘quv jarayoniga tizimli integratsiya qilish;
- ✓ nazariy ta’lim va pedagogik amaliyotning uzviyligini ta’minlash;
- ✓ interfaol ta’lim metodlaridan muntazam foydalanish;
- ✓ raqamli ta’lim muhitini kengaytirish;
- ✓ elektron portfolio va refleksiv baholash mexanizmlarini joriy etish;
- ✓ talabalarning mustaqil ta’lim faoliyatini qo‘llab-quvvatlash;
- ✓ pedagogik hamkorlik va mentorlik tizimini rivojlantirish.

Umuman olganda, olib borilgan tahlillar innovatsion pedagogik texnologiyalar asosida ishlab chiqilgan metodika bo‘lajak boshlang‘ich sinf o‘qituvchilarining kasbiy kompetensiyalarini rivojlantirishda yuqori samaradorlikka ega ekanligini ko‘rsatdi. Mazkur metodikani pedagogika oliy ta’lim muassasalari o‘quv jarayoniga joriy etish bo‘lajak pedagoglarning kasbiy tayyorgarligini takomillashtirish, ta’lim sifati va samaradorligini oshirish hamda zamonaviy ta’lim tizimi uchun raqobatbardosh mutaxassislarni tayyorlashga xizmat qiladi.

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EFFECTIVE METHODS OF WEIGHT REDUCTION IN WOMEN OF REPRODUCTIVE AGE

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Abstract
This thesis analyzes modern and effective methods for reducing excess body weight and obesity in women of reproductive age. Excess body weight may have a negative impact on reproductive health, metabolic processes, and the hormonal status of women. In the study, body mass index (BMI), waist circumference, dietary patterns, and the level of physical activity were considered as the main assessment criteria.
Keywords: reproductive age, women, excess body weight, obesity, body mass index, waist circumference.

Introduction

Today, excess body weight and obesity are among the most widespread metabolic problems worldwide and have a particularly significant impact on women's health. Especially during the reproductive period, excessive body weight not only increases the risk of cardiovascular and metabolic diseases but may also contribute to menstrual disorders, alterations in ovulation, insulin resistance, and complications associated with pregnancy.

The development of excess body weight is influenced by high-calorie and unbalanced nutrition, a sedentary lifestyle, disrupted sleep patterns, chronic stress, and an imbalance between energy expenditure and caloric intake. Therefore, short-term diets alone are insufficient for achieving effective and sustainable weight reduction. A comprehensive approach that includes improving dietary habits, increasing physical activity, and establishing a healthy lifestyle is required to achieve long-term results.

Weight reduction in women of reproductive age requires particular caution. Rapid and uncontrolled weight loss may negatively affect the body's energy and hormonal balance. Therefore, a weight management program should be developed individually, taking into account the woman's body mass index, waist circumference, dietary habits, level of physical activity, and reproductive plans.

Research Methodology

The study was conducted to evaluate effective methods for reducing excess body weight and obesity in women of reproductive age. A total of 300 women of reproductive age who were under observation at family polyclinics in Surkhandarya Region were included in the study. The main group consisted of 200 women with excess body weight or obesity, while the control group consisted of 100 women with normal body weight.

Clinical-anamnestic, anthropometric, and analytical methods were used in the study. Data regarding participants' age, dietary habits, level of physical activity, sleep patterns, and lifestyle were collected. Anthropometric assessment included body weight, height, body mass index (BMI), waist circumference, and hip circumference. BMI was calculated by dividing body weight in kilograms by height in meters squared. The obtained data were processed using variation-statistical methods. Quantitative indicators were expressed as mean values and standard deviations. Statistical significance of differences between the groups was assessed using a significance level of $\mathbf{p<0.05}$. The research methodology was aimed at determining the anthropometric effectiveness of a comprehensive approach to weight reduction in women of reproductive age.

Results and Analysis

The results demonstrated that metabolic and reproductive disorders occurred considerably more frequently among women with excess body weight and obesity. In particular, an elevated waist circumference was observed in 58.0% of women in the excess-weight/obesity group, which was 46.0 percentage points higher than in the normal-weight group. Menstrual cycle disorders were observed in 31.0% of women, anovulatory cycles in 24.0%, and signs of insulin resistance in 37.0% of cases. These findings indicate that increased body weight is not merely an anthropometric characteristic but also an important risk factor affecting women's metabolic and reproductive health.

Table 2. Frequency of Major Clinical and Metabolic Risk Factors Associated with Increased Body Weight

Indicator	Normal-weight women (n=100)	Overweight/obese women (n=100)	Difference, %
Elevated waist circumference	12 (12.0%)	58 (58.0%)	+46.0
Menstrual cycle disorders	9 (9.0%)	31 (31.0%)	+22.0

Anovulatory cycle	6 (6.0%)	24 (24.0%)	+18.0
Signs of insulin resistance	8 (8.0%)	37 (37.0%)	+29.0
Arterial hypertension	7 (7.0%)	21 (21.0%)	+14.0
Signs characteristic of polycystic ovary syndrome	5 (5.0%)	19 (19.0%)	+14.0

Conclusion

The analysis demonstrated that a comprehensive approach is one of the most effective methods for reducing excess body weight and obesity in women of reproductive age. A balanced and individually tailored diet, regular physical activity, normalization of daily routines and sleep, and the development of a healthy lifestyle contribute to gradual and sustainable weight reduction.

A weight reduction program for women of reproductive age should be based not on strict diets or uncontrolled physical exertion, but on an individualized, scientifically based approach that can be maintained over the long term. Therefore, women with excess body weight should be encouraged to implement simultaneous corrections in nutrition, physical activity, and lifestyle.

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THE ESSENCE, RELEVANCE, AND DISTINCTIVE FEATURES OF DEVELOPING VEGETABLE CROP SEED PRODUCTION

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Abstract: This thesis examines the theoretical and methodological foundations of developing vegetable crop seed production, its significance in agricultural production, relevance, and distinctive features. The importance of using high-quality, true-to-type, and high-reproduction seed materials in ensuring high yields, product quality, and production efficiency in vegetable farming is substantiated. Furthermore, the study highlights the need to improve the seed production system through modern breeding and technological approaches, certification of seed materials, digitalization, and strengthened integration between scientific research and agricultural production.

Keywords: vegetable production, seed production, seed materials, variety, breeding, yield, quality, reproduction, certification, agrotechnology, efficiency.

Introduction: Vegetable production is one of the important sectors of agriculture in ensuring a stable supply of high-quality and safe food products to the population. Achieving high and sustainable yields of vegetable crops depends not only on the application of modern agrotechnologies but also directly on the use of high-quality seed materials in the production process.

Seed production is a fundamental and strategic component of agricultural production, encompassing the preservation of the genetic characteristics of crops, the multiplication of high-yielding and high-quality seed materials, and their distribution to agricultural producers. From this perspective, the development of vegetable crop seed production is important not only from an agrotechnological standpoint but also from economic and strategic perspectives.

Relevance of the Research: Today, the efficient use of resources, increasing crop yields, and reducing production costs are among the key priorities in agriculture. In vegetable production, the quality of seed material is one of the decisive factors in addressing these challenges.

The use of low-quality seeds or seeds with impaired genetic characteristics can result in uneven germination, reduced resistance to diseases, lower yields, and deterioration in product quality. In contrast, the use of true-to-type, high-reproduction

seeds with high germination capacity and superior biological characteristics improves crop growth and development and contributes to increased productivity.

Therefore, the development of vegetable crop seed production is highly relevant under current conditions, not only in terms of increasing crop yields but also with regard to ensuring food security, developing the domestic seed market, creating import-substituting varieties, and expanding the production of export-oriented vegetable products.

The Essence of Developing Vegetable Crop Seed Production: The main essence of developing vegetable crop seed production lies in establishing a system that continuously supplies agricultural production with high-quality, genetically stable, highly viable seed materials adapted to the soil and climatic conditions of specific regions.

This process should not be limited solely to seed production. The seed production system encompasses a set of interconnected processes, including breeding, variety testing, production of elite and reproductive seed materials, seed sorting and calibration, storage, packaging, laboratory analysis, certification, logistics, and delivery to consumers.

From this perspective, the economic essence of seed production can be expressed through the following chain:

Breeding → Variety Development → Variety Testing → Seed Production → Quality Control → Certification → Storage → Packaging → Market Distribution → Production Efficiency



Figure 1. Development Chain of the Vegetable Crop Seed Production System

Ensuring quality and efficiency at each stage of this chain directly affects the final outcomes, namely the yield, quality, and economic efficiency of vegetable production.

Distinctive Features of Vegetable Crop Seed Production: Vegetable crop seed production differs from the seed production of other agricultural crops in several distinctive aspects.

First, vegetable crops encompass a wide range of species and varieties, each of which differs significantly in terms of biological characteristics, seed production periods, and agrotechnical requirements.

Second, for certain vegetable crops, maintaining varietal purity and seed quality requires spatial isolation, specialized agrotechnical measures, and strict control over seed production fields.

Third, seed germination capacity, purity, moisture content, and the degree of infestation by diseases and pests have a significant impact on subsequent production outcomes. Therefore, proper storage and transportation conditions for seed materials are also of considerable importance.

Fourth, modern vegetable production is witnessing an increasing demand among farmers and cluster farms for high-yielding, early-maturing varieties that meet market requirements and demonstrate resistance to diseases and adverse climatic conditions.

Fifth, under conditions of climate change, the development of varieties resistant to factors such as high temperatures, drought, water scarcity, and soil salinity, as well as the establishment of effective seed production systems for such varieties, is becoming strategically important.

Key Directions for the Development of Seed Production: For the sustainable development of vegetable crop seed production, priority should be given to the following key areas:

1. Strengthening scientific research and breeding activities. Developing high-yielding, early-maturing varieties adapted to local soil and climatic conditions and resistant to diseases and environmental stresses.
2. Improving the system for producing elite and high-reproduction seed materials. Establishing a high-quality seed base by maintaining varietal identity and genetic purity.

3. Strengthening quality control of seed materials. Regular laboratory monitoring of seed germination capacity, purity, moisture content, and other quality indicators.
4. Digitalization of seed production processes. Maintaining information on varieties and seed lots in electronic databases and introducing digital systems that enable traceability of seed origin and movement.
5. Strengthening the integration of science and production. Ensuring close cooperation among research institutions, breeding centers, seed-producing entities, farms, and cluster farms.
6. Developing the domestic seed market. Reducing dependence on external sources by increasing the production and multiplication of locally developed varieties and seed materials.
7. Increasing economic efficiency. Introducing resource-saving technologies in seed production, optimizing labor and material costs, and enhancing the competitiveness of seed products.

Scientific and practical significance: The scientific and practical significance of developing vegetable crop seed production lies in the fact that improving the quality of seed materials can enhance the efficiency of the entire production chain.

Improved seed quality contributes to uniform crop emergence, optimal plant population establishment, more effective implementation of agrotechnical practices, and increased product quality and yield. This, in turn, makes it possible to reduce production costs per unit of output and improve the economic performance of agricultural enterprises.

From this perspective, the development of seed production should be viewed not merely as an agrotechnological task, but as a comprehensive system integrating breeding, innovation, economics, logistics, and market mechanisms.

Conclusion: In conclusion, vegetable crop seed production is a strategically important component of agricultural production, and its level of development directly affects the productivity, product quality, and economic efficiency of the vegetable production sector.

The primary objective of developing seed production is not only to produce high-quality seed materials but also to establish an integrated system encompassing "breeding – seed production – quality control – certification – storage – market – production."

In this regard, the development of local breeding programs, multiplication of high-quality seed materials, digitalization of seed production processes, strengthening of laboratory quality control, ensuring the integration of science and production, and improving the infrastructure of the seed market are among the key priorities.

Thus, the development of vegetable crop seed production is not merely an agrotechnological prerequisite for achieving high yields, but also an important factor in ensuring food security, efficient use of resources, increasing farm incomes, and enhancing the competitiveness of the vegetable production sector.

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MATN – INTEROSEPTIV SEZGI IFODALOVCHI SINTAKTIK BIRLIK SIFATIDA

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Annotatsiya. Sezgi dunyoni bilish hamda idrok etishning dastlabki bosqichidir. Sezgi tashqi yoki ichki bo‘lishi mumkin. Mazkur tezisda ichki, ya’ni interoseptiv sezgi va uning verballashuvidagi muammolar yoritilgan. Matn verbal yoki noverbal interoseptiv sezgi ifodalovchi yirik sintaktik birlik sifatida tahlilga totrilgan.
Kalit so‘zlar: sensor tizim, eksteroseptiv, interoseptiv va proprioseptiv sezgi, subyekt, sinatktik sath, matn

Insonning dunyoni bilishi hamda idrok etishi dastlab sezgilar yordamida amalga oshadi. 1906-yilda ingliz fiziologi Ch. Sherrington «Nerv tizimining integrativ harakati» nomli asarida sezgilarni uch guruhga bo‘lib tasniflaydi: 1) eksteroseptiv – tananing yuzasida joylashgan retseptorlarga ta’sir qilganda paydo bo‘ladi; 2) interoseptiv yoki organik – ichki muhitdagi metabolik jarayonlar natijasida yuzaga keladi; 3) proprioseptiv yoki kinestetik – mushaklarda joylashgan retseptorlar ta’sirida paydo bo‘ladi; paylar, bo‘g‘im xaltachalari va tana qismlarining harakatlarini va nisbiy holatini ko‘rsatadi [Sherrington,1906:11].

Tilshunoslikda asosan eksteroseptiv (tashqi) sezgilar masalasi o‘rganilgan bo‘lib [Нагорная,2017:24], interoseptiv sezgilar yechimini kutayotgan dolzarb masalalardan biridir. Dunyo olimlarining fikricha, bugungi kunda shaxslarning ichki holatini ifodalay olmaslik muammolari ko‘p kuzatiladi. Ular bunga interoseptiv lug‘atlarning kamligi hamda sohadagi ilmiy tadqiqotlarning yetarli emasligini sabab qilib ko‘rsatishmoqda. Inson tanasining ichki qismida kechayotgan jismoniy va ruhiy holatini ifodalash aslida mavhum, ba’zan tushunarsiz. Shu sababli I.M.Sechenov ularni «yashirin sezgilar» («тёмные чувства»)[Сеченов,1942:25], deb ta’riflaydi. Shunday bo‘lsa-da, kishilar ichki sezgilarini tashqi duynodagi bilishlariga asoslanib tasvirlashga harakat qiladilar. Chunki uning mavjudligi shubhasiz va uni ifodalashga ehtiyoj mavjud. Oldizmizda turgan muammo esa «yashirin sezgilar»ni qay tarzda va qanday lingvistik sath birliklari yordamida ifodalanishini aniqlash. Interoseptiv sezgilar fonetik, leksik, morfologik, sintaktik birliklar orqali namoyon bo‘ladi. Bularning orasida sintaktik sath, ayniqsa, matn alohida ahamiyatga ega.

Matn – eng yirik sintaktik birlik. Hozirgi kunda matn sintaksisi e'tirof etilshi munosabati bilan matn ham sintaksisning alohida o'rganish obyekti sifatida tan olinadi [Mahmudov N., Nurmonov A. 1995:4].

– Xullas, o'tgan yili o'zimga kelolmay qoldim, boshim og'riydi, nafasim qisadi. Borliq qop-qorong'u... Eskichasigayam, yangichasigayam bormagan joyim qolmadi. Boshimda nimadir o'sib chiqayotganday, yo'q, kimdir ichkarida qoziq qoqayotganday bo'ladi.

Og'riqqa dosh berolmay hushimni yo'qota boshladim. E-e-e-ey, u azoblarni aytmay, bandasiga ravo ko'rmayman, aka. (Q.Norqobil,"Kuzning mahzun nigohi")

Bu matnda interoseptiv sezgilar organizmning ichki fiziologik holatini bevosita hamda metaforik vositalar orqali izchil ifodalaydi. Muallif kasallik kechinmalarini tashqi kuzatish asnosida emas, balki subyektning o'z tanasida his qilayotgan ichki sezgilari orqali tasvirlaydi. Matnda interoseptiv sezgilar boshim og'riydi, nafasim qisadi, boshimda nimadir o'sib chiqayotganday, kimdir ichkarida qoziq qoqayotganday, og'riqqa dosh berolmay hushimni yo'qota boshladim kabi til birliklari orqali ifodalangan. Muallif tananing ichki fiziologik holatini ham bevosita nominativ vositalar, metaforik tasvirlar yordamida aks ettirib, interoseptiv sezgilarning semantik va ekspressiv imkoniyatlarini keng namoyon etgan. Bu esa matnning interoseptiv mazmunini kuchaytirib, o'quvchiga kasallikning ichki kechinmalarini chuqur his etish imkonini beradi.

Quyidagi parcha ham interoseptiv sezgi ifodalovchi matnga yaxshi misol bo'la oladi.

…Qip-qizil ko'ylagi shamolda hilpirab, kelishgan beli-bastini ko'z-ko'zlab ketayotgan Xayriniso Ro'zi maxsumning ko'ziga lovullagan olov bo'lib ko'rinadi. Maxsum entikib ishtiyoq bilan tikiladi. Kaftini peshonasiga soyabon qilib qaraydi. Ichida nimadir qo'zg'alib, bo'g'ziga tiqilib qolganday bo'ladi. Qoni ko'pirib-toshadi. Og'ir-og'ir nafas oladi, entikib, xo'rsinib qo'yadi:

– Enag'ar, To'lqin tank, shunday juvonni xor qildi, – deydi o'ziga o'zi yutinib. So'ng adir adog'idagi gurullab yonayotgan qip-qizil olov ko'zdan g'oyib bo'lgunga qadar tikilib turadi-da, huvillagan hovlida bir o'zi so'ppayib qolgani, xotinini Ruqiyaning besh yashar qizini yetaklab onasinikiga, qo'shni qishloq – Obshirga qaytmas bo'lib ketgani alam qiladi, yolg'izlik jon-jonidan o'tib, suyak-suyagini qaqshatib og'ritayotganini his qiladi, behol paxsa devorga suyanib o'tirib qoladi. (Q.Norqobil,"Osmon ostidagi sir") Mazkur matnda eksteroseptiv (tashqi) ko'rish sezgisidan keyin tana ichida sodir bo'lgan qator interoseptiv sezgilar ifodasini uchratish mumkin. Ular "ichida nimadir qo'zg'alib, bo'g'ziga tiqilib qolganday bo'ladi", "qoni ko'pirib-toshadi", "og'ir-og'ir nafas oladi", "entikib", "xo'rsinib

qo‘yadi” kabi birliklar orqali ifodalangan. Ularning aksariyati metaforik va frazeologik xarakterga ega bo‘lib, qahramon organizmida yuzaga kelgan ichki fiziologik reaksiyalarni kuchli emotsional kechinmalar bilan uyg‘un holda aks ettiradi. Shu bois matnda interoseptiv sezgi nafaqat organizm holatini ifodalovchi vosita, balki qahramonning ichki ruhiy olamini ochishga xizmat qiluvchi muhim lingvopoetik vosita sifatida namoyon bo‘ladi.

Keyingi matn interoseptiv sezgilarning emotsional kechinmalar bilan uzviy bog‘liq holda ifodalanishiga xos bo‘lib, unda qahramonning ruhiy iztiroblari organizmda yuzaga kelgan ichki fiziologik holatlar orqali tasvirlanadi. Muallif dardni bevosita nomlashdan ko‘ra, uning tana ichida qanday kechayotganini obrazli vositalar yordamida ifodalashni maqsad qilgani yaqqol ko‘rinadi.

Sezmay qoldim, dard birdan yiqitdi. Shu bolam afg‘on urushiga ketganini eshitgan kunimda ko‘kragimda bir narsa paydo bo‘lgandi. Bolam o‘sha yoqdan kelgunigacha necha bor o‘lib tirildim. Ko‘ksimdagi og‘ir tosh kattarib, ich-etimni ezib yuborgan, bilsang oshna. Ha mayli, diydiyoning nafi yo‘q... (Q.Norqobil, “Osmon ostidagi sir”)

Matndagi interoseptiv sezgilar bevosita nominativ birliklar orqali emas, balki asosan metaforik va frazeologik vositalar yordamida ifodalangan. Muallif organizmning ichki fiziologik holatini ruhiy kechinmalar bilan uyg‘unlashtirib tasvirlaydi. Natijada ko‘krakdagi og‘irlik, bosim va ichki ezilish hissi nafaqat fiziologik sezgi, balki farzand taqdiri bilan bog‘liq chuqur iztirobning lingvopoetik ifodasiga aylanadi. Bu esa interoseptiv sezgilarning badiiy matndagi ekspressiv va semantik imkoniyatlari nihoyatda keng ekanini yaqqol namoyon etadi.

Quyidagi matnda esa interoseptiv sezgilarning kompleks tarzda ifodalanganini, unda qahramon organizmida sodir bo‘layotgan fiziologik o‘zgarishlar izchil ketma-ketlikda tasvirlanganini ko‘rish mumkin.

...Xayriniso ostonadan ko‘chaga hatlashi hamono qalqib ketdi, enasi Muztar momoga suyanib, o‘zini tutib qoldi. A’zoyi badani kuyib, ichida titroq turgan juvonning yurak urishi tezlashib, boshiga lo‘qillab og‘riq kirdi.

– Ena, g‘alati bo‘b ketayapman, oyoq-qo‘lim qaltirayapti. Darmonim yo‘q, ena, – dedi bazo‘r.

Muallif qahramonning holatini tashqi tavsif orqali emas, balki uning o‘z tanasida his qilayotgan ichki sezgilari vositasida ochib beradi. Natijada matnda interoseptiv sezgilar kasallik yoki organizm faoliyatining izdan chiqishini ifodalovchi asosiy semantik vositaga aylanadi.

Mazkur parchada interoseptiv sezgilar “a’zoyi badani kuyib”, “ichida titroq turgan”, “yurak urishi tezlashib”, “boshiga lo‘qillab og‘riq kirdi”, “g‘alati bo‘b ketayapman”,

“darmonim yo‘q” kabi birliklar orqali ifodalangan. Muallif ushbu birliklarni ketma-ket qo‘llash orqali organizmning me’yoriy fiziologik holatdan og‘ish jarayonini bosqichma-bosqich ochib beradi. Bu bilan qahramonning ichki kechinmalari hamda fiziologik holatini o‘quvchi ongida jonli va ta’sirchan tarzda gavdalantirib berishga erishadi.

Yuqorida keltirilgan barcha matnlarda interoseptiv sezgilarni ifodalovchi juda ko‘p verbal birliklardan foydalanildi. Kuzatishlarimiz davomida shunga guvoh bo‘ldikki, interoseptiv sezgilar noverbal tarzda ham ifodalanishi mumkin. Masalan, “chap ko‘ksini silamoq” – yurak bezovta qilishi, “boshini changallamoq” – bosh og‘rig‘ini, “qoringa urib qo‘yish” – ochlikni anglatadi. Quyida keltirilgan matn ham fikrimizning dalili bo‘la oladi.

Shu mahal tiqmachoqdekkina, bo‘ychan, xushchiroy juvon stol yoniga kelib “Ali Qambar”ga termulib qoladi. Qamishto‘rva ichidagi qovunni uzun-oppoq barmoqlari bilan silaydi. So‘l qo‘li bilan qornini siypalab, yutinib qo‘yadi. G‘ayriixtiyoriy tarzda stol qoshidan ketolmay serrayib turaveradi. Ko‘zlaridan yosh g‘iltillaydi, yana yutinadi. Do‘ppayibgina qolgan qornini siladi-da, meni g‘alati ahvolga tushib qarayotganimni ko‘rib, lablari pirpiradi, o‘rindiqqa cho‘kdi. Baribir nigohi qovunda. (Q.Norqobil,“Ko‘ksimdagi kavkazim”)

Ushbu matn interoseptiv sezgilarning fiziologik ehtiyoj bilan bog‘liq holda ifodalanishining yorqin namunasi hisoblanadi. Muallif homilador ayolning ichki holatini organizmda yuzaga kelayotgan fiziologik ehtiyoj va visseral reaksiyalar vositasida ochib beradi. Matnda interoseptiv sezgilar emotsional holat bilan uyg‘unlashgan bo‘lsa-da, ularning asosida organizmning tabiiy fiziologik ehtiyoji yotadi. Matndagi “qamishto‘rva ichidagi qovunni uzun-oppoq barmoqlari bilan silaydi” tasviri hali interoseptiv sezgining o‘zi emas, balki ichki fiziologik ehtiyoj ta’sirida yuzaga kelgan tashqi harakatdir. Qahramonning e’tibori qovunga qaratilgani organizmda muayyan oziq-ovqatga nisbatan kuchli ehtiyoj shakllanganini anglatadi. Interoseptiv holat keyingi birliklarda tobora aniqroq namoyon bo‘lib boradi. “So‘l qo‘li bilan qornini siypalab” birikmasi interoseptiv sezgining tashqi ifodasi sifatida xizmat qiladi. Qorin bu yerda ichki fiziologik jarayonlar markazi sifatida tasvirlanib, uni silash orqali qahramon organizmidagi ehtiyojni beixtiyor ifodalaydi. Ayniqsa, homiladorlik kontekstida mazkur harakat ichki sezgilar bilan bevosita bog‘liq bo‘lib, organizmning fiziologik holatini aks ettiradi. “Yutinib qo‘yadi” fe’li mazkur kontekstda oddiy yutinish harakatini emas, balki oziq-ovqatga bo‘lgan kuchli fiziologik ehtiyoj natijasida yuzaga kelgan reflektor reaksiyani bildiradi. Qovunni ko‘rish natijasida organizmning ovqat hazm qilish tizimi faollashadi, so‘lak ajralishi kuchayadi va

yutinish refleksi beixtiyor sodir bo‘ladi. Demak, ushbu birlik interoseptiv sezgining bevosita fiziologik ko‘rinishidir. “G‘ayriixtiyoriy tarzda stol qoshidan ketolmay serrayib turaveradi” jumlasi qahramonning ichki fiziologik ehtiyoji uning xulq-atvorini boshqarayotganini ko‘rsatadi. Bu yerda harakatning g‘ayriixtiyoriyligi organizm ehtiyojining ongli nazoratdan ustun kelganini bildiradi. Mazkur holat interoseptiv sezgining psixofiziologik ta’sirini namoyon etadi. “Ko‘zlaridan yosh g‘iltillaydi” birikmasi bevosita interoseptiv sezgini emas, balki ichki fiziologik va emotsional zo‘riqishning tashqi ifodasini bildiradi. Biroq undan keyingi “yana yutinadi” fe’li qahramonning organizmida saqlanib qolayotgan fiziologik ehtiyojning davom etayotganini ko‘rsatadi. Yutinishning takrorlanishi ichki sezgining kuchi pasaymaganini semantik jihatdan ta’kidlaydi. “Do‘ppayibgina qolgan qornini siladi-da” birikmasida ham qorin organizmning ichki fiziologik holatini ifodalovchi markaz sifatida tasvirlangan. Uni silash qahramonning o‘z organizmida kechayotgan jarayonlarni sezayotganini va ularga javoban beixtiyor harakat qilayotganini bildiradi. Bu harakat homiladorlik bilan bog‘liq visseral sezgilarni yanada yaqqolroq ifodalashga xizmat qiladi. Parchaning oxiridagi “Baribir nigohi qovunda” jumlasi interoseptiv sezgining natijasini ifodalaydi. Bu yerda nigohning qovundan uzilmasligi oddiy qiziqish emas, balki organizmning fiziologik ehtiyoji ong va diqqatni to‘liq egallab olganining badiiy ifodasidir. Muallif ichki ehtiyojning kuchini bevosita aytmaydi, balki uning inson xatti-harakatiga ta’sirini tasvirlash orqali ko‘rsatib beradi.

Bu matn oldingi misollardan shu jihati bilan farq qiladiki, interoseptiv sezgilar kasallik yoki og‘riqni emas, balki homiladorlik bilan bog‘liq fiziologik ehtiyojni noverbal ifodalagan.

Xulosa qilib aytganda, matn interoseptiv sezgilarning tilda voqelanishida eng faol va funksional lingvistik sathlardan biri ekanligi kuzatildi. Aynan sintaktik qurilmalar orqali organizmning ichki fiziologik holati, visseral kechinmalar, og‘riq, noqulaylik, fiziologik ehtiyoj hamda organizm faoliyatidagi turli funksional o‘zgarishlar mazmunan to‘liq va ta’sirchan ifodalanadi.

Demak, interoseptiv sezgilarni tadqiq etishda matn – sintaktik birligini tizimli ravishda o‘rganish uning tildagi ifodalanish mexanizmlarini, badiiy matndagi funksional imkoniyatlarini hamda antroposentrik mazmunini chuqurroq ochib berishga xizmat qiladi.

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PEDAGOGIK VAZIYATLAR ASOSIDA O‘QUVCHILARDA MAS’ULIYAT HISSINI RIVOJLANTIRISHNING ILMIY-NAZARIY ASOSLARI

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Annotatsiya

Mazkur maqolada zamonaviy ta’lim jarayonida o‘quvchilarda mas’uliyat hissini rivojlantirishning ilmiy-nazariy asoslari hamda pedagogik vaziyatlardan samarali foydalanish imkoniyatlari tahlil qilinadi. Mas’uliyat shaxsning o‘z xatti-harakati, qabul qilgan qarori va bajargan faoliyati natijalarini anglay olishi bilan bog‘liq muhim ijtimoiy-axloqiy sifat sifatida qaraladi. O‘quvchilarda mazkur sifatni shakllantirishda faqat nazariy bilim berish bilan cheklanib qolmasdan, ularni turli hayotiy va ta’limiy vaziyatlarga jalb etish, muammoli holatlarda mustaqil qaror qabul qilishga o‘rgatish muhim ahamiyat kasb etadi. Tadqiqotda pedagogik vaziyatlarning tarbiyaviy imkoniyatlari, ularni tashkil etish tamoyillari, o‘quvchilarning mustaqil fikrlashi va ijtimoiy faolligiga ta’siri yoritilgan. Shuningdek, muammoli vaziyat, rolli o‘yin, munozara, keys-stadi va hamkorlikka asoslangan topshiriqlarning o‘quvchilarda mas’uliyat hissini rivojlantirishdagi o‘rni ochib berilgan.

Kalit so‘zlar: mas’uliyat, pedagogik vaziyat, o‘quvchi shaxsi, tarbiya, muammoli ta’lim, mustaqil qaror, ijtimoiy kompetensiya, axloqiy tarbiya, pedagogik texnologiya.

Kirish

Bugungi globallashuv va axborot texnologiyalari jadal rivojlanayotgan sharoitda ta’lim oldiga har tomonlama rivojlangan, mustaqil fikrlaydigan, o‘z qarorlariga mas’uliyat bilan yondashadigan va jamiyat hayotida faol ishtirok eta oladigan shaxsni tarbiyalash vazifasi qo‘yilmoqda. Zamonaviy ta’limning asosiy maqsadi o‘quvchiga ma’lum hajmdagi bilimlarni berish bilangina chegaralanmaydi. Ta’lim jarayonida o‘quvchining shaxsiy, ijtimoiy, axloqiy va kommunikativ kompetensiyalarini rivojlantirish ham muhim vazifa hisoblanadi.

Shaxsning ijtimoiy rivojlanishida mas’uliyat hissi alohida o‘rin tutadi. Mas’uliyatli inson o‘z faoliyatining oqibatlarini oldindan tasavvur qilishga, belgilangan vazifalarni o‘z vaqtida bajarishga, boshqalarning huquq va manfaatlarini hurmat qilishga hamda

yuzaga kelgan muammolarga befarq bo‘lmaslikka intiladi. Shu sababli o‘quvchilarda mas’uliyat hissini rivojlantirish ta’lim va tarbiya jarayonining ustuvor yo‘nalishlaridan biri bo‘lishi lozim.

O‘quvchilarda mas’uliyat hissini rivojlantirishning samarali usullaridan biri pedagogik vaziyatlarni maqsadli tashkil etishdir. Pedagogik vaziyat o‘quvchini muayyan muammo yoki tanlov oldida qoldiradigan, uning fikrlashi, qaror qabul qilishi va xatti-harakatini namoyon etishiga imkon beradigan ta’limiy-tarbiyaviy holatdir.

Mavzuning dolzarbligi

Hozirgi davrda yosh avlodning ijtimoiy faolligini oshirish, ularda mustaqil fikrlash, tashabbuskorlik va mas’uliyat kabi sifatlarni shakllantirish masalasi xalqaro ta’lim siyosatida ham muhim yo‘nalishlardan biri sifatida qaralmoqda.

An’anaviy ta’lim jarayonida o‘quvchining faoliyati ko‘pincha tayyor bilimlarni o‘zlashtirish bilan chegaralanishi mumkin. Bunday holatda o‘quvchi real hayotda uchraydigan muammoli vaziyatlarda mustaqil qaror qabul qilishga yetarlicha tayyor bo‘lmasligi mumkin. Shu nuqtayi nazardan, ta’lim jarayonini hayotiy vaziyatlar bilan bog‘lash va o‘quvchini faol subyekt sifatida shakllantirish zarur.

Pedagogik vaziyatlardan foydalanish o‘quvchiga nazariy bilimlarni amaliy holatlarda qo‘llash, o‘z qarorini asoslash, muammoning turli yechimlarini taqqoslash va o‘z tanlovining natijasi uchun javobgarlikni his qilish imkonini beradi.

Mas’uliyat hissining shakllanishi bir martalik pedagogik ta’sir natijasi emas, balki muntazam va tizimli tarbiyaviy faoliyat natijasida yuzaga keladigan jarayondir. Shu bois pedagog o‘quvchilar uchun mas’uliyatni talab qiladigan vaziyatlarni muntazam tashkil etishi, ularning faoliyatini kuzatishi va zarur hollarda pedagogik ko‘mak berishi lozim.

Mas’uliyat tushunchasining ilmiy-nazariy mazmuni

Mas’uliyat tushunchasi falsafa, psixologiya, pedagogika va sotsiologiya fanlarida turli nuqtayi nazardan talqin qilinadi. Umumiy ma’noda mas’uliyat shaxsning o‘z xatti-harakatlari va ularning oqibatlarini anglash, o‘z zimmasidagi vazifalarni bajarish hamda qabul qilgan qarorlariga javob bera olish qobiliyatini ifodalaydi.

Pedagogik nuqtayi nazardan mas’uliyat o‘quvchining o‘quv faoliyatiga, o‘qituvchi va tengdoshlari bilan munosabatlariga, maktab jamoasi va jamiyat oldidagi vazifalariga ongli ravishda yondashishini anglatadi.

O‘quvchida mas’uliyat hissining shakllanganligini quyidagi jihatlar orqali kuzatish mumkin:

- topshiriqlarni o‘z vaqtida va sifatli bajarish;
- o‘z xatti-harakatining oqibatlarini tushunish;
- berilgan vazifani nazoratsiz ham bajarishga intilish;
- qabul qilgan qarorini asoslay olish;
- xatolarini tan olish va ularni tuzatishga harakat qilish;
- jamoaviy faoliyatda o‘z vazifasini bajarish;
- boshqa insonlarning fikri va manfaatlariga hurmat bilan munosabatda bo‘lish;
- muammoli vaziyatlarda mas’uliyatli qaror qabul qilish.

Demak, mas’uliyat hissi faqat intizom bilan bog‘liq tushuncha emas. U shaxsning o‘z faoliyatini boshqarishi, ijtimoiy munosabatlarda faol ishtirok etishi va mustaqil qarorlar qabul qila olishi bilan chambarchas bog‘liq.

Pedagogik vaziyatlarning mohiyati

Pedagogik vaziyat — ta’lim yoki tarbiya jarayonida o‘quvchini muayyan faoliyatga jalb qiluvchi, undan fikrlash va tanlov qilishni talab etuvchi maxsus tashkil etilgan holatdir.

Pedagogik vaziyatlar tabiiy ravishda yuzaga kelishi yoki o‘qituvchi tomonidan oldindan rejalashtirilishi mumkin. Mas’uliyat hissini rivojlantirish maqsadida o‘qituvchi tomonidan tashkil etiladigan vaziyatlarning tarbiyaviy imkoniyatlari ayniqsa katta.

Masalan, o‘qituvchi o‘quvchilar oldiga quyidagi muammoni qo‘yishi mumkin:

“Guruh bilan bajariladigan topshiriqning yakuniy natijasi barcha a’zolarning faoliyatiga bog‘liq. Guruhdagi ayrim o‘quvchilar o‘z vazifalarini bajarmasa, qolganlar qanday yo‘l tutishi kerak?”

Bunday vaziyatda o‘quvchilar muammoni muhokama qiladi, turli yechimlarni taklif etadi va o‘z fikrlarini asoslaydi. Natijada ular faqat nazariy bilim emas, balki mas’uliyat, hamkorlik va qaror qabul qilish tajribasiga ega bo‘ladilar.

Pedagogik vaziyatlarning asosiy turlari

O‘quvchilarda mas’uliyat hissini rivojlantirish uchun pedagogik vaziyatlarni bir necha guruhga ajratish mumkin.

1. Muammoli vaziyatlar

Muammoli vaziyatda o‘quvchiga tayyor javob berilmaydi. U muammoni tahlil qilishi va mustaqil ravishda yechim topishi kerak.

Masalan:

“Sinfdoshlaringizdan biri guruh topshirig‘ini bajarmadi. Sizningcha, guruh qanday qaror qabul qilishi kerak?”

Bunday topshiriq o‘quvchini mas’uliyat, adolat va hamkorlik tushunchalarini muhokama qilishga undaydi.

2. Tanlovga asoslangan vaziyatlar

Bunday vaziyatlarda o‘quvchi bir nechta variantdan birini tanlaydi va o‘z tanlovini asoslaydi.

Masalan, o‘quvchiga “Siz guruh sardorisiz. Guruhdagi ikki o‘quvchi o‘z vazifasini bajarmadi. Siz qanday qaror qabul qilasiz?” degan vaziyat beriladi.

Bu jarayonda o‘quvchi qabul qilgan qarorining natijasini o‘ylashga o‘rganadi.

3. Rolli vaziyatlar

Rolli o‘yinlarda o‘quvchilar turli ijtimoiy rollarni bajaradilar. Masalan, guruh rahbari, jamoa a’zosi, mas’ul shaxs, kuzatuvchi yoki muayyan muammoni hal qiluvchi shaxs rolini bajarishlari mumkin.

Bu usul o‘quvchilarning empatiyasi, kommunikativ qobiliyati va ijtimoiy mas’uliyatini rivojlantirishga yordam beradi.

4. Keys-stadi vaziyatlari

Keys-stadi real yoki shartli hayotiy muammolarni tahlil qilishga asoslanadi. O‘quvchilar muammoni o‘rganib, uning sabablarini aniqlaydi va yechim taklif qiladi.

Mazkur metod ayniqsa yuqori sinf o‘quvchilarida mustaqil fikrlash va qaror qabul qilish ko‘nikmalarini rivojlantirish uchun samarali hisoblanadi.

Pedagogik vaziyatlarni tashkil etish tamoyillari

O‘quvchilarda mas’uliyat hissini rivojlantirishga qaratilgan pedagogik vaziyatlar bir qator pedagogik tamoyillarga asoslanishi lozim.

Birinchidan, **maqsadlilik tamoyili**. Har bir vaziyat aniq tarbiyaviy yoki ta’limiy maqsadga ega bo‘lishi kerak.

Ikkinchidan, **o‘quvchining faolligi tamoyili**. Vaziyatni o‘qituvchi emas, imkon qadar o‘quvchining o‘zi hal qilishi maqsadga muvofiq.

Uchinchidan, **mustaqillik tamoyili**. O‘quvchiga qaror qabul qilish imkoniyati berilishi kerak.

To‘rtinchidan, **hamkorlik tamoyili**. O‘quvchilar bir-birining fikrlarini tinglashi, baholashi va umumiy qarorga kelishi uchun sharoit yaratiladi.

Beshinchidan, **refleksiya tamoyili**. Vaziyat yakunlangach, o‘quvchi o‘z faoliyatini tahlil qilishi kerak. “Men qanday qaror qabul qildim?”, “Nima uchun shunday qaror qildim?”, “Qarorim qanday natijaga olib kelishi mumkin?” kabi savollar o‘quvchining o‘z faoliyatini baholashiga yordam beradi.

Pedagogik vaziyatlar orqali mas’uliyatni rivojlantirish mexanizmi

O‘quvchilarda mas’uliyat hissining rivojlanishini shartli ravishda quyidagi ketma-ketlikda tashkil etish mumkin:

Vaziyatni anglash → muammoni aniqlash → variantlarni ishlab chiqish → qaror qabul qilish → qarorni amalga oshirish → natijani baholash → refleksiya.

Mazkur mexanizmning har bir bosqichi o‘quvchining shaxsiy mas’uliyatini shakllantirishga xizmat qiladi.

Vaziyatni anglash bosqichida o‘quvchi muammoning mohiyatini tushunadi. Muammoni aniqlash jarayonida sabab va oqibatlar o‘rtasidagi bog‘liqlikni ko‘radi. Variantlarni ishlab chiqish orqali turli yechimlarni taqqoslaydi. Qaror qabul qilish bosqichida o‘z tanlovini amalga oshiradi. Natijani baholash esa o‘quvchiga o‘z qarorining samaradorligini aniqlash imkonini beradi.

Shu tariqa o‘quvchi mas’uliyatni faqat o‘qituvchining talabi sifatida emas, balki o‘z faoliyatining tabiiy natijasi sifatida anglay boshlaydi.

O‘qituvchining roli

Pedagogik vaziyatlardan samarali foydalanishda o‘qituvchining roli alohida ahamiyatga ega. O‘qituvchi vaziyatni yaratish bilan birga, o‘quvchiga mustaqil fikrlash imkoniyatini ham berishi lozim.

O‘qituvchi:

1. vaziyatning maqsadini belgilaydi;
2. o‘quvchilarning yosh va individual xususiyatlarini hisobga oladi;
3. muammoni tushunarli shaklda taqdim etadi;
4. o‘quvchilarni mustaqil qaror qabul qilishga yo‘naltiradi;
5. zarur hollarda savollar orqali pedagogik ko‘mak beradi;
6. yakuniy natijani tahlil qiladi;
7. o‘quvchilarni o‘z faoliyatini baholashga undaydi.

Bunda o‘qituvchi tayyor yechimni aytib beruvchi emas, balki o‘quvchining mustaqil fikrlashini tashkil etuvchi pedagog sifatida namoyon bo‘ladi.

Xalqaro tajriba va zamonaviy yondashuvlar

Zamonaviy xalqaro ta’lim amaliyotida o‘quvchilarning akademik bilimlari bilan bir qatorda ularning ijtimoiy-emotsional kompetensiyalarini rivojlantirishga ham katta e’tibor berilmoqda. O‘quvchilarning mustaqil qaror qabul qilishi, hamkorlik qilishi, o‘z faoliyatini boshqarishi va jamiyatdagi mas’uliyatini anglashiga yo‘naltirilgan ta’lim yondashuvlari tobora keng tarqalmoqda.

Mazkur yondashuvlar pedagogik vaziyatlardan foydalanish bilan bevosita bog‘liq. Chunki real yoki modellashtirilgan hayotiy vaziyatlar o‘quvchiga nazariy bilimlarni amaliy faoliyat bilan bog‘lash imkonini beradi.

Xalqaro tajribadan kelib chiqib, o‘quvchilarda mas’uliyatni rivojlantirishda quyidagi yo‘nalishlarga e’tibor qaratish mumkin:

- o‘quvchiga tanlov imkoniyatini berish;
- mustaqil loyihalarni tashkil etish;
- guruhiy faoliyatdan foydalanish;
- real hayotiy muammolarni dars jarayoniga olib kirish;
- o‘z-o‘zini baholash va refleksiyani rivojlantirish;
- o‘quvchilarning ijtimoiy loyihalarda ishtirokini qo‘llab-quvvatlash;
- o‘qituvchi va o‘quvchi o‘rtasidagi hamkorlikni kuchaytirish.

Amaliy pedagogik vaziyat namunasi

O‘quvchilarda mas’uliyat hissini rivojlantirish uchun quyidagi vaziyatdan foydalanish mumkin:

Vaziyat: Sinfda umumiy loyiha topshirig‘i berildi. Har bir guruh a’zosiga alohida vazifa yuklatildi. Topshiriqni topshirish muddatiga ikki kun qolganda guruh a’zolaridan biri o‘z vazifasini bajarmagani ma’lum bo‘ldi.

Savollar:

1. Guruh qanday yo‘l tutishi kerak?
2. Vazifani boshqa o‘quvchi bajarishi adolatlimi?
3. Vazifani bajarmagan o‘quvchiga qanday munosabatda bo‘lish kerak?
4. Guruh rahbari qanday qaror qabul qilishi lozim?
5. Ushbu vaziyatda kim va nima uchun mas’ul?

Mazkur vaziyat muhokama qilingach, o‘quvchilar o‘z qarorlarini asoslaydilar. O‘qituvchi esa turli qarashlarni umumlashtirib, mas’uliyat, o‘zaro yordam, adolat va jamoaviy javobgarlik tushunchalarini izohlaydi.

Pedagogik vaziyatlarning kutiladigan natijalari

Pedagogik vaziyatlardan tizimli foydalanish natijasida o‘quvchilarda quyidagi sifatlarning rivojlanishi kutiladi:

- mustaqil fikrlash;
- qaror qabul qilish;
- o‘z xatti-harakatini baholash;
- vazifaga mas’uliyatli munosabat;
- jamoada ishlash;
- o‘z fikrini asoslash;
- boshqalarning fikrini hurmat qilish;
- muammoli vaziyatlarda to‘g‘ri yo‘l tanlash;
- o‘z xatolarini tan olish;
- o‘z faoliyatining natijalarini tahlil qilish.

Shuningdek, pedagogik vaziyatlar o‘quvchilarning o‘ziga bo‘lgan ishonchini oshirishga va ularni faol ta’lim subyekti sifatida shakllantirishga xizmat qiladi.

Xulosa

Yuqoridagi tahlillardan ko‘rinadiki, o‘quvchilarda mas’uliyat hissini rivojlantirish zamonaviy ta’lim-tarbiya jarayonining muhim vazifalaridan biridir. Mas’uliyat shaxsning nafaqat o‘z vazifalarini bajarishi, balki o‘z qarorlari va faoliyatining natijalarini anglay olishi bilan tavsiflanadi.

Pedagogik vaziyatlar esa mazkur sifatni shakllantirish uchun samarali pedagogik vosita bo‘lib xizmat qiladi. Ayniqsa, muammoli vaziyatlar, keys-stadi, rolli o‘yinlar, munozaralar va guruhiy topshiriqlar o‘quvchilarning mustaqil fikrlashi hamda qaror qabul qilish ko‘nikmalarini rivojlantirish imkonini beradi.

Pedagogik vaziyatning asosiy afzalligi shundaki, o‘quvchi mas’uliyat tushunchasini faqat nazariy jihatdan o‘rganib qolmay, balki uni amaliy faoliyat davomida his qiladi. U o‘z tanlovini amalga oshiradi, uning natijasini kuzatadi va faoliyatini tahlil qiladi.

Shu sababli umumiy o‘rta ta’lim jarayonida pedagogik vaziyatlardan foydalanishning metodik imkoniyatlarini kengaytirish, o‘qituvchilarni mazkur texnologiyalardan foydalanishga tayyorlash va o‘quvchilarning yosh xususiyatlariga mos vaziyatlar bankini yaratish maqsadga muvofiqdir.

Umuman olganda, pedagogik vaziyatlar asosida tashkil etilgan ta’lim-tarbiya jarayoni o‘quvchini passiv bilim oluvchidan faol, mustaqil fikrlaydigan va o‘z faoliyati uchun javob bera oladigan shaxsga aylantirishga yordam beradi. Bu esa zamonaviy ta’limning insonparvarlik, kompetensiyaviy va shaxsga yo‘naltirilgan yondashuvlari bilan uyg‘unlashadi.

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ВЛИЯНИЕ РЕГУЛЯТОРОВ РОСТА НА УСКОРЕНИЕ РИЗОГЕНЕЗА КОРНЕВОЙ СИСТЕМЫ ЧЕРЕНКОВ ЯБЛОНИ

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Анотация. В научной статье приводится экспериментальный материал по выращиванию подвоев солеустойчивых сортов яблони Бабаарабская и Хазараспская из зеленных черенков в искусственных субстратах с использованием сооружений с регулируемым микроклиматам внутри.

Исследованием установлено, что оптимальной концентрацией ИМК для укоренения черенков яблони обоих сортов в субстрате является 40 мг/л воды.

Введение. **В последние десятилетия учеными многих стран выявлена положительная реакция черенков ряда пород и сортов многолетних растений на обработку регуляторами роста. Под влияниям этих веществ наблюдается усиленный гидролиз крахмала, отток Сахаров и азотистых веществ из листьев в нижние части черенка. Такое интенсивное накопление питательных веществ в этой части черенка благоприятствует меристема-тической активности и развитию придаточных корней [1,2,3,4].**

Методика исследования. Известно, что основные виды яблони относятся к растениям, которые трудно размножаются вегетативно. Для решения этой проблемы разработаны специальные научные приемы, которые успешно применяются в садоводстве при размножении растений. Одним из элементов этой технологии является использование стимуляторов роста, таких как индолилмасляная, индолилуксусная, альфа и бета нафтил уксусные кислоты и других. Применение этих веществ позволяет ускорить ризогенез утраченных органов черенков и формировать восстановление целостного организма растения.

В опыте в качестве экспериментального материала были выбраны местные вегетативно размножаемые сорта яблони Бабаарабская и Хазараспкая.

Исследования по изучению особенностей регенерации корневой системы и развитию подвоев проводились в специальном сооружении с регулируемым микроклиматом. Растения выращивались в искусственном субстрате, состоящем из речного песка, с фракцией частиц 1,0-1,5 мл и перегноем в соотношением 1:3

Результаты исследований. Как показали исследования в 2024-2025 гадах предпосадочная обработка черенков яблони в растворах индолилмасляной кислоты различной концентрации оказывала положительное влияние как на ризогенез корневой системы, так и регенерацию надземной части подвоев. Так, из экспериментальных данных, приведенных в таблице 1, видно, что оба типа подвоя обладают высокой естественной регенерационной способностью.

Использование же регулятора роста ИМК практически во всех концентрациях ускоряет регенерационные процессы у высаженных в субстрат черенков. У обработанных ИМК черенков яблони в сравнении с контрольными (без обработки) ускоряется образование каллуса в базальной части - на 10-12 дней, массовое корнеобразование - на 6- 8 дней, начало роста побегов - на 16-19 дней, при этом качество укоренения маточных черенков в сравнении с необработанными увеличивается на 17,4-19%. Исследованиями также установлено, что оптимальной концентрацией раствора ИМК для обработки черенков вегетативных подвоев яблони является 40 мг/л воды. Дальнейшее увеличение концентрации регулятора роста влияния на интенсификацию развития растений не оказывает. (таблица - 1)

Т аблицы 1

Влияние обработки черенков яблони ИМК на ризогенез подвоев (2022-2023 г.г.)

Варианты опыта	Число дней от посадки черенков до:			Укореняе-мость черенков, %
	начала образования каллуса	массового корнеобразования	начала роста побегов	
Бабаарабская яблоня				

Обработка черенков в воде-контроль	32	45	46	50,7
ИМК-20мг\л воды	22	39	30	61,4
ИМК-40мг\л воды	21	38	28	69,3
ИМК-60мг\л воды	20	37	28	39,5
ИМК-80мг\л воды	20	37	28	69,7
ИМК-100мг\л воды	20	37	28	69,7
НСР05	-	-	-	1,6
Р,%	-	-	-	2,5
Хазараспская яблоня				
Обработка черенков в воде-контроль	30	43	43	58,8
ИМК-20мг\л воды	21	38	29	69,7
ИМК-40мг\л воды	20	36	27	74,0
ИМК-60мг\л воды	20	36	26	75,9
ИМК-80мг\л воды	20	36	27	76,1
ИМК-100мг\л воды	20	36	27	76,2

НСР 05	-	-	-	1,5
P,%	-	-	-	2,1

Выводы. 1.Прохождение начальных этапов ризогенеза подвоев яблони, выращиваемых из зеленных маточных черенков - каллусообразование, формирование корневых бугорков и зачатков корней, не зависит от природы происхождения маточных растений.

2. Оптимальной концентрацией раствора ИМК для стимулирования образования у зеленых черенков подвоев яблони корневой системы является 40мг/л воды.

3. Использование индолилмасляной кислоты в концентрации 40 мг/л воды ускоряет ризогенез черенков яблони и регенерацию надземной части на 10-12 дней в сравнении с необработанными черенками.

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ENDOCRINE COMORBIDITIES AND CELLULAR IMMUNE ALTERATIONS IN GRANULOMA ANNULARE: AN INTEGRATED APPROACH TO PATIENT ASSESSMENT

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Background. Granuloma annulare is a chronic granulomatous inflammatory skin disorder characterized by annular papules and plaques with variable clinical manifestations. Although the disease has been recognized for more than a century, its exact pathogenesis remains incompletely understood. Increasing attention has recently been focused on the interaction between cellular immune responses and metabolic or endocrine abnormalities in the development and progression of granuloma annulare.

Activation of T lymphocytes, macrophages and dendritic cells is considered an important component of granulomatous inflammation. At the same time, granuloma annulare has been reported in association with diabetes mellitus, thyroid disorders, obesity, dyslipidemia, insulin resistance and metabolic syndrome. These observations suggest that endocrine and metabolic disturbances may modify the local inflammatory response and potentially influence the clinical phenotype of the disease. However, the relationship between endocrine comorbidities, cellular immune alterations and different clinical forms of granuloma annulare remains insufficiently characterized.

Objective. To investigate the relationship between endocrine abnormalities, clinical and morphological manifestations, and cellular immune markers in patients with different forms of granuloma annulare.

Materials and Methods. The planned study will include 100 patients presenting to dermatology and/or endocrinology services with clinical manifestations suggestive of

granuloma annulare. A comprehensive assessment will include clinical examination, histological evaluation of skin biopsy specimens, biochemical and hormonal investigations, and immunohistochemical analysis.

The immunohistochemical component will focus on T-lymphocyte markers CD3+ and CD8+ and dendritic-cell markers CD1a+, CD207 (Langerin) and CD209/DC-SIGN. Clinical and immunohistochemical parameters will be analyzed in relation to the presence of concomitant endocrine disorders and the clinical form of granuloma annulare. Statistical methods will be used to determine potential associations between immune, endocrine and morphological variables.

Expected Scientific Significance. The integrated assessment of cellular immunity and endocrine status is expected to improve understanding of the pathogenetic heterogeneity of granuloma annulare. Identification of characteristic immunohistochemical patterns associated with endocrine comorbidities may help distinguish patient subgroups with different clinical manifestations and potentially different disease courses.

Particular attention to the expression of T-cell and dendritic-cell markers may provide additional insight into the mechanisms responsible for the persistence of granulomatous inflammation. Simultaneous assessment of biochemical, hormonal, morphological and immune parameters may also contribute to the development of a more comprehensive diagnostic strategy.

Conclusion. A combined evaluation of cellular immune markers and endocrine abnormalities represents a promising approach to studying granuloma annulare. Integrating dermatological, histological, immunohistochemical and endocrinological findings may improve disease characterization and provide a scientific basis for individualized diagnostic and management algorithms.

Keywords: granuloma annulare, cellular immunity, endocrine disorders, diabetes mellitus, T lymphocytes, dendritic cells, CD3, CD8, CD207, CD209.

IMPROVING THE PRACTICE OF REGULATING THE LIQUIDITY OF COMMERCIAL BANKS

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Abstract: The thesis considers the modern practice of regulating the liquidity of commercial banks and, on this basis, proposes directions for its improvement. Liquidity regulation is treated as a system of instruments that combines microprudential ratios (LCR, NSFR, LR), macroprudential requirements, deposit-insurance mechanisms and central-bank facilities, and that must be adapted to the digital transformation of banking. Empirical experience of the Basel III implementation, of the 2020 COVID-19 pandemic, of the 2022–2023 interest-rate cycle and of the 2023 collapse of Silicon Valley Bank, Signature Bank and First Republic Bank is analysed, along with the regulatory practice of the Republic of Uzbekistan in 2020–2026. On the basis of a critical review of the works of Adrian and Shin, Bonner, van Lelyveld and Zymek, Duffie, Drechsler, Savov and Schnabl, Jiang, Matvos, Piskorski and Seru, Koont, Santos and Zingales, the paper proposes an integrated seven-direction package of improvements. A summary table of current problems and proposed solutions is presented. It is concluded that the further improvement of the liquidity regulation framework in Uzbekistan should combine international best practice with the specific features of the national banking system.
Keywords: commercial bank, liquidity regulation, Basel III, LCR, NSFR, digital bank run, deposit insurance, macroprudential policy, RegTech, Republic of Uzbekistan.

Introduction

The practice of regulating the liquidity of commercial banks has undergone significant transformation over the past two decades. After the 2008 global financial crisis, the Basel Committee on Banking Supervision introduced the Liquidity Coverage Ratio and the Net Stable Funding Ratio, which became international standards. However, the 2023 collapse of U.S. mid-sized banks, in which USD 42 billion was withdrawn from Silicon Valley Bank in 48 hours despite formal compliance with Basel III, demonstrated that the existing framework requires further improvement, particularly with respect to digital bank runs, the concentration of uninsured deposits and interest-rate risk in the securities portfolio.

The relevance of the topic is reinforced by three factors. First, the digital speed of modern deposit outflows requires new stress-testing scenarios and shorter regulatory horizons than the classical 30-day LCR. Second, the interaction between liquidity risk and interest-rate risk in the banking book has become a systemic issue, requiring the coordination of Basel III liquidity ratios with the IRRBB framework. Third, in the Republic of Uzbekistan the Central Bank has actively implemented Basel III standards in 2020–2026, but the further improvement of the national framework requires the integration of macroprudential-digital elements and the strengthening of deposit-insurance credibility.

The aim of this thesis is to analyse the current practice of regulating commercial bank liquidity, to identify its main problems and to propose directions for its improvement, with particular reference to the Republic of Uzbekistan. The methodology relies on scientific abstraction, comparative and structural analysis, historical-logical method and content analysis of Basel Committee documents and academic publications indexed in Scopus and Web of Science.

Main body

The empirical experience of the Basel III implementation has demonstrated both significant achievements and important shortcomings. Bonner, van Lelyveld and Zymek (2015) confirmed that the LCR has effectively strengthened the short-term liquidity resilience of banks, and Duffie (2019) documented its effect on the microstructure of secondary markets. During the COVID-19 pandemic in 2020, well-capitalised and LCR-compliant banks were able to maintain their intermediation function; the IMF (2026) report confirms that banks with an LCR above 150 % experienced significantly fewer liquidity problems. As of 2026, the average LCR of commercial banks in Uzbekistan is 142 % and the average NSFR is 118 %, both above the international minimum of 100 %.

At the same time, the 2023 collapse of U.S. mid-sized banks revealed serious shortcomings. Jiang, Matvos, Piskorski and Seru (2024) empirically demonstrated that unrealised losses on the securities portfolio of U.S. banks, combined with a high share of uninsured deposits, generated a systemic vulnerability that was not detected by classical Basel III indicators. Koont, Santos and Zingales (2024) introduced the concept of "digital bank walks" and showed that mobile banking applications enable deposit outflows at a speed several times higher than the run-off rates assumed by Basel III. Drechsler, Savov and Schnabl (2021) demonstrated that the deposit franchise itself

provides a natural hedge against interest-rate risk, but only if the deposit base is diversified, stable and low-beta.

For the Republic of Uzbekistan, the practical implementation of Basel III standards since 2020 has produced substantial results: the average LCR and NSFR of commercial banks are above the international minimum, the deposit base has grown by 336 % in nominal terms, the share of national-currency deposits has increased from 54.8 % to 68.4 % and the share of term deposits has risen to 67.1 %. Nevertheless, a number of issues remain: the deposit-insurance ceiling is comparatively low, the share of uninsured large corporate deposits is significant, macroprudential-digital instruments are not yet formalised, and supervisory reporting still relies mainly on traditional coefficient-based indicators. The summary of current problems and proposed solutions is presented in Table 1.

Table 1. Problems of current liquidity regulation practice and proposed improvements

Problem area	**Manifestation**	**Proposed solution**
Digital speed of deposit outflows	Traditional 30-day LCR misses digital bank walks	Introduce a 5-day "digital LCR" and behavioural run-off rates
Interaction of liquidity and IRRBB	Unrealised losses on securities amplify liquidity shocks	Integrate Basel III IRRBB and NSFR into a joint stress test
Deposit-insurance limits	Uninsured deposits > 50 % in some banks	Raise the insurance ceiling; introduce partial coverage for corporate operational deposits
Concentration of the deposit base	High HHI of top-20 depositors in medium-sized banks	Introduce Pillar 2 supervisory add-ons for concentration risk
Supervisory analytics	Reporting relies on monthly balance-sheet ratios	Deploy RegTech / SupTech real-time analytics and behavioural dashboards
Macroprudential coverage	Shadow banking and fintech partnerships outside the perimeter	Extend liquidity requirements to

		material non-bank financial intermediaries
Communication and reputational management	Social-media-driven run risk	Establish a supervisory protocol for crisis communication and monitor media sentiment

On the basis of the above analysis, the following integrated package of improvements is proposed for the Republic of Uzbekistan. First, the introduction of a supplementary "digital LCR" for a five-day horizon calibrated on Uzbek data. Second, the integration of Basel III liquidity ratios with the Interest Rate Risk in the Banking Book framework into a joint quarterly stress test. Third, the gradual increase of the deposit-insurance ceiling and the elaboration of a partial-coverage scheme for corporate operational deposits. Fourth, the introduction of Pillar 2 supervisory add-ons for banks with high concentration of the deposit base. Fifth, the deployment of RegTech and SupTech real-time analytics and the mandatory disclosure of behavioural indicators. Sixth, the extension of macroprudential requirements to material non-bank financial intermediaries and fintech partners. Seventh, the establishment of a supervisory protocol for crisis communication and the systematic monitoring of media sentiment concerning banks.

A critical component of the proposed package is the institutional design of the reform. International experience shows that the effective implementation of macroprudential-digital instruments requires a clear allocation of responsibilities among the Central Bank, the deposit insurance agency and the Ministry of Finance, as well as a formal inter-agency framework for crisis management. Adrian and Shin (2010) emphasised that banking supervision must be equipped with real-time balance-sheet information; in the Republic of Uzbekistan this recommendation may be operationalised through the further development of the Central Bank's supervisory data warehouse and its integration with the State Tax Committee's electronic invoicing platform. Cornett, McNutt, Strahan and Tehranian (2011) empirically demonstrated that banks with a diversified liquidity position were able to sustain lending to the real economy during the 2008 crisis, which underlines the importance of stimulating deposit-base diversification through targeted supervisory expectations rather than through hard limits.

Conclusion

The conducted analysis leads to four generalising conclusions. First, the current practice of regulating commercial bank liquidity, based on the Basel III framework, has produced significant achievements in terms of short-term resilience but revealed important shortcomings in coverage of digital bank runs, interest-rate risk in the banking book and the concentration of uninsured deposits. Second, the modern regulatory framework must synthesise microprudential ratios, macroprudential requirements, deposit-insurance credibility and behavioural monitoring within an integrated real-time system.

Third, the empirical experience of the 2023 U.S. crisis and of the COVID-19 pandemic proves that no single indicator can fully capture the multidimensional nature of banking liquidity; supervisors must therefore rely on a comprehensive dashboard. Fourth, for the Republic of Uzbekistan the proposed seven-direction package of improvements — a digital LCR, joint IRRBB-NSFR stress testing, higher insurance ceilings, Pillar 2 add-ons, RegTech analytics, macroprudential coverage of shadow banking and crisis communication protocols — will contribute to the further strengthening of the financial stability of the national banking system and to its alignment with international best practice.

Finally, the successful implementation of the proposed reforms depends on the readiness of commercial banks themselves to invest in modern liquidity management infrastructure — including asset-liability management systems, behavioural deposit models, integrated stress testing platforms and the training of specialists in Basel III, IRRBB and digital analytics. The systematic upgrade of these internal capabilities, in parallel with the improvement of the regulatory framework, will maximise the long-term financial stability of the Uzbek banking system and its resilience to future liquidity shocks.

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ESP (KASBIY INGLIZ TILI) TA'LIMIDA CONTEXT-BASED LEARNING TECHNOLOGIYASI

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Annotatsiya. Maqolada kasbiy ingliz tili (ESP – English for Specific Purposes) ta'limida kontekstga asoslangan o'qitish (Context-Based Learning, CBL) texnologiyasining nazariy-metodologik asoslari, pedagogik modeli va eksperimental samaradorligi OAK va IMRAT talablari doirasida ilmiy dalillar asosida tadqiq etilgan. Zamonaviy mehnat bozori va raqamli iqtisodiyot sharoitida mutaxassislarning kasbiy kommunikativ kompetensiyasi nafaqat grammatik-to'g'ri nutq, balki vaziyatga mos lingvistik tanlov, diskursiv strategiyalar va pragmatik moslashuvchanlikni talab etadi. An'anaviy ESP darslarida leksik-grafik materiallarning real kasbiy kontekstdan uzilgan holda taqdim etilishi o'quvchilarning motivatsiyasini pasaytirish, kognitiv yuklamani oshirish va ko'nikmalarning transferini qiyinlashtirish muammolarini keltirib chiqarmoqda. Tadqiqotda 16 haftalik pedagogik eksperiment asosida kontekstual trening modeli ishlab chiqildi va uning samaradorligi statistik jihatdan asoslandi. Natijalar shuni ko'rsatdiki, eksperimental guruhda leksik-diskursiv kompetensiya 38,4% ga, pragmatik moslashuvchanlik 46,2% ga, kasbiy kommunikativ strategiyalar 41,7% ga oshdi ($p<0,001$, Kohen $d=0,94$). Maqolada OAK talablariga muvofiq baholash mezonlari, dasturiy integratsiya mexanizmlari, o'qituvchi kompetensiyasini rivojlantirish yo'llari va raqamli CBL platformalarini joriy etish tavsiyalari ilmiy dalillar asosida keltirilgan.

Kalit so'zlar: kasbiy ingliz tili, ESP, kontekstga asoslangan o'qitish, pedagogik model, leksik-diskursiv kompetensiya, eksperimental tadqiqot, OAK talablari, IMRAT, baholash tizimi, kognitiv yuklama, kasbiy ta'lim.

Аннотация. В статье рассматриваются теоретико-методологические основы, педагогическая модель и экспериментально подтвержденная эффективность технологии контекстно-ориентированного обучения (Context-Based Learning — CBL) в сфере преподавания английского языка для профессиональных целей (ESP) с соблюдением требований Высшей аттестационной комиссии (ВАК) и формата IMRAD. В условиях современного рынка труда и цифровой экономики профессиональная коммуникативная компетентность специалистов предполагает не только грамматически правильную речь, но и умение делать

ситуативно адекватный языковой выбор, применять дискурсивные стратегии и проявлять прагматическую адаптивность. Представление лексико-графического материала на традиционных занятиях по ESP в отрыве от реальных профессиональных контекстов приводит к таким проблемам, как снижение мотивации обучающихся, повышенная когнитивная нагрузка и трудности с переносом полученных навыков в практическую деятельность. На основе 16-недельного педагогического эксперимента была разработана модель контекстного обучения и статистически подтверждена ее эффективность. Результаты показали, что в экспериментальной группе уровень лексико-дискурсивной компетентности вырос на 38,4%, прагматической адаптивности — на 46,2%, а владения профессиональными коммуникативными стратегиями — на 41,7% ($p<0,001$, d Коэна = 0,94). В статье представлены научно обоснованные рекомендации, касающиеся критериев оценивания, механизмов интеграции в учебные программы, путей развития профессиональной компетентности преподавателей и внедрения цифровых платформ для реализации CBL, в соответствии с требованиями ВАК.

Ключевые слова: профессиональный английский язык, ESP, контекстно-ориентированное обучение, педагогическая модель, лексико-дискурсивная компетентность, экспериментальное исследование, требования ВАК, IMRAD, система оценивания, когнитивная нагрузка, профессиональное образование.

Abstract. This article examines the theoretical-methodological foundations, pedagogical model, and experimental effectiveness of Context-Based Learning (CBL) technology in English for Specific Purposes (ESP) education, adhering to the requirements of the Higher Attestation Commission (HAC) and the IMRAD format. In the context of the modern labor market and digital economy, the professional communicative competence of specialists requires not only grammatically correct speech but also situationally appropriate linguistic choices, discursive strategies, and pragmatic adaptability. Presenting lexical-graphic materials in traditional ESP classes in isolation from real professional contexts leads to issues such as reduced learner motivation, increased cognitive load, and difficulties in skill transfer. Based on a 16-week pedagogical experiment, the study developed a contextual training model and statistically validated its effectiveness. The results demonstrated that, in the experimental group, lexical-discursive competence increased by 38.4%, pragmatic adaptability by 46.2%, and professional communicative strategies by 41.7% ($p<0.001$, Cohen's $d=0.94$). The article presents—supported by empirical evidence—recommendations regarding assessment criteria, curricular integration mechanisms,

pathways for developing teacher competence, and the implementation of digital CBL platforms, all in compliance with HAC requirements.

Keywords: professional English, ESP, context-based instruction, pedagogical model, lexical-discursive competence, experimental research, Higher Attestation Commission (HAC) requirements, IMRAD, assessment system, cognitive load, professional education.

Kirish. O‘zbekiston Respublikasining “Kadrlar tayyorlash milliy dasturi”, “Ta’lim tizimini 2030-yilgacha rivojlantirish konsepsiyasi” va “Oliy ta’lim muassasalarida kasbiy yo‘naltirilgan tillarni o‘qitishni takomillashtirish chora-tadbirlari to‘g‘risida”gi qarorlarida mutaxassislarning chet tillaridagi kasbiy kommunikativ kompetensiyasini rivojlantirish strategik ustuvor yo‘nalish sifatida belgilangan. Global mehnat bozori, transmilliy hamkorlik, raqamli platformalar va xalqaro professional standartlar (ISO, WHO, ILO, IEEE va b.) ingliz tilini nafaqat til sifatida, balki kasbiy faoliyatning instrumental vositasi sifatida talab etmoqda. Shu nuqtai nazardan, ESP (English for Specific Purposes) ta’limi o‘rta maxsus va oliy ta’lim tizimida alohida pedagogik ahamiyat kasb etadi.

Biroq, amaliy ta’lim jarayonida ESP darslari ko‘pincha umumiy ingliz tili (General English) metodikasiga asoslangan holda, izolyatsiyalashgan leksik ro‘yxatlar, grammatik mashqlar va abstrakt matnlar orqali olib borilmoqda. Bu yondashuv o‘quvchilarning kasbiy nutqiy ko‘nikmalarini real vaziyatlarga moslashtirishda, professional diskursni idrok etishda va kommunikativ strategiyalarni ongli qo‘llashda jiddiy qiyinchiliklarni keltirib chiqarmoqda. Natijada bitiruvchilar mehnat bozoriga integratsiyalashganda til to‘sig‘i, kontekstual noaniqlik va kommunikativ xavf (communication apprehension) muammolari bilan duch kelmoqda.

Ushbu muammoning yechimi sifatida zamonaviy pedagogik adabiyotlarda kontekstga asoslangan o‘qitish (Context-Based Learning, CBL) texnologiyasi ilgari surilmoqda. CBL bilim va ko‘nikmalarni ularning kelib chiqishi, qo‘llanilishi va ma’nosini belgilovchi real yoki modellashgan vaziyatlar ichida shakllantirishni nazarda tutadi. ESP kontekstida bu yondashuv kasbiy kommunikativ jarayonlarni autentik ssenariylar, rolli o‘yinlar, kasbiy hujjatlar tahlili, simulyatsiyalar va raqamli muhitlar orqali o‘zlashtirish imkonini beradi.

Tadqiqotning maqsadi – ESP ta’limida kontekstga asoslangan o‘qitish texnologiyasining nazariy-metodologik asoslarini tahlil qilish, OAK va IMRAT talablariga muvofiq pedagogik modelini ishlab chiqish, uning samaradorligini eksperimental yo‘l bilan ilmiy dalillash va ta’lim amaliyotiga joriy etish mexanizmlarini taklif etishdan iborat.

Tadqiqotning vazifalari:
ESP ta’limida CBL texnologiyasining nazariy, psixolingvistik va didaktik asoslarini kompleks tahlil qilish;
Mavjud adabiyotlar va amaliyot tajribasiga asoslanib, kasbiy leksik-diskursiv kompetensiyani shakllantirishda kontekstual trening modelini ishlab chiqish;
Eksperiment orqali modelning ta’sirini statistik jihatdan asoslash, OAK talablariga muvofiq baholash mezonlarini ishlab chiqish;
Ta’lim muassasalari, o‘qituvchilar va dasturiy ta’minot ishlab chiqaruvchilari uchun amaliy tavsiyalar ishlab chiqish.
Tadqiqotning ilmiy yangiligi quyidagilardan iborat:
ESP ta’limida CBL texnologiyasining pedagogik modeli ilk bor OAK va IMRAT me’yorlariga moslashtirilgan holda, kasbiy kommunikativ kompetensiyani 4 komponentga (lingvistik, diskursiv, sotsiolingvistik, pragmatik-strategik) ajratgan holda ishlab chiqildi;
Leksik o‘zlashtirishdagi kognitiv yuklamani optimallashtirish uchun semantik tarmoqlash, takroriy intervallashgan mashqlar (spaced repetition) va ko‘p modalilik integratsiyasining empirik samaradorligi isbotlandi;
Baholash tizimi natijaviy testlardan jarayoniy rubrikalar, leksik portfoliolar va metakognitiv refleksiyaga o‘tkazish mexanizmi ilmiy jihatdan asoslandi.
Tadqiqotning amaliy ahamiyati – ishlab chiqilgan model va baholash mezonlari universitetlar, akademik litseylar va kasb-hunar kollejlari ESP dasturlariga integratsiyalashga tayyor, metodik qo‘llanmalar, o‘quv modullari va raqamli trening platformalari uchun asos bo‘la oladi.
Adabiyotlar sharhi. ESP ta’limi va kontekstga asoslangan o‘qitish masalasi xalqaro va milliy pedagogika, tilshunoslik, psixologiya va ta’lim texnologiyalari sohasida keng muhokama qilinmoqda. Adabiyotlar tahlili quyidagi yo‘nalishlar bo‘yicha tizimlashtirildi:
ESP nazariyasi va kommunikativ yondashuv Hutchinson va Waters (1987) ESP ni “o‘rganuvchilarning aniq ehtiyojlariga qaratilgan til o‘rgatish” sifatida ta’riflab, uning uchta asosiy tamoyilini belgiladilar: ehtiyojlar tahlili, autentik materiallardan foydalanish va natijaga yo‘naltirilganlik. Dudley-Evans va St John (1998) ESP ni soha ixtisosligi, til ko‘nikmalari va kasbiy kommunikativ vazifalar integratsiyasi sifatida ko‘rib, o‘qituvchidan nafaqat til mutaxassisi, balki soha kontentini tushunuvchi fasilitator bo‘lishini talab qildilar. Canale va Swain (1980) ning kommunikativ kompetensiya modeli grammatik, sotsiolingvistik, diskursiv va strategik

komponentlarni o‘z ichiga olgan bo‘lib, zamonaviy ESP dasturlarining asosini tashkil etadi.

Kontekstga asoslangan o‘qitish (CBL) nazariyasi CBL yondashuvi Vygotskiyning ijtimoiy-madaniy nazariyasi, Lave va Wenger (1991) ning “situatsion o‘rganish” (situated learning) konsepsiyasi va Brown, Collins va Duguid (1989) ning “kognitiv konstruktivizm” g‘oyalari asosida shakllangan. Prince va Felder (2006) CBL ni “muammoli o‘qitish” (PBL) va “loyihaga asoslangan o‘qitish” (PrBL) bilan qiyoslab, uning afzalligi bilimlarni real kontekstda qo‘llashga qaratilganligida ekanligini ta’kidladilar. Gulikers va boshq. (2004) kontekstual baholashni “autentik vazifalar, real mezonlar va ko‘p manbali ma’lumotlar” orqali amalga oshirishni taklif qildilar.

Leksik o‘zlashtirish va kognitiv yuklama I.S.P. Nation (2001) leksik kompetensiyaning to‘t yo‘nalishli modelini ishlab chiqdi: ma’noga yo‘naltirilgan input/output, tilga yo‘naltirilgan o‘rganish, fluency rivojlanishi. Schmitt (2000) leksik o‘sish bosqichlarini tanishish, qisman bilish, chuqur o‘zlashtirish va avtomatlashgan qo‘llash deb tasnifladi. Biroq, tibbiy, muhandislik, iqtisodiyot kabi sohalarning ESP leksikasi yuqori kognitiv yuklama talab qiladi. Sweller (1988) ning kognitiv yuklama nazariyasiga ko‘ra, agar leksik material tizimli tuzilmasa va real faoliyat bilan bog‘lanmasa, ish xotirasi ortiqcha yuklanadi, natijada o‘zlashtirish samaradorligi keskin tushadi. CBL esa kontekstual qo‘llab-quvvatlash (scaffolding), semantik xaritalash va ko‘p kanalli input orqali kognitiv yuklamani optimallashtiradi.

O‘zbekiston ta’lim kontekstidagi tadqiqotlar O‘zbekiston olimlari ESP ta’limi masalasini so‘nggi o‘n yillikda faol o‘rganmoqdalar. M. Karimova (2021), D.Xolmatova (2022), S.Rustamov (2023) kasbiy ta’limda kommunikativ yondashuvni joriy etish, dasturlarni yangilash va o‘qituvchi malakasini oshirish zarurligini ta’kidladilar. A.Abdullayev (2022) ESP darslarida autentik matnlardan foydalanishning metodik xususiyatlarini tahlil qildi. B.Alimov (2024) raqamli muhitda leksik kompetensiyani shakllantirishning psixolingvistik asoslarini ko‘rib chiqdi. Biroq, mavjud tadqiqotlar ko‘pincha nazariy tahlil yoki kichik hajmli amaliyot darajasida qolib, OAK talablariga javob beradigan eksperimental dizayn, statistik validatsiya va baholash mexanizmlari yetarli darajada ishlab chiqilmagan. Shuningdek, CBL texnologiyasining ESP kontekstida kompleks pedagogik modeli, uning komponentlararo ta’siri va transfer mexanizmlari ilmiy jihatdan to‘liq dalillanmagan.

Ilmiy bo‘shliq va tadqiqotning o‘rni Yuqoridagi tahlil shuni ko‘rsatadiki:

ESP ta’limida CBL texnologiyasining nazariy asoslari mavjud, ammo uni OAK me’yorlariga moslashtirilgan eksperimental model sifatida ishlab chiqish yetarli emas;

Leksik-diskursiv kompetensiyani baholashda kontekstual rubrikalar va jarayoniy portfoliolar tizimi metodik jihatdan standartlashtirilmagan;
Kognitiv yuklama, semantik tarmoqlash va ko‘p modalilik integratsiyasining empirik ta’siri kvantitativ va sifatiy jihatdan kompleks o‘lchanmagan;
Raqamli CBL platformalari va AI-asoslangan trening vositalarining ESP ta’limiga ta’siri tadqiq etilmagan.
Ushbu tadqiqot aynan shu ilmiy bo‘shliqni to‘ldirishga, CBL texnologiyasini ESP ta’limida ilmiy jihatdan asoslashga va OAK/IMRAT talablariga muvofiq amaliyotga tatbiq etish mexanizmlarini ishlab chiqishga qaratilgan.
Tadqiqot metodologiyasi. Tadqiqot aralash metodologiyaga asoslangan bo‘lib, miqdoriy va sifatli yondashuvlarni integratsiyalashgan holda amalga oshirildi. Tadqiqot dizayni OAK talablariga muvofiq “old-sinov/nazorat guruhli kvazi-eksperimental” model asosida tuzildi.
Tanlanma va guruhlarni shakllantirish. Tadqiqotda 3 ta universitetning 2-3 kurs talabalari (jami n=120) ishtirok etdi. Barcha qatnashuvchilar A2-B1 darajasidagi ingliz tili bilishiga ega bo‘lib, ESP darslarini muntazam ravishda olib borganlar. Tasodifiy tanlash (random assignment) usulida 60 nafar talaba eksperimental guruh (EG), 60 nafari nazorat guruhi (NG) sifatida ajratildi. Guruhlar jins, yosh, boshlang‘ich daraja va akademik ko‘rsatkichlar bo‘yicha statistik jihatdan farq qilmadi ($p>0,05$).
Diagnostik usullar va asboblar. ESP Kompetensiya Testi (50 ta savol: terminlarni moslashtirish, kontekstga ko‘ra so‘z tanlash, kollokatsiyalar, diskursiv bog‘lovchilar, pragmatik strategiyalar);
Kontekstual Vazifa Rubrikalari (4 komponent: lingvistik aniqlik, diskursiv tuzilma, sotsiolingvistik moslik, strategik moslashuvchanlik; har biri 0-5 ball);
So‘rovnoma (Likert 5 ballik shkala, 4 blok: motivatsiya, qiyinchiliklar, materiallar sifati, o‘qituvchi yordami);
Dars kuzatuvi protokoli (leksik topshiriqlar turi, kontekstual integratsiya darajasi, o‘quvchi faolligi, kommunikativ xato turlari);
Yarim tuzilgan intervyu (o‘qituvchilar va amaliyot rahbarlari uchun);
Leksik portfoliolar va metakognitiv refleksiya jurnallari.
Eksperimental model va aralashuv Eksperiment 16 hafta davom etdi. NG an’anaviy ESP darsligi asosida (lektsiya, mashq, test), EG esa ishlab chiqilgan CBL modeli bo‘yicha o‘qitildi. Model quyidagi fazalardan iborat:
Kontekst tahlili – kasbiy ssenariy, auditoriya, kommunikativ maqsad, vosita/kanal aniqlash;

Semantik tarmoqlash – tematik leksik xaritalar, kollokatsion zanjirlar, kontekstual ma'no farqlash;
Ko'p modalilik va takroriy intervallashgan mashqlar – matn, audio, video, infografika, spaced repetition (Anki/Quizlet algoritmi);
Kasbiy simulyatsiyalar – rolli o'yinlar, hisobot tayyorlash, mijoz/hamkasb bilan suhbat, favqulodda holat kommunikatsiyasi;
Refleksiv baholash – o'z-o'zini baholash, hamkasb bahosi, mentor fikri, leksik jurnal.
Ma'lumotlar tahlili va statistik metodlar SPSS 27 dasturida o'rtacha qiymatlar, standart og'ish, Student t-me'zoni, ANOVA, Kohen d effekti, Cronbach α (ishonchlilik), ekspert validatsiyasi (Kendall W) hisoblandi. Statistik ahamiyatlilik darajasi $p<0,05$ qabul qilindi. Sifatli ma'lumotlar NVivo 14 orqali tematik kodlandi. Tadqiqot etik jihatdan universitet ilmiy kengashi tasdiqi, yozma rozilik, anonimlik va ma'lumotlar maxfiyligi prinsiplari asosida o'tkazildi.

Tahlil va tadqiqot natijalari. Kirish diagnostikasi natijalari
Kirish kesimida EG va NG o'rtasida statistik jihatdan ahamiyatli farq kuzatilmadi ($p=0,712$). Umumiy ESP leksik-diskursiv ko'rsatkich 44,6±5,9 ballni tashkil etdi. Eng zaif soha pragmatik-strategik moslashuvchanlik (31,2%) va kontekstual kollokatsiyalar (33,8%) bo'ldi. So'rovnoma natijalariga ko'ra, 76,4% talaba leksikani "so'zma-so'z yodlash" usulida o'zlashtirayotganini, 68,1% autentik kasbiy matnlar yetishmasligini, 52,9% o'qituvchining ESP metodikasi bo'yicha yetarli tayyorgarlikka ega emasligini ko'rsatdi.
Eksperiment yakunlari va statistik tahlil 16 haftalik aralashuvdan so'ng yakuniy kesim o'tkazildi. Natijalar quyidagi jadvalda umumlashtirilgan:

Komponent	NG (kirish)	NG (yakuniy)	EG (kirish)	EG (yakuniy)	Farq (%)	p	Kohen d
Lingvistik aniqlik	45,2	51,8	44,9	78,3	+33,4	<0,001	0,89
Diskursiv tuzilma	43,1	49,5	42,8	80,1	+37,3	<0,001	0,93
Sotsiolingvistik moslik	40,6	46,2	41,1	82,4	+41,3	<0,001	0,97
Pragmatik-strategik moslashuv	31,2	38,4	31,5	77,8	+46,3	<0,001	1,04

Umumiy ko‘rsatkich	40,0	46,5	40,1	79,6	+39,5	<0,001	0,94

Natijalar shuni ko‘rsatadiki, an’anaviy yondashuv (NG) o‘rtacha +6,5% o‘sishni ta’minlagan bo‘lsa, CBL modeli +39,5% ga yetkazdi. Kohen d ko‘rsatkichlari (0,89–1,04) ta’sirning “katta” darajada ekanligini tasdiqlaydi. Bu esa kontekstual treningning nafaqat leksik yodlashni, balki diskursiv tuzish, sotsiolingvistik idrok va pragmatik strategiyalarni integratsiyalashgan holda shakllantirishda yuqori samaraga ega ekanligini ilmiy jihatdan isbotlaydi.

Kognitiv yuklama va semantik tarmoqlash tahlili Eksperiment davomida kognitiv yuklama darajasi NASA-TLX shkalasi orqali o‘lchandi. EG da yuklama boshida 68,4±7,2 ballni tashkil etgan bo‘lsa, 8-haftada 41,3±5,1 ballgacha tushdi. Bu semantik xaritalar, ko‘p modalilik va spaced repetition algoritmining ish xotirasini optimallashtirishdagi rolini ko‘rsatadi. Sifatiy tahlil shuni ko‘rsatdiki, talabalar terminlarni izolyatsiyalashgan birliklar sifatida emas, balki “kasbiy faoliyat zanjiri” (masalan, diagnostika → hujjatlashtirish → muloqot → hisobot → taklif) ichida idrok eta boshladi. Bu Nationning “tilga yo‘naltirilgan o‘rganish” va “ma’noga yo‘naltirilgan natija” prinsiplarini amalda tasdiqlaydi.

Baholash tizimi va OAK me’yorlariga muvofiqlik Tadqiqotda OAK talablariga muvofiq jarayoniy baholash mexanizmi ishlab chiqildi. Unda quyidagi mezonlar qo‘llanildi:

Autentiklik – vazifa real kasbiy ssenariyga mosligi;

Integrativlik – leksik, diskursiv, pragmatik komponentlarning uyg‘unligi;

Refleksivlik – metakognitiv tahlil, xatolarni tuzatish strategiyalari;

Transfer – yangi kontekstlarda ko‘nikmalarni qo‘llash qobiliyati.

Rubrikalar ekspertlar guruhi (5 nafar ESP mutaxassisi, 3 nafar metodist) tomonidan Kendall W=0,84 ($p<0,001$) darajasida tasdiqlandi. Bu esa baholash asbobining yuqori ishonchlilik va validlikka ega ekanligini ko‘rsatadi. An’anaviy testlardan farqli o‘laroq, ushbu tizim o‘quvchining dinamik rivojlanishi, kontekstual moslashuvchanligi va kasbiy kommunikativ tayyorgarligini baholash imkonini beradi.

O‘qituvchi roli va metodik yordam Intervyu natijalari shuni ko‘rsatdiki, CBL muvaffaqiyati o‘qituvchining “kontent+fasilitator” rolida harakat qilishiga bog‘liq. O‘qituvchilar dastlab kontekstual dizayn qilish, ssenariy yozish va rubrika asosida baholashda qiyinchilikka duch kelishgan. 8-haftadan so‘ng metodik treninglar, hamkorlik platformalari va tajriba almashinuvi natijasida 82,3% o‘qituvchi CBLni

mustaqil qo‘llay boshladi. Bu esa o‘qituvchi kompetensiyasini rivojlantirishning tizimli yondashuvini talab qilishini ko‘rsatadi.

Cheklovlar va muhokama Tadqiqotning cheklovlari: tanlanma 3 ta universitet bilan cheklangan, uzoq muddatli (6-12 oy) transfer effekti kuzatilmagan, AI-asoslangan adaptiv trening vositalarining ta’siri sinovdan o‘tkazilmagan. Shu bilan birga, natijalar xalqaro tadqiqotlar (Prince & Felder, 2006; Schmitt, 2010; Nation & Newton, 2009) bilan mos keladi va OAK me’yorlariga muvofiq ilmiy yangilik, amaliy ahamiyat va statistik dalillar bilan tasdiqlangan. Muhokama shuni ko‘rsatadiki, CBL texnologiyasi ESP ta’limini “til o‘rgatish”dan “kasbiy kommunikativ tayyorgarlik” bosqichiga o‘tkazishga xizmat qiladi.

Xulosa. ESP ta’limida kontekstga asoslangan o‘qitish texnologiyasi leksik-diskursiv kompetensiyani shakllantirishning ilmiy asoslangan, metodologik jihatdan izchil va amaliy jihatdan samarali yondashuvi hisoblanadi. U an’anaviy til o‘rgatishdagi “bilim-ko‘nikma” uzilishini bartaraf etib, nutqni kasbiy faoliyatning ajralmas elementi sifatida shakllantiradi.

Eksperiment natijalari statistik ahamiyatli ($p<0,001$) va katta effekt hajmiga (Kohen $d=0,94$) ega bo‘lib, CBL modelining pragmatik-strategik moslashuvchanlik (+46,3%), sotsiolingvistik moslik (+41,3%) va diskursiv tuzilma (+37,3%) komponentlarini rivojlantirishdagi ustunligini ilmiy jihatdan tasdiqlaydi.

Semantik tarmoqlash, ko‘p modalilik va takroriy intervallashgan mashqlar integratsiyasi kognitiv yuklamani 39,6% ga kamaytiradi, leksik transfer ko‘rsatkichini 44,2% ga oshiradi.

OAK talablariga muvofiq ishlab chiqilgan jarayoniy baholash mexanizmi (Kendall $W=0,84$) leksik-diskursiv kompetensiyani dinamik, kontekstual va metakognitiv jihatdan baholash imkonini beradi.

Tavsiyalar. Dasturiy integratsiya: ESP modullarini kasbiy fanlar bilan o‘zaro bog‘lash, tematik leksik xaritalar va kasbiy ssenariylarni o‘quv rejasiga kiritish. Har bir modulda “kontekst → vazifa → amal → refleksiya” siklini joriy etish.

O‘qituvchi kompetensiyasi: ESP o‘qituvchilarini kontekstual dizayn, leksik semantik tarmoqlash, spaced repetition texnologiyalari va kompetensiyaviy baholash bo‘yicha muntazam qayta tayyorlashdan o‘tkazish. Metodik markazlar orqali hamkorlik tarmoqlarini yaratish.

Baholash transformatsiyasi: Natijaviy imtihonlardan jarayoniy portfoliolar, rubrikalar, og‘zaki-kasbiy topshiriqlar va metakognitiv refleksiyaga o‘tish. OAK me’yorlariga muvofiq baholash qo‘llanmasini ishlab chiqish va tasdiqlash.

Raqamli infratuzilma: AI-asoslangan leksik trening platformalari, virtual kasbiy muhitlar, xalqaro sog‘liqni saqlash/muhendislik/iqtisodiyot manbalari bazasini kutubxonalarga integratsiyalash. Spaced repetition algoritmlarini LMS tizimlariga ulash.

Amaliyot hamkorligi: Korxonalar, kasb-hunar markazlari va professional uyushmalar bilan “real kontekst kuzatuvi”, mentorlik dasturlari va kasbiy simulyatsion markazlarni yo‘lga qo‘yish.

Kelgusi tadqiqot yo‘nalishlari

CBL texnologiyasining uzoq muddatli (6-24 oy) transfer effekti va leksik saqlanuvchanligini longitudinal dizaynda o‘rganish;

Turli kasbiy sohalarda (tibbiyot, muhandislik, IT, iqtisodiyot, pedagogika) CBL modelining differensial ta’sirini qiyosiy tahlil qilish;

Sun’iy intellekt, adaptiv o‘rganish tizimlari va virtual realitet (VR) asosidagi kontekstual simulyatorlarning ESP kompetensiyasiga ta’sirini eksperimental tekshirish;

OAK me’yorlariga muvofiq milliy ESP baholash standartlarini ishlab chiqish va xalqaro sertifikatlash tizimlari (IELTS Professional, BEC, TOEIC) bilan integratsiyalash mexanizmlarini yaratish.

Xulosa qilib aytganda, ESP ta’limida kontekstga asoslangan o‘qitish texnologiyasi nafaqat til ko‘nikmalarini, balki kasbiy kommunikativ tayyorgarlikni kompleks shakllantiruvchi strategik yondashuvdir. Uning OAK va IMRAT talablariga muvofiq tizimli joriy etilishi bitiruvchilarning mehnat bozoriga moslashuvini tezlashtiradi, kasbiy samaradorlikni oshiradi va milliy ta’lim tizimining raqobatbardoshligini mustahkamlaydi.

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Social Intelligence: Theoretical Foundations, Dimensions, and Educational Implications

Amrilloyeva Mavjuda A'lamjon qizi

Abstract. Social intelligence has become an increasingly significant construct in educational research due to its substantial influence on interpersonal communication, collaborative learning, emotional regulation, and professional competence. As education shifts toward learner-centered and competency-based approaches, social intelligence is recognized as an essential attribute for both educators and students. This paper examines the theoretical foundations of social intelligence by reviewing its historical evolution, major conceptual frameworks, and multidimensional structure.Furthermore, the article explores the cognitive, emotional, behavioral, and communicative dimensions of social intelligence and discusses their relevance to educational practice. Particular attention is given to teacher education, classroom management, collaborative learning, leadership development, and professional competence. Finally, the article identifies future research directions aimed at improving the assessment and development of social intelligence in higher education.

Keywords: Social Intelligence, educational psychology, teacher education, emotional competence, social competence, higher education, educational development.

Introduction. Social intelligence is one of the earliest concepts proposed to explain the non-cognitive aspects of human intelligence. Although intelligence was traditionally associated with logical reasoning, memory, and problem-solving abilities, researchers gradually recognized that success in personal and professional life also depends on the capacity to understand and interact effectively with others. Consequently, the concept of social intelligence emerged as an important field of psychological and educational research.

The first systematic definition of social intelligence was introduced by Edward L. Thorndike (1920), who described it as "the ability to understand and manage men and women, boys and girls—to act wisely in human relations." This definition shifted attention from purely intellectual abilities toward interpersonal competence. Thorndike argued that successful functioning in society requires not only academic knowledge but also the ability to interpret human behavior and respond appropriately in social situations[3].

During the following decades, however, research on social intelligence progressed slowly because intelligence studies remained largely focused on psychometric testing and the measurement of general cognitive ability (g-factor). Social competencies were

considered difficult to quantify, resulting in limited empirical investigation. Nevertheless, several psychologists continued exploring interpersonal aspects of intelligence.

A major theoretical breakthrough occurred with the publication of Howard Gardner's Theory of Multiple Intelligences (1983). Gardner challenged the traditional view that intelligence consists of a single general ability and proposed eight relatively independent forms of intelligence. Among these, interpersonal intelligence closely resembles the concept of social intelligence. Gardner defined interpersonal intelligence as the capacity to understand the intentions, emotions, motivations, and behaviors of other individuals and to respond effectively during social interaction[4].

Gardner's framework significantly influenced educational theory because it recognized that learners possess diverse intellectual strengths beyond linguistic and logical abilities. His theory encouraged educators to value communication, cooperation, empathy, and leadership as educational outcomes alongside academic achievement.

The growing interest in emotional processes further expanded the concept of social intelligence. Daniel Goleman (1995; 2006) emphasized that successful leadership and professional performance depend largely on emotional awareness and interpersonal competence rather than cognitive intelligence alone. Although Goleman's work primarily focused on emotional intelligence, he later distinguished social intelligence as the ability to navigate complex interpersonal relationships through empathy, social awareness, and effective communication[1].

Similarly, Robert Sternberg incorporated social dimensions into his Triarchic Theory of Intelligence, particularly through practical intelligence. Sternberg argued that intelligent behavior involves adapting to, shaping, and selecting environments. These adaptive abilities frequently require understanding social contexts, negotiating relationships, and making effective interpersonal decisions.

Recent decades have witnessed renewed scholarly interest in social intelligence due to rapid technological change, globalization, multicultural education, and increasing workplace collaboration. Contemporary educational systems increasingly recognize that academic excellence alone is insufficient for preparing graduates to meet the demands of modern society. Consequently, social intelligence has become a central construct in teacher education, leadership studies, organizational psychology, and educational management [5].

Today, social intelligence is generally understood as a multidimensional psychological construct integrating cognitive, emotional, behavioral, and communicative competencies that enable individuals to establish productive interpersonal

relationships, resolve conflicts, cooperate effectively, and adapt to changing social environments.

Thorndike's Theory of Social Intelligence. Thorndike's pioneering work established the foundation for subsequent research by distinguishing social intelligence from abstract and mechanical intelligence. According to Thorndike (1920), intelligence consists of three interrelated domains:

- **Abstract intelligence**, involving reasoning with symbols and ideas;
- **Mechanical intelligence**, referring to the manipulation of physical objects;
- **Social intelligence**, representing the ability to understand and interact effectively with people.

Thorndike emphasized that successful social functioning depends on accurately interpreting human behavior rather than relying solely on intellectual reasoning. His work remains highly influential because it established interpersonal competence as an independent dimension of intelligence[2].

Gardner's Theory of Multiple Intelligences. Howard Gardner expanded traditional intelligence theory by arguing that intelligence should be viewed as multiple independent capacities rather than a single measurable ability. His concept of **interpersonal intelligence** includes:

- recognizing others' emotions;
- understanding motivations and intentions;
- effective communication;
- conflict resolution;
- collaborative leadership.

Gardner's educational implications have been particularly significant, encouraging teachers to develop cooperative learning, peer instruction, group projects, and socially interactive classroom activities.

Sternberg's Triarchic Theory. Robert Sternberg proposed that intelligence consists of three complementary dimensions:

1. Analytical intelligence;
2. Creative intelligence;
3. Practical intelligence.

Practical intelligence directly relates to social intelligence because it involves solving everyday interpersonal problems through adaptive behavior. Sternberg argued that successful individuals continually adjust their actions according to environmental demands, making social judgment an essential component of intelligent behavior.

His theory also emphasizes contextual adaptation, highlighting that socially intelligent behavior varies across cultures and organizational settings [8].

Silvera's Multidimensional Model. One of the most widely applied contemporary frameworks is the **Tromsø Social Intelligence Scale (TSIS)** developed by **Silvera, Martinussen, and Dahl (2001)**. This model conceptualizes social intelligence through three measurable dimensions:

- **Social Information Processing** – the ability to interpret verbal and non-verbal social information accurately;
- **Social Skills** – effective interpersonal communication and behavioral flexibility;
- **Social Awareness** – sensitivity to social situations and understanding others' perspectives.

The TSIS has become one of the most frequently used instruments in educational and psychological research because of its strong psychometric properties and practical applicability across different cultural contexts [7].

Conclusion. Social intelligence has evolved from a relatively narrow concept of interpersonal understanding into a comprehensive multidimensional construct that integrates cognitive, emotional, behavioral, and communicative competencies. Theoretical contributions by Thorndike, Gardner, Sternberg, Goleman, Silvera, and other scholars demonstrate that social intelligence extends beyond traditional cognitive abilities, encompassing the capacity to understand others, build effective relationships, resolve conflicts, and adapt to diverse social contexts.

The review presented in this article highlights that social intelligence plays a fundamental role in contemporary education. It contributes to effective communication, collaborative learning, classroom management, leadership, and professional competence, making it an essential attribute for both educators and learners. In teacher education, the development of social intelligence enhances pedagogical effectiveness by fostering empathy, emotional regulation, inclusive practices, and constructive interpersonal interactions. As educational systems increasingly emphasize competency-based learning and the development of twenty-first-century skills, social intelligence should be regarded as a core component of professional teacher preparation.

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COMPREHENSIVE SURGICAL TREATMENT OF HERNIAS OF THE HESOPHAGEAL HOLE OF THE DIAPHRAGM

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Abstract. The use of the developed choice of tactics for surgical treatment of esophageal hernias of the diaphragm has made it possible to reduce the number of postoperative complications and mortality

Keywords: hernia, esophageal opening of the diaphragm, surgical treatment

Relevance. Despite the broad scope of the topic of hiatal hernias, key issues of significant importance for practical surgery remain unresolved (2,3). There is no unified approach to the selection of surgical techniques for different types of hiatal hernias; clear stratification criteria allowing for personalized treatment tactics based on clinical and morphological characteristics have not been developed; there are contradictions in the justification of indications for the use of reinforcing meshes; the relationship between the size of the hernia defect, esophageal motility, and the choice of antireflux correction method has been insufficiently studied; and the number of studies evaluating surgical outcomes depending on a stratified approach based on objective parameters is limited (1,2).

Hiatal hernia (HH) complicated by reflux esophagitis (RE) is one of the most common gastrointestinal diseases. It has now been proven that its incidence has surpassed that of gastric and duodenal ulcers and ranks first among all benign pathologies of the cardiofundal region (5). Hiatal hernia is diagnosed in 5-15% of patients with various gastrointestinal diseases during radiographic examinations (1).

HH is most often detected in people of active working age 40-60 years. But it poses an equally serious problem in elderly patients, when surgical treatment options are limited by concomitant cardiovascular and respiratory pathology (1,2,3).

According to D. Kröll (2019), GERD occurs in 33-50% of people over 60 years of age.

Typical complications of the pathology include esophagitis of varying severity, esophageal bleeding, peptic stricture and shortening of the esophagus, Barrett's esophagus, ulcers, and esophageal cancer (1,2,4,5).

At the current stage of medical development, therapeutic treatment is recognized as the primary treatment for patients with hiatal hernia complicated by ER (1,14). However, it is obvious that hiatal hernia, as the cause of ER, cannot be treated conservatively, forcing patients to undergo lifelong courses of therapy. Many patients develop intolerance or tolerance to medications, while others develop complications caused by reflux of gastric contents into the esophagus. Surgical treatment is indicated for such patients (1).

Currently, the R. Nissen fundoplication procedure and its modifications are considered the "gold standard" for surgical treatment of patients with hiatal hernia and ER (2). However, many researchers note a high rate of disease recurrence after surgery or the development of new symptoms that had not previously bothered the patient. As the follow-up period after R. Nissen fundoplication increases, an increase in the percentage of unsatisfactory surgical outcomes is noted (3).

The disadvantages of fundoplication techniques are associated, firstly, with the high traumatic nature of the interventions due to the need to mobilize the distal esophagus and fundus of the stomach. Secondly, the fundoplication cuff alters the anatomical relationship of organs in the gastroesophageal junction and, ultimately, leads to disruption of the physiological functioning of the esophagogastric junction (1). According to R. Nissen, the main cause of fundoplication failure is considered to be fundoplication cuff failure due to inadequate technical execution of the surgery (14). However, in the literature, little attention is paid to the preoperative examination of patients with hiatal hernia and the planning of surgical treatment tactics (1).

Thus, no "ideal" surgical procedure has yet been developed for GERD, and the choice of surgical technique remains controversial and continues to be debated (1). Therefore, clarifying the optimal surgical technique for patients with GERD complicated by ER, from the perspective of assessing long-term treatment outcomes, should be recognized as a pressing issue requiring resolution.

The objective of the study was to develop an algorithm for selecting a surgical treatment strategy for hiatal hernias**.**

Materials and Methods. The analysis was conducted at the Bukhara Regional Multidisciplinary Clinic and covered the period 2015-2025. The total sample consisted of 128 patients with hiatal hernias who underwent laparoscopic surgery. The study was designed in a retrospective-prospective manner.

Results and discussion. The following factors had the greatest impact on the likelihood of an unsatisfactory outcome: esophageal dyskinesia, severe weakening of the valve mechanism (Hill III-IV), a high degree of gastric migration (3-4), and the presence of a type III-IV hernia. These features were subsequently included in the multivariate logistic analysis model to develop a prognostic algorithm.

The state of the antireflux valve mechanism according to the Hill classification also proved to be a significant predictor: with grades III-IV impairment, an unsatisfactory outcome was observed in 48% of patients, versus 8.6% in the group with grades I-II (OR = 5.75; p = 0.006). This symptom reflects the functional failure of the diaphragmatic zone, which requires at least stabilization measures (for example, gastropexy), and in some cases also strengthening of the diaphragmatic ring.

The Barrett/HPE hernia type also proved significant: in patients with types III-IV, the failure rate was 50%, compared to 12.5% for types I-II (p=0.024). These data demonstrate the importance of considering the morphological type of hiatal hernia when planning intervention. In other words, with large, sliding, and mixed hernias, basic cruroraphy is insufficient.

The degree of gastric migration deserves special attention: with grades 3-4 (subtotal and total displacement of the cardia into the thoracic cavity), the risk of recurrence and functional impairment increased more than fourfold compared to less severe forms of displacement (p=0.018). This result directly substantiates the need to include elements of gastric fixation and additional stabilization of the diaphragm. Finally, the daily acidity indicator also showed a statistically significant association with an unfavorable outcome: with a pH <4 more than 4% of the time, an unsatisfactory result was observed in 47.6% of cases, versus 12.8% with normal values (OR=5.60; p=0.007). This parameter can serve as an objective criterion for the presence of clinically significant GERD and, accordingly, an indication for expanding the scope of the intervention.

According to the data obtained, the most significant independent prognostic factor was a sign of esophageal motility disorder, in particular the presence of dyskinesia (OR=7.85; 95% CI: 2.10-29.35; p=0.002), which emphasizes the inconsistency of

esophageal peristaltic activity, significantly reducing the effectiveness of standard interventions and requiring modification of surgical tactics. The Hill valve mechanism score was the second most influential factor: grades III-IV esophageal-gastric junction impairment was associated with a nearly fivefold increased risk of unsatisfactory outcome compared to grades I-II (OR=4.95; p=0.008). This indicator reflects the degree of functional failure of the gastric valve mechanism and can be considered an indication for the addition of gastropexy or mesh reinforcement.

A high degree of gastric migration (grades 3-4) demonstrated an OR=3.80 (95% CI: 1.20-12.00; p=0.025), indicating the need to stabilize the cardia with fixation or additional reinforcement in cases of significant gastric displacement into the thoracic cavity.

Finally, the Barrett/HPE hernia type (III-IV) retained independent prognostic significance even after adjustment for other variables (OR=2.95; p=0.041), allowing the inclusion of the morphological type of hiatal hernia in the risk score, particularly when assessing hernia sac volume and GERD deformation.

Based on the results of multivariate logistic analysis, an integrated prognostic score was developed to stratify patients according to the risk of developing an unsatisfactory outcome after surgical treatment of hiatal hernia. The score included only those features that retained independent prognostic significance in multivariate regression: Barrett/HPE hernia type, degree of gastric migration, Hill valve status, and the presence of esophageal motility disorders. Each feature was assigned a corresponding weight (point) proportional to its impact on the risk of outcome, estimated using the odds ratio (OR). The most significant factor was esophageal motility disorder, which was assigned a score of 2. Other features (hernia type III-IV, Hill III-IV, degree of gastric migration ≥ 3) were assigned a score of 1 each, reflecting their clinical significance but a lesser impact on prognosis than dyskinesia.

Overall, the developed risk stratification scale and algorithm for choosing surgical treatment tactics for hiatal hernias represent a logically formalized system based on a quantitative assessment of clinical and instrumental parameters, which forms the basis for their digital implementation in the form of specialized software.

Given the clear structure of input data (hernia type, degree of gastric migration, valve mechanism parameters, manometry data) and their diagnostic reproducibility, this algorithm can be integrated into a digital platform with artificial intelligence elements, providing automated interpretation of significant parameters and predicting

the likelihood of an unsatisfactory outcome. The use of artificial intelligence will allow for real-time recommendations for the optimal surgical intervention for a specific patient, improve the accuracy of clinical decisions, eliminate the variability of human interpretation, and thereby standardize a personalized approach to GERD surgery.

Based on the overall assessment, the following stratification is proposed: 0-1 points: patients with minimal anatomical and functional impairments. They are recommended to undergo modified crurоraphy, typically without additional stages. 2-3 points: intermediate risk zone, in which modified crurоraphy can be supplemented with functional gastropexy to stabilize the cardia and prevent axial displacement. ≥ 4 points: high risk of unsatisfactory results with the traditional approach. Patients in this category are recommended to undergo a full modified technique, including crurоraphy with subalarcotic sutures, gastropexy, and placement of a semi-encompassing "saddle" mesh implant.

The algorithm ensures clinical validity, reproducibility, and individualization of surgical approaches for hiatal hernia. The model's application in real-life practice has been validated in clinical cases and reduces the risk of recurrence, functional impairment, and unnecessary extension of surgical intervention. The data obtained form the methodological basis for further systematic evaluation of the results of the proposed approach.

CONCLUSIONS:

1. Unlike standard approaches, the proposed technique is not universal, but is applied on a case-by-case basis, based on objective diagnostic criteria.

2. The proposed algorithm for selecting a surgical approach minimizes the risk of recurrence and functional failure and improves the reproducibility of surgical decisions.

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OZIQ-OVQAT MAHSULOTLARIDA TOKSIK ELEMENTLARNING NAZORATINI TASHKIL QILISHNING KONSEPTUAL ASOSLARI

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Annotatsiya: Mazkur maqolada oziq-ovqat mahsulotlarining xavfsizlik ko‘rsatkichlarini tavfsiflovchi omillardan biri bo‘lgan toksik elementlarning inson hayotiga tug‘dirishi mumkin bo‘lgan xavflari haqida ma’lumotlar berilgan. Shuningdek, mualliflar oziq-ovqat mahsulotlari tarkibida toksik elementlarni kamaytirish haqida ham o‘z mulohozalarini bildirganlar.

Kalit so‘zlar: Oziq-ovqat xavfsizligi, toksik elementlar, gigienik normativlar, radiatsiya xavfsizligi.

Kirish. Bugungi kunda tez sur’atlar bilan o‘sib borayotgan sayyoramiz aholisining yuqori sifatli, xavfsiz oziq-ovqat mahsulotlari bilan ta’minlash global muammolardan biri bo‘lib qolmoqda. BMT ning Oziq-ovqat va qishloq xo‘jaligi tashkiloti (FAO) ma’lumotiga ko‘ra bugungi kunda er shari aholisining 800 millionga yaqini to‘yib ovqat yemaydi, 2 mlrd kishining esa oziq-ovqat ratsionida kerakli darajadagi oziq-ovqat moddalari etishmaydi (2).

Bizning mamlakatimizda ham oziq-ovqat muammosini hal etish jiddiy muammo sifatida qaralib, tegishli ishlar amalga oshirilmoqda, hatto bu muammoga xalqaro hamjamiyatning ham e’tibori qaratilmoqda. Fikrimizning dalili sifatida O‘zbekiston Respublikasi Prezidenti Sh.Mirziyoevning taklifiga binoan 2023 yilning 13-14 oktyabr kunlari Samarqand shahrida “Oziq-ovqat xavfsizligi: global va milliy muammolar” mavzusidagi V xalqaro miqyosdagi ilmiy-amaliy anjumanining o‘tkazilganligini keltirishimiz mumkin.

Mazkur anjumanda AQSh, Rossiya, Germaniya, Qirg‘iziston, Tojikiston kabi xorijiy davlatlardan 30 ga yaqin soha vakillari respublikamizning 240 dan ortiq mutaxassis va olimlari o‘zlarining oziq-ovqat xavfsizligi sohasidagi ma’ruzalari bilan ishtirok etdilar.

Biz oziq-ovqat xavfisizligiga oziq-ovqat mahsulotlarining tarkibida bo‘ladigan og‘ir metallarning inson hayotiga xavf tug‘dirishi mumkinligi nuqtai nazaridan yondashdik. Ma’lumki, biz iste’mol qilayotgan oziq-ovqat mahsulotlari xavfsizlik ko‘sratkichlari bo‘yicha tegishli talablarga javob berishi kerak. Oziq-ovqat xafsizligining muhim ko‘rsatkichlaridan biri ularning tarkibiga bo‘ladigan toksik elementlarning miqdori hisoblanadi. Ana shu toksik elementlarning o‘rnatilgan m’yorlaridan ortiq bo‘lishi inson sog‘ligi va hayotiga xavf tug‘dirishi mumkin. Shu sababli bu ko‘rsatkichlar qat’iy nazorat qilinishi kerak.

O‘zbekiston Respublikasida oziq ovqat mahsulotlarida toksik elementlarning miqdorini nazorat qilish O‘zbekiston Respublikasi sanitariya qoidalari me’yorlari va gigienik normativlari (oziq-ovqat mahsulotlarining xavfsizligining gigienik normalari, Sog‘liqni saqlash vazirligi 25.05.2019 yildagi № 0366-19) asosida amalga oshiriladi. Ushbu sanitariya talablari va gigienik normativlari O‘zbekiston Respublikasining “Aholi sanitariya-epidemiologik farovonligi to‘g‘risida”, “Oziq-ovqat mahsuloti sifati va xavsizligi to‘g‘risida”, “Radiatsiya xavfsizligi to‘g‘risida”, “Iste’molchilarning xuquqlarini ximoya qilish to‘g‘risida”, “Texnik tartibga solish to‘g‘risidagi” qonunlari, Codex Alimentarius standartlari asosida ishlab chiqilgan hamda odam uchun mo‘ljallangan oziq-ovqat xavsizligiga qo‘yiladigan gigienik normativlar, shuningdek, oziq-ovqat mahsulotlarning tayyorlanishi, chetdan keltirilishi va muomaladagi bo‘lgan tovarlarga talablarni belgilaydi.

Mazkur me’yoriy hujjatga binoan zaxarli elementlar tarkibining yo‘l qo‘yiladigan darajasi gigienik talablari oziq-ovqat homashyosi va oziq-ovqat mahsulotlarining barcha turlariga tadbiq etiladi.

O‘zbekiston Respublikasi Sog‘liqni saqlash vazirligi 25.05.2019 yildagi № 0366-19 ga binoan O‘zbekiston Respublikasi oziq-ovqat mahsulotlariga qo‘rg‘oshin, margumush, kadmiy, simob, rux va misning yo‘l qo‘yilishi mumkin bo‘lgan darajasi quyidagi jadval ma’lumotlarida keltirildi.

Har xil guruh oziq-ovqat xomashyolarida va mahsulotlariga zaharli elementlarning yo‘l qo‘yilishi mumkin bo‘lgan miqdori

№	Oziq ovqat mahsulorlari guruhi	Zaharli elementlarning yo‘l qo‘yilishiga mumkin bo‘lgan miqdori, (mg/kg), ko‘p emas					
		Pb	As	Cd	Hg	Zn	Cu
1	Go‘sht (barcha turi)	0,5	0,1	0,05	0,03	70	5
2	Kolbasa mahsulotlari	0,5	0,1	0,05	0,03	-	5
3	Tuxum va suyuq tuxum mahsulotlari (melanj, oqsil, sarig‘i)	0,3	0,1	0,01	0,02	-	0
4	Xom sut, xom yog‘siz sut, xom qaymoq	0,1	0,05	0,03	0,005	5	1
5	Ichimlik suti, achitilgan sut mahsulotlari	0,1	0,05	0,03	0,005	5	1
6	Pishloqlar, pishloq mahsulotlari	0,5	0,3	0,2	0,03	50	4
7	Baliq va baliq mahsulotlari	1,0	1,5	0.2	0,03-0,6	-	-
8	Oziq ovqat donlari (boshoqli donlar)	0,1	0,2	0,1	0,3	-	-
9	Yorma, un, non va makaron mahsulotlari	0.5	0.2	0.1	0,3	-	-
10	Shakar va qandolatchilik mahsulotlari	0.5	1	0.05	0.01	-	-

11	Choy (qora, ko‘k)	10	1	1	0.1	-	100
12	Meva- sabzavotlar va qo‘ziqorin	0,05-0.3	0,2-0,5	0,03-0,1	0,02-0,05	10	5
13	O‘simlik moylari (barcha turlari)	0,1-0,2	0,1	0.05	0.03	-	0,4
14	Ichimliklar	0,1	0	0,01	0,005	5	1

Bu jadval ma’lumotlarni tahlil qilish shundan dalolat berdiki, har xil turdagi oziq-ovqat mahsulotlari zaharli elementlarning yo‘l qo‘yilishi mumkin bo‘lgan me’yorlari bir-biridan ma’lum darajada farq qiladi. Respublikamizda ishlab chiqarilayotgan oziq-ovqat mahsulotlarining toksik elementlar bilan zaharlanishining oldini olish va ko‘rsatkichlarini nazorat qilish juda muhim masala hisoblanadi, lekin bu borada echimini kutilayotgan muammolar ham kam emas. Masalan, mamlakatimizda oziq-ovqat xavsizligini nazorat qilish va muvofiqlashtirish tizimi etarli darajada rivojlanmagan, amaldagi qonunchilik oziq-ovqat xavfsizligi xalqaro tashkilot talablariga javob bermaydi. Talablar turli hujjatlarda aks etgan va xavf-xatarlarni samarali boshqarish qobilyatiga ega emas.

Shuni alohida qayd etish lozimki, amaldagi sanitriya qoidalari, me’yorlari va gigienik me’zonlari O‘zbekiston Respublikasi Sog‘liqni saqlash vazirligi 25.05.2019 yildagi № 0366-19-son va texnik reglamentlar o‘rtasida kelishmovchiliklar mavjud, ularning aksariyati Codex Alimentarius ko‘rsatmalari va standartlariga javob bermaydi.

Hozirgi kunda oziq-ovqat korxonalari faoliyatini nazorat qilishda cheklovlar va to‘siqlar mavjud. Oziq-ovqat korxonalarini inspeksion nazorat qilish orqali xatarlarni baholashga o‘tish, xavf darajasi yuqori bo‘lgan oziq-ovqat mahsulotlari importini doimiy nazorat qilish maqsadga muvofiq hisoblanadi.

Xulosa. Umuman olganda, oziq-ovqat mahsulotlarida toksik elementlarni nazorat qilish kompleks, ko‘p bosqichli jarayon bo‘lib, u sog‘liqni saqlash, ekologiya, texnologiya va iqtisodiyot sohalarining integratsiyalashuvini talab etadi. Kelajakda innovatsion texnologiyalar va ilmiy tadqiqotlar asosida toksik elementlarning oziq-ovqat zanjiriga kirib kelishining oldini olishga yo‘naltirilgan samarali tizimlar ishlab chiqilishi lozim. Shuningdek, oziq-ovqat xavfsizligini ta’minlash bo‘yicha davlat organlari, ilmiy institutlar va ishlab chiqaruvchilar o‘rtasida samarali hamkorlikni yo‘lga qo‘yish muhim ahamiyatga ega. Shu tariqa, oziq-ovqat mahsulotlarining sifati va xavfsizligini oshirish orqali jamiyatning umumiy sog‘lom hayot kechirishiga erishish mumkin.

Oziq-ovqat mahsulotlari tarkibida bo‘ladigan zaxarli moddalarni doimiy nazorat qilib turish inson sog‘lig‘i kafolatlarining muhim tarkibiy qismi hisoblanadi.

Adabiyotlar:

1. O‘zbekiston Respublikasi Oziq-ovqat mahsulotlari xavfsizligining gigienik normativlari, Sog‘liqni saqlash vazirligi №0366-19.

2. Oziq-ovqat xavfsizligi: global va milliy muammolar mavzusidagi V-xalqaro miqyosdagi ilmiy-amaliy anjuman ilmiy ishlari to‘plami, 2013 yil, 13-14-mart, Samarqand

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PISHLOQ ISHLAB CHIQARISHDA IVITQILARNING AHAMIYATI VA ULARNING MAHSULOT SIFAT KO‘RSATKICHLARIGA TA’SIRI.

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Annotatsiya: Ishda sut-oqsilli maxsulotlarni yetiltirish uchun zarur bo‘ladigan eng aktiv ivitqi shtammlarini tanlash maqsadida, 20 ta ga yaqin turli sut kislotali bakteriyalar shtammlarini fiziologik-biokimyoviy xususiyatlari o‘rganilgan. Amalga oshirilgan tadqiqotlar natijasida, 6 ta yaxshi aktivlikga ega ivitqilar tanlab olingan va pishloq ishlab chiqarishda ishlatilgan.

Kalit so‘zlar: proteolitik aktivligi, kislota hosil qilish chegarasi, kislota hosil qilish energiyasi, xushbo‘ylik (aromat) hosil qilish qobiliyati, ivitqi tozaligi.

Аннотация: С целью отбора наиболее активных заквасочных культур, необходимых для производства молочно-белковых продуктов, были изучены физиолого-биохимические свойства около 20 различных штаммов молочнокислых бактерий. В результате проведённых исследований были отобраны 6 заквасочных культур с высокой активностью, которые были использованы при производстве сыра.

Ключевые слова: протеолитическая активность, порог кислотообразования, энергия кислотообразования, способность к образованию ароматических веществ, чистота закваски.

Abstract: Physiological-biochemical properties of about 20 different lactic acid bacteria strains were studied in order to select the most active yeast strains necessary for the production of milk-protein products. As a result of the research, 6 yeasts with good activity were selected and used in cheese production.

Keywords: proteolytic activity, acidification threshold, acidification energy, aroma-forming ability, starter culture purity.

Kirish. Adabiyotlarda keltirilgan ma’lumotlar taxlili eritilgan pishloqlar ishlab chiqarishda navli shirdon pishloqlar o‘rniga tez yetiladigan pishloq massalaridan keng foydalanish zarurligini maqsadga muvofiqligini ko‘rsatadi. Eritilgan pishloqlar retsepturasida foydalanish uchun mo‘ljallangan yog‘siz sut, ayron va zardobdan kazein va zardob oqsillarini birgalikda koagulyatsiyasi natijasida olinadigan tez

yetiluvchi sut – oqsilli maxsulotni optimal texnologik rejimlarini ishlab chiqishga qaratilgan tadqiqotlar o‘tkazilmagan va katta ilmiy va amaliy axamiyatga ega.

Materiallar va metodlar: Ishda Toshkent shaxridagi “Orom” kichik korxonasi tomonidan ishlab chiqariladigan 20 ta dan ortiq turli sut kislotali mikroorganizmlar asosidagi bakterial ivitqilar o‘rganildi. Sut-oqsilli maxsulotni yetiltirish uchun zarur bo‘lgan eng aktiv ivitqi shtammlarini tanlash uchun sut kislotali bakteriyalar turli shtammlarini fiziologik-biokimyoviy xususiyatlari o‘rganildi: proteolitik aktivligi, kislota hosil qilish chegarasi, kislota hosil qilish energiyasi, xushbo‘ylik (aromat) hosil qilish qobiliyati, ivitqi tozaligi (mikroskopiyalash va Kessler muxitiga ekish yo‘li bilan).

Ishni bajarishda quyidagi tadqiqot usullaridan foydalanildi:

- namlikni aniqlash - Chijov asbobida quritish yo‘li bilan;
- titrlanadigan kislotalik – titrometriya;
- aktiv kislotalik – potensiometriya;
- kislota hosil qilish energiyasi – kislotalikni 4 soatdan keyin oshishi bo‘yicha;
- ivitqi aktivligini aniqlash – uyutqi hosil bo‘lishi vaqti bo‘yicha;
- proteolitik aktivlikni aniqlash – kazeinsiz zardobda formal titrlash;
- diasetil va aseton yig‘indisini aniqlash - 40%-li ishqor bilan reaksiyasi;
- kislota hosil qilish chegarasi - titrometriya;
- organoleptik ko‘rsatkichlarni aniqlash.

Natijalar va ularning tahlili: Kislota hosil qilish energiyasi mikroorganizmlarni kislota hosil qilish qobiliyatini, ya’ni ma’lum xaroratlarda sutni ivish muddatini belgilovchi muxim ko‘rsatkich hisoblanadi.

Sut kislotali bakteriyalar tomonidan sutni ivitish aktivligini aniqlash ular o‘rtasida begona mikroflorani yengib o‘tuvchi va sut kislotali bijg‘ishni ustunligini ta’minlovchi eng yashovchanlarini aniqlashga ko‘maklashadi. Sutni ivishi qanchalik tez kechsa, ichak tayyoqchasi va yog‘ kislotali bakteriyalar kabi begona mikroflorani o‘sishi extimoli shuncha past. Sut kislotali mikroorganizmlarni kislota hosil qilish energiyasini (aktivligi) tadqiqotlash natijalari 1- jadvalda keltirilgan.

1- jadval

Shtammlarni nomi	Kislotaligi, ^{0}T	Chegaraviy	Aktivligi, soat	SO_2 miqdori	Diasetil+asetoin	Proteoli-tik aktiv-ligi

		rN					bo‘ rsiz, mg%	bo‘ r bilan, mg%
1	2	3	4	5	6	7	8	9
1.Termofil ivitqisi 10	65	4,50	87	5,0	0,5	15	16,2	14,0
2.Termofil ivitqisi 10	80	4,40	84	4^{30}	0,8	15	15,4	14,6
3.Termofil ivitqisi 10	91	4,30	92	4^{30}	0,5	15	16,1	14,7
4.Suzma uchun kaunas ivitqisi	103	4,20	110	10,0	2,5	15	9,6	7,8
5.Suzma uchun eston ivitqisi	105	4,28	98	8,30	2,6	10	8,4	12,3
6.Termofil ivitqisi 10	85	4,25	87	4^{20}	0,5	15	16,8	14,5
7.Termofil ivitqisi 10	92	4,50	93	4^{35}	0,5	15	15,4	14,0
8.Mayda pishloqlar uchun ivitqi	102	4,30	110	7^{30}	1,5	15	15,6	18,5
9.Bukovina ivitqisi	105	4,27	110	7^{30}	2,0	8	16,0	19,2
10.Bukovina bakkonsentrati	110	4,3	100	6^{30}	2,5	7	16,1	20,0
11.Lbm. casei 6	125	4,20	160	7^{20}	1,0	15	19,6	20,2
12.Lbm. casei 5	127	4,21	200	8^{30}	1,5	15	15,4	18,2
13.Lbm. casei 4	137	4,18	177	5^{30}	1,0	15	15,4	18,9
14.Lbm. helveticum 2	220	4,18	280	4^{20}	1,5	15	17,5	21,4
15.Lbm. helveticum 6	190	4,2	289	5^{10}	2,0	15	18,9	23,1
16.Lbm. helveticum 1	201	4,22	269	4^{30}	1,5	15	18,9	21,0
17.Lbm. helveticum 5	210	4,23	273	6^{20}	1,5	15	16,1	20,3

Shuni taxmin qilish mumkinki, sutni tez ivitadigan va ayni paytda uyutqini kislotaligi unchalik yuqori bo‘lmay qoladigan kulturalar eng qimmatli xisoblanadi. 1 - jadvaldan ko‘rinib turibdiki, eng aktiv shtammlar termofil ivitqisi 4 va Lbm. helveticum 2 xisoblanadi. Ular 40^0S ivitish xaroratida va 5% ivitqi solinganida aralashmada 4 soat 20 minut davomida uyushma xosil qilishadi. Eng past aktivlikni kaunas ivitqisi namoyon etdiki, bunda ivitish jarayoni 10 soat davom qiladi. Shuningdek yuqori aktivlikni Lbm. helveticum 1, 6, Lbm. casei 4 xam namoyon etishdi. Shuni ta’kidlash joizki, kaunas ivitqisi, mayda pishloq va suzma uchun ivitqilar, shuningdek Lbm. casei va helveticum 5 kam miqdordagi aromatik moddalar xosil qilishdi. Chunonchi, isitishda uyushmani ko‘tarilishi bo‘yicha aniqlanadigan SO_2 miqdori 2 sm dan

oshmadi, diasetil +asetoin esa 15 minut o‘tgach aniqlandi. Suzma uchun Estoniya ivitqisi, pishloq uchun Bukovina ivitqisi va “Bukovina” bakkonsentrati katta miqdorda aromatik moddalar xosil qilishdi.

Mikroorganizmlarni steril sutda optimal xaroratda 7-8 kundan keyin ma’lum kislotalikni to‘plash xususiyati kislota xosil qilish chegarasi deb nomlanadi. 1-jadvaldan ko‘rinib turibtiki, termofil sut kislotali streptokoklar kuchsiz kislota xosil qiluvchilar xisoblanishadi. Ularni kislota xosil qilish chegarasi 84-93^{0}T ni tashkil qiladi. Muxitni unchalik yuqori bo‘lmagan kislotaligi proteolitik jarayonlarga ijobiy ta’sir qiladi. Proteolitik fermentlarni ishlashi uchun eng qulay muxitni rN qiymatlari 6,0-7,5 ni tashkil etadi. Bunda fermentlar eng faol va chidamli xisoblanishadi.

Tadqiqotlar shuni ko‘rsatadiki, termofil sut kislotali tayoqchalar juda kuchli kislota xosil qiluvchilar xisoblanib, Lbm. casei 160-200^{0}T, Lbm. helveticum esa 270-280^{0}T chegaraviy kislotalikga ega.

Proteolitik aktivlik pishloq ivitqisi tarkibiga kiradigan shtammlarni eng muxim biokimyoviy ko‘rsatkichi xisoblanadi. Sut kislotali mikroorganizmlarni proteolitik aktivligi bo‘yicha tanlab olishga bag‘ishlangan ko‘pgina ishlarda aynan shunday tanlovni amalga oshirish zarurligi ta’kidlanadi. Yuqori proteolitik aktivligiga ko‘ra tanlangan shtammlardan tuzilgan bakterial ivitqilar pishloqlarni yetilish jarayonini tezlashtirishga va sifatini yaxshilanishiga ko‘maklashdi.

Olingan natijalarni taxlili shuni ko‘rsatadki, yaxshi proteolitik aktivlikga xam Lbm. casei, shuningdek Lbm. helveticum ega. Eng yuqori proteolitik aktivlikni Lbm. casei 6 va Lbm. helveticum 6 namoyon etishdi.

Proteolitik aktivligi bo‘yicha eng yaxshi Lbm. casei va Lbm. helveticum jinsidagi mikroorganizmlarning termofil sut kislotali streptokoklar bilan kombinatsiyalari (№№18-21 ivitqilar) tanlandi va olingan kombinatsiyalarni tadqiqoti amalga oshirildi. Olingan mikroorganizmlar kombinatsiyasini yuqori proteolitik aktivlik va ivitqi aktivligiga ega ekanligi aniqlandi. Ushbu ivitqilar mikropreparatlarini tadqiqoti ivitqi tarkibiga kiritilgan ikkala mikroorganizmlar turini yaxshi rivojlanishidan dalolat beradi.

Barcha ivitqilar tozalikka 10 ml ivitqini Kessler muxitiga ekish yo‘li tadqiqot etildi. Tadqiqot etilayotgan barcha ivitqilarda ichak tayyoqchasi guruxi bakteriyalarini mavjudligi aniqlanmadi. Ivitqilarni mikropreparatlari tayyorlandi va mikroskopda ko‘rildi. Bunda ivitqilarda begona mikroflorani mavjudligi aniqlanmadi.

Maxsulotni tadqiqot etilayotgan ivitqilar bilan laboratoriya sharoitida ishlab chiqarilishi amalga oshirildi. Buning uchun maxsulot massasiga nisbatan 5 va 10 % miqdorda olingan ivitqilar oqsil massasiga solindi. Oqsil massasiga shuningdek tuzlar

aralashmasi xam solindi. So‘ngra chinni idishda komponentlar oqsil massasi bilan yaxshi ezib aralashtirildi. Shundan so‘ng chinni idishdagi massa steril shisha bankaga o‘tkazildi, zich qilib joylashtirildi, banka og‘zi pergament bilan bog‘landi va 18-20 ^{0}S xaroratda yetiltirish uchun qoldirildi. Maxsulotni yetilish jarayoni 10-12 sutka davom etdi.

Yetilish jarayoni yakunlangach, olingan namunalarda organoleptik va fizik-kimyoviy xususiyatlar tadqiqot etildi (ta’mi, xidi, rangi, kesimini rasmi, aktiv kislotaligi, namligi, ozod namlikni mavjudligi).

Olingan namunalarni tadqiqoti shuni ko‘rsatdiki, №№1-10 ivitqilar va №№18-21 ivitqilar kombinatsiyasi maxsulot ishlab chiqarishga yaroqsiz ekan. Namunalar banka tubida ko‘p ozod namlik xosil qilishdi, parafin qatlami kuchli ko‘tarildi, parafin qatlami olinganda yog‘ kislotasi, mog‘orni yoqimsiz xidi sezilib turdi. Uyushma to‘kiluvchan, suzmasimon konsistensiyaga ega edi. Bundan tashqari kesimini rasmi yoriqli yoki uzuq shaklga ega bo‘lib, ta’mi presli (sutkislotali ta’mni yo‘qligi), xamirini rangi esa oq edi. Bularni barchasi maxsulotni yetilishi kerakli yo‘nalishda bormayotganidan dalolat beradi. Shuning uchun yuqorida ko‘rsatilgan ivitqilar keyingi tadqiqotlardan olib tashlandi. №11-17 ivitqilardan foydalanilib ishlab chiqarilgan namunalarni organoleptik va fizik-kimyoviy ko‘rsatkichlarini baxolash natijalari 2-jadvalda keltirilgan.

2- jadval

Tartib raqami	Shtamm-larni nomi	Namuna ta’mi	Namuna xamirini rangi	Xidi	Konsis-tensiya-si	rasmi	rN	Namligi, %	Erkin nmlikni mavjudligi
1	2	3	4	5	6	7	8	9	10
1	casei 6	pishloq-li, yaqqol namoyon bo‘lgan, ozgina kislota-li	xamirini rangi massasi bo‘yicha bir xil o‘zgardi (sariq)	pish-loq-li	plastik, yengil qayish-qoq	burchak-simon shakl-dagi ko‘z-chalar	5,96	58	yo‘q

2	casei 5	pishloq-li, ozgina kislota-li	xamirini rangi massasi bo‘yicha bir xil o‘zgardi (sariq)	pish-loq-li	plastik, yengil qayish-qoq	burchak-simon shakl-dagi ko‘z-chalar	5,85	59	yo‘q
3	casei 4	toza, sut kislota-li, yaqqol namoyon bo‘lma-gan	xamirini rangi massasi bo‘yicha bir xil o‘zgardi (sariq)	sut kis-lota-li	plastik, yetarli-cha qayish-qoq emas	aloxi-da ko‘zcha-lar	5,38	58	yo‘q
4	helveti-cum 2	pishloq-li, ozgina kislota-li	xamirini rangi massasi bo‘yicha bir xil o‘zgardi (sariq)	pish-loq-li	plastik, yengil qayish-qoq	massa-si bo‘yich a bir xil duma-loq, burchak-simon shakl-dagi ko‘zcha lar	5,94	59	yo‘q
5	helveti-cum 6	pishloq-li	xamirini rangi massasi bo‘yicha bir xil o‘zgardi (sariq)	pish-loq-li	me’yori-da qayish-qoq	massa-si bo‘yich a bir xil dumalo q, burchak-simon shakl-dagi	5,74	56	yo‘q

						ko‘zcha lar			
6	helveti-cum 1	pishloq-li, yaqqol namoyon bo‘lgan, ozgina kislota-li	xamirini rangi massasi bo‘yicha bir xil o‘zgardi (sariq)	pish-loq-li	plastik	massa-si bo‘yich a bir xil dumalo q, burchak -simon shakl-dagi ko‘zcha lar	5,95	58	yo‘ q
7	helveti-cum 5	pishloq-li, yaqqol namoyon bo‘lgan, ozgina kislota-li	xamirini rangi massasi bo‘yicha bir xil o‘zgardi (sariq)	pish-loq-li	plastik, yengil qayish-qoq	massa-si bo‘yich a bir xil dumalo q, burchak -simon shakl-dagi ko‘zcha lar	5,80	59	yo‘ q

2- jadvaldan ko‘rinib turibdiki, barcha namunalarni pishloq uchun xos bo‘lgan pishloqli ta’mga ega ekanligi oqsil massasida yetilish jarayoni kechganligidan dalolat beradi. Pishloq kesimida rasmni mavjudligi mikrobiologik va biokimyoviy jarayonlarni to‘g‘ri kechkanligidan dalolat beradi. Maxsulot namligi boshlang‘ich qiymatlariga nisbatan 3 - 6% ga o‘zgardi, maxsulotni aktiv kislotaligi esa 5,38 dan 5,96 chegaralarida o‘zgardi. Lbm. casei 4 ivitqi bilan olingan namuna yetarlicha bo‘lmagan pishloqli ta’mga ega bo‘ldi. Ushbu ivitqi bilan qo‘shimcha ravishda 4 marta maxsulot ishlab chiqarildi, ammo olingan maxsulotga presli, yaqqol namoyon bo‘lmagan ta’m xos edi. Shuning uchun ushbu ivitqi keyingi tadqiqotlardan olib tashlandi.

Xulosa. Shunday qilib sut-oqsilli maxsulotni yetiltirish uchun zarur bo‘lgan eng aktiv ivitqi shtammlarini tanlash uchun sut kislotali bakteriyalar turli shtammlarini fiziologik-biokimyoviy xususiyatlari o‘rganildi. Amalga oshirilgan laboratoriya ishlab chiqarishlari natijasida 6 ta yaxshi ivitqilar tanlab olindi va ular bilan keyingi tadqiqotlar davom ettiriladi.

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Post-covid-19 attitudes of young people toward epidemiological risks: a behavioral epidemiology perspective

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Abstract: This thesis examines the attitudes, risk perceptions, and health behaviors of young people toward epidemiological risks in the post-COVID-19 period. The COVID-19 pandemic fundamentally transformed how populations perceive and respond to infectious disease threats. Young people (aged 18–30), initially perceived as a low-risk group, experienced significant psychological, social, and behavioral changes during the pandemic that continue to shape their responses to epidemiological risks today. This study synthesizes existing literature on vaccine hesitancy, risk perception, health literacy, preventive behavior adoption, and mental health outcomes among youth in the post-pandemic era. Young people demonstrate a paradoxical combination of heightened health awareness and increased risk-taking behavior. The thesis proposes targeted public health strategies to address these complex behavioral patterns.

Keywords: COVID-19 post-pandemic, young people, epidemiological risk perception, health behavior, vaccine hesitancy, pandemic fatigue, behavioral epidemiology.

Introduction

The COVID-19 pandemic, declared by the World Health Organization in March 2020, represented the most significant global public health crisis of the 21st century. Beyond its immediate mortality and morbidity impact, the pandemic profoundly altered how populations understand, evaluate, and respond to epidemiological risks. As the world transitions into the post-pandemic era, understanding these behavioral changes becomes crucial for preparing for future health emergencies.

Young people, typically defined as individuals aged 18–30, represent a particularly important demographic in this context. Initially, public health messaging often portrayed younger populations as less vulnerable to severe COVID-19 outcomes, potentially leading to lower risk perception and lower compliance with preventive measures. However, research has demonstrated that young people experienced substantial pandemic-related disruptions to education, employment, social relationships, and mental health, which continue to influence their health behaviors.

Main Body

1. Risk Perception Among Young People in the Post-COVID Era

1.1. Shifting Risk Perception Patterns

The COVID-19 pandemic fundamentally altered risk perception among young people. Pre-pandemic, infectious diseases were often perceived as distant threats in developed countries. The pandemic brought epidemiological risk into daily consciousness. Studies indicate that young people now demonstrate more sophisticated understanding of transmission dynamics, including airborne transmission, asymptomatic spread, and superspreading events.

However, risk perception is not uniform. Research shows a bifurcation in post-pandemic risk perception: some young people remain hypervigilant about infectious disease risks, while others have developed significant risk desensitization. A 2024 multinational study found that approximately 38% of young adults reported decreased concern about infectious diseases compared to peak pandemic levels, while 32% reported sustained or increased concern.

1.2. Demographic and Socioeconomic Variations

Risk perception among young people varies significantly based on demographic factors:

- **Gender:** Studies consistently show that young women report higher risk perception and greater adherence to preventive behaviors compared to young men. This pattern, observed during the pandemic, persists in the post-COVID era.
- **Educational background:** Young people with higher education levels, particularly in health-related fields, demonstrate more accurate risk assessment and greater health literacy. However, a concerning trend is the emergence of "information bubbles" where highly educated individuals selectively trust information sources that confirm pre-existing beliefs.
- **Geographic variation:** Young people in regions with high COVID-19 mortality rates maintain higher risk perception compared to those in less-affected areas. This suggests that direct experience with disease severity shapes lasting behavioral patterns.

2. Health Behaviors in the Post-COVID Period

2.1. Vaccine Hesitancy and Acceptance

COVID-19 vaccination represented a critical juncture in understanding young people's epidemiological risk behaviors. Global vaccination rates among young people varied significantly:

- High-income countries achieved 70–85% primary vaccination coverage among 18–30 year-olds
- Lower-middle-income countries achieved 40–60% coverage
- Significant disparities existed within countries by socioeconomic status and geographic location

Post-pandemic vaccine hesitancy demonstrates complex patterns:

Booster fatigue: Even among vaccinated youth, booster uptake has declined significantly. A 2025 global survey found that only 45% of young people who received primary vaccination obtained recommended boosters, citing "pandemic fatigue," "perception of reduced risk," and "inconvenience."

2.2. Health Information Seeking and Trust

The post-COVID period has witnessed profound changes in how young people seek health information:

Digital health literacy: Young people increasingly use digital platforms for health information, with social media (TikTok, Instagram, YouTube) serving as primary sources. This presents both opportunities (rapid dissemination of public health messages) and challenges (misinformation spread).

Trust fragmentation: Institutional trust patterns have fragmented:

Trust Source	Pre-Pandemic	Post-Pandemic	Change
Public health agencies	65%	52%	-13%
Healthcare providers	78%	71%	-7%
Personal physicians	82%	76%	-6%
Social media influencers	18%	31%	+13%
Peer recommendations	45%	58%	+13%
Traditional media	52%	38%	-14%

This trust shift has significant implications for future pandemic preparedness and routine health communication.

2.4. Mental Health and Behavioral Health Interactions

The pandemic's mental health impact on young people continues to influence epidemiological risk behaviors:

- Anxiety and depression rates remain elevated: 34% of young adults report clinically significant anxiety symptoms compared to 18% pre-pandemic

- Pandemic-related PTSD affects approximately 15% of young people who experienced severe COVID-19 infection, bereavement, or healthcare worker burnout
- Substance use patterns have shifted, with increased alcohol and cannabis use reported among 28% of young adults
- Social connection deficits persist, with 40% reporting fewer social interactions than pre-pandemic

These mental health factors interact with epidemiological risk behaviors. Young people with anxiety disorders demonstrate both hypervigilance (excessive preventive behaviors) and avoidance (delaying healthcare seeking). Those with depression show reduced health maintenance behaviors and lower vaccine uptake.

Health locus of control: Young people's belief about who controls their health outcomes significantly influences behavior. Those with strong internal locus of control (belief in personal ability to influence health) show better adherence to preventive measures. Those with external locus (belief that health is determined by fate or external forces) demonstrate lower engagement.

Conclusion

The COVID-19 pandemic fundamentally transformed how young people perceive and respond to epidemiological risks. In the post-pandemic era, this generation demonstrates complex, sometimes contradictory behavioral patterns: increased health awareness coexists with pandemic fatigue; sophisticated understanding of transmission coexists with vaccine hesitancy; concern for community welfare coexists with prioritizing individual convenience.

The post-COVID period offers a critical window of opportunity. The experiences of the pandemic are still fresh in young people's memories, creating teachable moments for health communication. The urgency of pandemic response has passed, allowing for thoughtful, evidence-based planning. And this generation, which will face the epidemiological challenges of the coming decades, deserves investment in its health and well-being.

Ultimately, improving young people's responses to epidemiological risks is not only about preparing for future health emergencies but about recognizing their fundamental right to health, participation, and a future in which their potential can flourish. The young people who experienced COVID-19 will be tomorrow's leaders, healthcare providers, policymakers, and community organizers. Investing in their health literacy, trust in public health, and protective behaviors is an investment in collective future resilience.

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Plesionymy in Uzbek and English: Lexico-semantic differentiation and functional realization.

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Annotation. This article investigates plesionymy as a lexico-semantic relationship characterized by substantial semantic proximity accompanied by differentiating semantic or functional features. The study focuses on Uzbek and English and aims to identify the criteria that distinguish plesionymy from synonymy and graduonymy. Particular attention is paid to contextual realization, stylistic differentiation, figurative representation. The research employs componential, contextual, functional and contrastive methods. Selected Uzbek and English lexical and phraseological units are analyzed to establish their shared semantic components and differentiating features.

Key words. Plesionymy, near-synonymy, lexical semantics, semantic differentiation, functional semantics, Uzbek, English, synonymy, graduonymy, contextual meaning.

Аннотация. В данной статье исследуется плесионимия как лексико-семантическое отношение, характеризующееся значительной семантической близостью, сопровождающейся дифференцирующими семантическими или функциональными признаками. Исследование сосредоточено на узбекском и английском языках и направлено на выявление критериев, позволяющих разграничить плесионимию, синонимию и градуонимию. Особое внимание уделяется контекстуальной реализации, стилистической дифференциации и образному представлению. В исследовании применяются компонентный, контекстуальный, функциональный и сопоставительный методы. Отдельные лексические и фразеологические единицы узбекского и английского языков анализируются с целью выявления их общих семантических компонентов и дифференцирующих признаков.

Ключевые слова: плесионимия, квазисинонимия, лексическая семантика, семантическая дифференциация, функциональная семантика, узбекский язык, английский язык, синонимия, градуонимия, контекстуальное значение.

Annotatsiya. Mazkur maqolada plesionimiya leksik-semantik munosabatning alohida turi sifatida tadqiq etiladi. Plesionimiya semantik jihatdan sezilarli darajadagi yaqinlikka ega bo‘lgan, biroq muayyan farqlovchi semantik yoki funksional xususiyatlar bilan ajralib turuvchi leksik birliklar o‘rtasidagi munosabat sifatida talqin qilinadi. Tadqiqot o‘zbek va ingliz tillari materiallari asosida olib borilib,

plesionimiyani sinonimiya va graduonimiyadan farqlash imkonini beruvchi asosiy mezonlarni aniqlashga qaratilgan. Unda plesionimik munosabatlarning kontekstual voqelanishi, uslubiy differensiallashuvi hamda obrazli ifodalanish xususiyatlariga alohida e'tibor qaratiladi. Tadqiqot jarayonida komponent tahlili, kontekstual, funksional va qiyosiy-tarixiy bo'lmagan kontrastiv metodlardan foydalaniladi. O'zbek va ingliz tillaridan tanlab olingan leksik hamda frazeologik birliklar ularning umumiy semantik komponentlari va farqlovchi belgilari asosida tahlil qilinadi. Tadqiqot natijalari plesionimiyaning sinonimiya va graduonimiyaga yaqin jihatlari bilan bir qatorda, uni alohida leksik-semantik munosabat sifatida belgilovchi xususiyatlarni aniqlashga xizmat qiladi.

Kalit so'zlar: plesionimiya, yaqin ma'nodoshlik, leksik semantika, semantik differensiallashuv, funksional semantika, o'zbek tili, ingliz tili, sinonimiya, graduonimiya, kontekstual ma'no.

Introduction. The lexical system of a language is characterized by a complex network of semantic relations. Synonymy, antonymy, hyponymy, and other relations have traditionally provided the principial categories for describing the organization of vocabulary. Nevertheless, many lexical units demonstrate a degree of semantic proximity that cannot be adequately described either as a complete synonymy or as clearly contrasting lexical relations. The aim of the study is to identify and compare the principial lexico-semantic and functional characteristics of potential plesionymic relations in Uzbek and English. The study pursues the following objectives:

- To clarify the semantic characteristics of plesionymy;
- To distinguish plesionymy from synonymy and graduonymy
- To identify shared and differentiating semantic features in selected Uzbek and English exical relations
- To examine the role of context in the realization of differentiation.

Methodology. *Componential analysis* identifies the semantic components shared by the members of a lexical pair and components responsible for differentiation. For example, die: (cessation of life + direct designation), pass away: (cessation of life + indirect designation).

Contextual analysis. Contextual analysis examines how lexical meanings are realized in actual discourse. This is necessary because differentiating features may be weakly expressed in isolation but become prominent in particular contexts.

Contrastive analysis compares the semantic and functional behavior of potential plesionyms in Uzbek and English. The analysis does not assume that the two languages

possess direct lexical equivalents. Instead, it investigates comparable semantic-functional mechanisms.

Discussion and results. Plesionymy may be understood as a relationship between lexical units that are close in meaning but not completely identical. Its basic structure can be represented as: semantic proximity+semantic/functional differentiation. The first component establishes the relationship between the units; the second prevents their meaning from being considered completely equivalent. The differentiating feature may occur at several levels: semantic, conceptual, stylistic, pragmatic, evaluative, phraseological, collocational. Thus plesionymy should be considered a multidimensional phenomenon rather than a uniform category. Storjohann`s research is particularly significant in this respect. Her corpus-based analysis demonstrates that plesionymic relations of synonymy.

Plesionymy and synonymy. The relationship between synonymy and plesionymy is particularly complex. Synonymy emphasizes semantic similarity or equivalence, whereas plesionymy emphasizes similarity together with differentiation. A simplified representation is:

Synonymy- similarity/equivalence

Plesionymy- similarity+differentiation.

Near –synonymous lexical units may therefore overlap considerably while remaining sensitive to contextual, stylistic, or functional restrictions.

Plesionymy and graduonymy. Graduonymy is based primarily on scalar relations between lexical units. For example: lexical units may represent different points on a scale: small-medium-large. Plesionymy, however, does not necessarily involve scalar progression. Closely related units can differ in register, manner, conceptualization, or pragmatic effect without forming a scale.

Feature	Cessation of life	Direct designation	Formality	Respectful connotation
O`lmoq	+	+	Relatively neutral	-/+
Vafot etmoq	+	_	+	+

The distinction illustrates a central property of plesionymy: two units can share a substantial denotational component while differing in their communicative realization. *O`lmoq- ko`z yummoq* the phraseological expression *ko`z yummoq* can denote death in an appropriate context. The differentiating feature is the mode of conceptualization. The event is expressed indirectly through a figurative image. This example demonstrates that plesionymy may involve not only lexical items but also

phraseological expressions. The Uzbek lexical- semantic field of death includes other expressions such as *dunyodan ketmoq, dunyodan o`tmoq, jon bermoq, joni uzilmoq, halok bo`lmoq* and *nobud bo`lmoq*. However, these expressions should not automatically categorized as plesionyms. For example, *halok bo`lmoq* and *nobud bo`lmoq* may contain additional semantic information concerning manner, circumstance, destruction, or loss. Their classification therefore requires contextual evidence.

The English pair *die-pass away* provides a particularly useful comparison with Uzbek o`lmoq- vafot etmoq. Both expressions denote the cessation of life, but they differ in communicative presentation. *Die*-direct designation, *pass away*-indirect/euphemistic designation. The two expressions therefore demonstrate: shared semantic core + functional differentiation. The comparison is particularly valuable because it shows that similar communicative distinctions can be expressed through different lexical forms in the two languages. Foggy-misty is a well-known examplein the literature on plesionymy. Storjohann identifies foggy- mistyamong examples traditionally used to illustrate close semantic relationships involving shared and differentiating properties. The two adjectives belong to the same conceptual domain of atmospheric conditions, but they are not completely interchangeable. A simplified representation is:

foggy: atmospheric obscurity + fog-like condition

misty: atmospheric obscurity + fine/light suspended moisture

The shared component establishes semantic proximity, while the differentiating component provides semantic specification. The findings support a broader understanding of plesionymy as a relationship based on semantic proximity and meaningful differentiation. The analysis leads to five principial observations. First, semantic similarity alone cannot establish plesionymy. Second, the differentiating feature may be semantic, functional, stylistic, conceptual, figurative, cultural, or pragmatic. Third, context may strengthen or weaken the perception of differentiation. Fourth, closely related lexical units are not necessarily freely interchangeable. Fifth, cross-linguistic comparison should focus on functional-semantic correspondence rather than only formal translation equivalents. These observations are consistent with the corpus-based perspective developed by Storjohann, who argues for greater attention to the contextual realization of plesionymic relations. They also complement Djumabaeva`s comparative treatment of plesionymy and graduonymy in English and Uzbek.

Conclusion. The study has examined selected potential plesionymic relations in Uzbek and English from lexico-semantic, contextual, functional, and contrastive perspectives.

The findings indicate that plesionymy cannot be adequately defined as simple synonymy or as an intermediate stage between synonymy and antonymy. Rather, it represents a multidimensional relationship in which substantial semantic proximity coexists with meaningful differentiation. The differentiating feature may concern semantic specification, stylistic register, euphemism, figurative representation, cultural association, or conceptual profiling. The Uzbek examples *o`lmoq-vafot etmoq, o`lmoq-ko`z yummoq* demonstrate different forms of functional and semantic differentiation. The English examples *die-pass away, foggy-misty* demonstrate euphemistic, semantic, and conceptual differentiation respectively. Further research should expand the empricial database and use larger balanced corpora to the test the proposed criteria quantitatively. Such research may contribute to establishing more precise boundaries between plesionymy, synonymy, graduonymy, and other lexical-semantic relations.

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Effectiveness of Nanohydroxyapatite in the Remineralization of Tooth Enamel: Current Evidence and Clinical Perspectives

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Abstract:
Dental caries is one of the most prevalent oral diseases worldwide and is primarily associated with an imbalance between enamel demineralization and remineralization. The development of biomimetic remineralizing agents has therefore become an important area of preventive dentistry. Nanohydroxyapatite (nHAp), a nanoscale form of hydroxyapatite that closely resembles the mineral phase of natural dental enamel, has attracted considerable attention because of its physicochemical properties, biocompatibility, and potential to promote enamel remineralization. This review evaluates the current scientific evidence concerning the effectiveness of nHAp in the remineralization of early enamel lesions and white spot lesions. Evidence from systematic reviews, meta-analyses, and experimental and clinical studies indicates that nHAp can increase enamel surface microhardness, facilitate mineral deposition, reduce mineral loss, and contribute to the repair of early carious lesions. Its proposed mechanisms include direct deposition of apatite nanoparticles, provision of calcium and phosphate ions, formation of a protective apatite-rich layer, and promotion of crystal growth within subsurface enamel lesions. Recent systematic reviews suggest that nHAp may demonstrate remineralizing effects comparable to, and in some experimental conditions greater than, conventional fluoride-based approaches. However, the available evidence remains heterogeneous, with a substantial proportion of studies being in vitro or in situ and relatively few well-designed long-term clinical trials. Therefore, nHAp should currently be regarded as a promising biomimetic remineralizing agent rather than an unequivocally established replacement for fluoride. Further standardized randomized controlled trials are required to determine optimal concentrations, formulations, treatment protocols, and long-term clinical effectiveness.

Keywords: nanohydroxyapatite; nano-hydroxyapatite; enamel remineralization; dental caries; white spot lesions; biomimetic dentistry; preventive dentistry; fluoride.

Introduction

Dental caries is a dynamic, biofilm-mediated disease characterized by alternating periods of mineral loss and mineral gain in dental hard tissues. When the demineralization process predominates, subsurface enamel lesions may develop and clinically appear as white spot lesions (WSLs). At this early stage, the lesion may remain potentially reversible through non-invasive remineralization. Consequently, strategies that promote mineral recovery without mechanical removal of tooth structure have become a major component of minimally invasive dentistry.

Dental enamel is composed predominantly of inorganic mineral, with hydroxyapatite representing the principal crystalline phase. The similarity between synthetic hydroxyapatite and the mineral component of dental tissues has led to extensive investigation of hydroxyapatite-based materials as biomimetic agents. Nanohydroxyapatite possesses nanoscale dimensions, high surface area, increased surface reactivity, and physicochemical characteristics that facilitate interaction with enamel surfaces. These characteristics have generated significant interest in its application in preventive and restorative dentistry The potential of nHAp is particularly relevant to early caries management. Unlike conventional restorative approaches, remineralization aims to restore mineral content while preserving the original tooth structure. Several experimental studies and clinical investigations have reported beneficial effects of nHAp-containing dentifrices and other formulations on initial enamel lesions. However, the magnitude and clinical relevance of these effects remain subjects of scientific debate.

The purpose of this review is to critically examine the current evidence regarding the effectiveness of nanohydroxyapatite in enamel remineralization, with particular emphasis on its mechanism of action, experimental evidence, clinical outcomes, comparison with fluoride, and limitations of the existing literature.

Physicochemical Characteristics of Nanohydroxyapatite

Hydroxyapatite is a calcium phosphate mineral that constitutes a major component of the inorganic phase of dental hard tissues. Nanohydroxyapatite consists of hydroxyapatite particles at the nanoscale and has attracted interest because its morphology and chemical composition resemble those of biological apatite.

The nanoscale structure provides several potentially advantageous properties. First, nHAp has a high surface-area-to-volume ratio, increasing its ability to interact with the enamel surface. Second, its similarity to enamel apatite may facilitate biomimetic deposition onto demineralized areas. Third, nHAp can function as a source or reservoir of calcium and phosphate ions, which are essential for the formation of new apatite crystals.

The biological compatibility of hydroxyapatite is another important characteristic. Because hydroxyapatite is naturally present in mineralized tissues, nHAp has been investigated as a biomimetic material in several dental applications, including caries prevention, enamel remineralization, dentinal hypersensitivity management, and restorative materials.

Mechanisms of Enamel Remineralization by Nanohydroxyapatite

The remineralizing activity of nHAp appears to involve several complementary mechanisms.

Direct deposition of apatite nanoparticles

Demineralized enamel contains microscopic pores and regions of reduced mineral density. Because of their small dimensions, nHAp particles may penetrate or accumulate within these defects and serve as nucleation sites for subsequent mineral deposition. This process can result in the formation of an apatite-rich layer on the enamel surface and within superficial lesion

Calcium and phosphate ion delivery

Remineralization requires adequate availability of calcium and phosphate ions. nHAp can provide these mineral components at the enamel interface. Under favorable conditions, released ions contribute to supersaturation with respect to enamel apatite and promote precipitation of new mineral.

Biomimetic crystal growth

The structural similarity between nHAp and biological apatite allows nHAp particles to act as templates for crystal growth. Newly deposited mineral may become integrated with existing enamel crystals, potentially increasing mineral density and mechanical resistance.

Surface protection

In addition to promoting mineral deposition, nHAp may produce a mineral-rich protective layer on the enamel surface. Such a layer may reduce exposure of the underlying enamel to acidic challenges and contribute to the inhibition of subsequent demineralization.

Evidence from Experimental Studies

A substantial body of laboratory research has demonstrated the remineralization potential of nHAp. Experimental models have reported increases in enamel surface microhardness, reductions in mineral loss, and morphological changes consistent with mineral deposition.

A scoping review examining nHAp-containing dentifrices concluded that available studies generally support a role for nHAp in the remineralization of initial carious

lesions and reduction of enamel demineralization. The review also emphasized that the evidence base includes a considerable number of in vitro and in situ investigations, which limits direct extrapolation to clinical practice

An important experimental observation concerns concentration. Research summarized in the literature suggests that a 10% nHAp suspension may provide substantial remineralization of early enamel lesions, whereas increasing the concentration beyond this level does not necessarily produce proportional improvements. One proposed explanation is that excessive deposition on the external enamel surface may reduce penetration of nanoparticles into deeper porous areas of the lesion.

These findings demonstrate that the therapeutic effect of nHAp is not determined solely by the presence of the material. Particle size, concentration, formulation, exposure time, and physicochemical characteristics may substantially influence its effectiveness.

Evidence from Systematic Reviews and Meta-Analyses

Higher-level evidence provides a more balanced interpretation of the effectiveness of nHAp.

A systematic review and meta-analysis investigating the efficacy of nHAp for caries prevention included in vivo and in situ studies and identified five in vivo and five in situ studies involving more than 600 teeth and over 1,000 specimens. The authors concluded that the available evidence supported the potential of nHAp to reduce caries development and promote remineralization; however, considerable heterogeneity prevented a quantitative meta-analysis of the in vivo studies.

More recent evidence specifically addressing white spot lesions is also encouraging. A systematic review and meta-analysis published in 2024 included 14 studies, of which three were in vivo, one was in situ, and ten were in vitro. The analysis reported that pure nHAp was associated with significantly greater enamel surface microhardness and mineral gain compared with fluoride alone in the included studies. Nevertheless, the authors emphasized that the relatively small number of clinical studies, methodological limitations, high risk of bias in some studies, and short follow-up periods prevent definitive conclusions regarding long-term clinical effectiveness.

These findings are important because they demonstrate a distinction between **experimental efficacy** and **clinical effectiveness**. While nHAp consistently demonstrates remineralizing potential under laboratory conditions, stronger clinical evidence is necessary before it can be considered an established substitute for fluoride in all clinical circumstances.

Fluoride remains one of the most extensively studied and widely accepted agents for caries prevention. Its principal anticaries effects include enhancement of remineralization and formation of more acid-resistant fluoridated apatite phases.

nHAp differs mechanistically from fluoride because it can directly supply calcium-phosphate mineral and produce a biomimetic apatite layer. Consequently, the two approaches may be complementary rather than mutually exclusive.

A 2024 systematic review specifically evaluated products combining nHAp and fluoride for the treatment of initial enamel lesions. Five studies were included: four clinical studies and one in situ study, involving 151 white spot lesions. The studies varied substantially in treatment duration, protocols, and control groups, preventing quantitative meta-analysis. Nevertheless, most studies reported potentially favorable results for the combination of nHAp and fluoride, while the overall level of evidence was considered moderate. The authors concluded that the clinical evidence was promising but insufficient to recommend widespread use based solely on the current evidence. An updated systematic review and meta-analysis of hydroxyapatite-containing oral-care products also reported clinical evidence supporting hydroxyapatite as an effective caries-preventive agent. This emerging evidence strengthens the rationale for considering hydroxyapatite-based formulations within modern preventive dentistry. **Clinical Implications**

The potential clinical applications of nHAp are particularly relevant to patients with early enamel lesions, high caries risk, orthodontic white spot lesions, and conditions characterized by repeated episodes of enamel demineralization.

The main advantages of nHAp include its biomimetic nature, biocompatibility, capacity for mineral deposition, and ability to increase enamel surface hardness. Its incorporation into toothpastes, gels, mouthrinses, and other oral-care formulations provides opportunities for non-invasive management of early lesions.

However, clinicians should distinguish between the ability of nHAp to improve laboratory measures of remineralization and its capacity to produce clinically meaningful prevention of cavitation. Early intervention, adequate oral hygiene, dietary control, plaque management, and appropriate fluoride exposure remain fundamental components of caries prevention.

Limitations of the Current Evidence

Despite promising results, several limitations affect the interpretation of current research.

First, a substantial proportion of published studies are in vitro or in situ. Such experimental models cannot completely reproduce the complex oral environment,

including saliva, biofilm, dietary acids, mechanical abrasion, and individual patient behavior.

Second, substantial methodological heterogeneity exists among studies. Differences have been reported in particle size, nHAp concentration, formulation, application frequency, exposure time, enamel substrate, artificial lesion model, and outcome assessment methods.

Third, clinical trials are relatively limited compared with laboratory studies. The 2024 systematic review of WSLs, for example, identified only three in vivo studies among 14 eligible investigations.

Finally, long-term clinical outcomes remain insufficiently characterized. More studies are required to determine whether improvements in surface microhardness and mineral content translate into reduced incidence of cavitation and clinically measurable long-term caries prevention.

Future Research Directions

Future investigations should prioritize well-designed randomized controlled clinical trials with sufficiently large sample sizes and standardized outcome measures. Research should also establish optimal nHAp particle size, concentration, delivery system, and frequency of application.

Longitudinal studies comparing nHAp directly with conventional fluoride products would be particularly valuable. In addition, studies evaluating combinations of nHAp with fluoride, calcium-phosphate technologies, or other biomimetic agents may help identify synergistic approaches to enamel remineralization.

Advanced imaging and analytical techniques, including scanning electron microscopy, energy-dispersive X-ray spectroscopy, micro-computed tomography, and quantitative microhardness testing, should be combined with clinically relevant endpoints to provide a more comprehensive assessment of remineralization.

Conclusion:

Nanohydroxyapatite represents a promising biomimetic approach to the prevention and management of early enamel demineralization. Its chemical and structural similarity to natural enamel apatite, high surface reactivity, and ability to provide calcium and phosphate make it a biologically plausible remineralizing agent.

Current experimental evidence indicates that nHAp can increase enamel surface microhardness, promote mineral deposition, reduce mineral loss, and facilitate remineralization of early carious and white spot lesions. Systematic reviews and meta-analyses provide encouraging evidence, including findings suggesting that pure nHAp may perform favorably compared with fluoride in certain experimental outcomes.

Nevertheless, the clinical evidence remains less conclusive than the laboratory evidence. The relatively small number of clinical trials, methodological heterogeneity, short follow-up periods, and risk of bias limit the certainty of current conclusions. Therefore, nHAp should be considered a promising adjunct or alternative remineralizing technology, while fluoride remains an established component of evidence-based caries prevention.

Overall, nanohydroxyapatite has considerable potential within minimally invasive and biomimetic dentistry. Further high-quality randomized controlled trials and long-term clinical investigations are necessary to establish standardized treatment protocols and determine its precise position in contemporary preventive dentistry.

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Литература как отражение социальных проблем общества: многообразие источников и широкий выбор произведений

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Аннотация

В данной статье рассматривается литература как глубокое и динамичное отражение социальных проблем, анализируется, как различные литературные эпохи и жанры служат зеркалом для социальных, экономических и моральных кризисов. Исторически литература функционировала не просто как эстетическое средство, но и как важнейший инструмент социального комментария и реформ. Через исследование широкого спектра мировых и национальных литературных произведений — от реализма девятнадцатого века до современных психологических и общественно-политических романов — в работе выделяются ключевые тематические векторы взаимодействия литературы с социальной реальностью. Особое внимание уделяется проблемам классового неравенства, гендерного угнетения, последствий тоталитаризма и духовного кризиса личности. В конечном итоге доказывается, что комплексный литературоведческий анализ предоставляет неоценимые качественные данные для понимания исторической и современной эволюции человеческого общества.

Ключевые слова

Литература и общество, социальные проблемы, реализм, литературная критика, социальное неравенство, гендерное отражение, критический анализ, общественно-политический роман.

Взаимосвязь литературы и общества является одним из фундаментальных вопросов эстетики, социологии культуры и литературоведения. На протяжении всей истории человеческой цивилизации художественное слово не только выполняло эстетическую функцию, но и выступало в качестве мощного инструмента фиксации, анализа и критики социальной реальности. Литература никогда не существовала в вакууме; она неизбежно рождается внутри определенного социокультурного контекста, впитывая в себя противоречия, конфликты, надежды и травмы своей эпохи.

Французский писатель и философ Луи де Бональд еще в начале XIX века сформулировал знаменитый тезис: «Литература — это выражение общества». В эпохи радикальных исторических трансформаций, социальных потрясений и системных кризисов именно писатели первыми брали на себя роль летописцев и диагностов общественных болезней. Художественное произведение способно

очеловечить сухую статистику социологических отчетов, превращая абстрактные показатели бедности, угнетения или бесправия в живые, глубоко драматичные человеческие судьбы.

Целью данной статьи является комплексный анализ литературы как зеркала социальных проблем общества через призму многообразия исторических источников и широкого выбора классических и современных произведений. В работе будут рассмотрены механизмы, с помощью которых художественная проза выявляет классовые антагонизмы, гендерное неравенство, последствия тоталитаризма и духовный кризис личности, а также то, как литература сама становится катализатором социальных изменений.

Классовое неравенство и экономическая несправедливость в зеркале реализма

Эпоха девятнадцатого века, ознаменовавшаяся бурным развитием капитализма, индустриализацией и урбанизацией, породила глубокие социальные разломы. Именно в этот период критический реализм утвердился как ведущий литературный метод, ориентированный на беспристрастное и глубокое исследование структуры общества.

Одним из наиболее ярких примеров широкого социального анализа является «Человеческая комедия» Оноре де Бальзака. В этом монументальном цикле произведений французский писатель детально воссоздал панораму французского общества, где главной движущей силой и одновременно разрушителем человеческой морали становятся деньги. Бальзак с хирургической точностью демонстрирует, как финансовый капитал подчиняет себе семейные узы, любовь, политику и искусство, превращая человека в товар.

В английской литературе викторианской эпохи центральной фигурой социальной критики стал Чарльз Диккенс. Его романы, такие как «Оливер Твист», «Холодный дом» и «Тяжелые времена», обнажили страшные последствия индустриализации: нищету рабочих кварталов, жестокость работных домов, эксплуатацию детского труда и бесчеловечность бюрократической судебной системы. Диккенс не просто развлекал публику; он целенаправленно апеллировал к совести британского общества, требуя реформ образования и социальной защиты.

Аналогичные процессы нашли глубокое отражение и в русской литературе. Роман Ф. М. Достоевского «Преступление и наказание» представляет собой не только глубокий психологический этюд, но и жесткий социальный манифест. Атмосфера трущоб Петербурга, душные каморки, нищета «маленьких людей»,

таких как семья Мармеладовых, создают ту самую удушливую социальную среду, в которой рождается разрушительная и античеловеческая теория Родиона Раскольникова. Достоевский показывает, что социальное неблагополучие неизбежно ведет к моральной и духовной катастрофе личности.

Гендерная проблематика и борьба за права женщин

Другой важнейшей социальной проблемой, нашедшей широкое отражение в литературе, является бесправие женщин, их изоляция внутри патриархальной семьи и ограничение их права на самореализацию. Широкий выбор произведений разных эпох позволяет проследить эволюцию этого протеста.

В мировой драматургии поворотным моментом стала пьеса Генрика Ибсена «Кукольный дом». Финал пьесы, в котором главная героиня Нора Хельмер уходит от мужа и детей, чтобы обрести собственную идентичность и человеческое достоинство, потряс европейское общество конца XIX века. Ибсен подверг радикальной критике буржуазный брак, который воспринимался обществом как священный институт, но на деле часто являлся формой красивого, легитимного рабства, где женщина лишалась права голоса и выбора.

В англоязычной традиции роман Шарлотты Бронте «Джейн Эйр» стал вехой в репрезентации независимой женской личности. В отличие от современных ей сентиментальных героинь, Джейн Эйр заявляет о своем праве на равенство, уважение и внутреннюю свободу, несмотря на свое бедное социальное положение гувернантки. Бронте открыто говорит о том, что интеллектуальный и духовный потенциал женщины равен мужскому, а социальные рамки, ограничивающие женщину домашним кругом, глубоко несправедливы.

В начале XX века этот дискурс был блестяще продолжен Вирджинией Вулф в ее эссе-манифесте «Своя комната». Вулф анализирует исторические и экономические причины, по которым женщины на протяжении веков были исключены из мирового литературного процесса. Ее тезис о том, что для занятия творчеством женщине необходимы материальная независимость (пятьсот фунтов годового дохода) и личное пространство (своя комната), стал классическим постулатом феминистской критики, увязавшим культуру напрямую с экономическими правами.

XX век принес человечеству новые, невиданные ранее по масштабам социальные и политические катастрофы: две мировые войны, возникновение тоталитарных диктатур, концлагеря и массовый террор. Литература этого периода взяла на себя миссию осмысления природы зла и защиты человеческого в человеке.

Жанр антиутопии стал главным литературным ответом на тоталитарные вызовы. Роман Джорджа Оруэлла «1984» служит универсальным предупреждением о механизмах тоталитарного контроля, уничтожения исторической памяти, деформации языка («новояз») и тотального подавления инакомыслия. Оруэлл показал, как государство, стремящееся к абсолютному контролю, разрушает базовые социальные связи между людьми — доверие, дружбу и любовь.

Величайшим памятником литературы, зафиксировавшим трагедию сталинских репрессий и системы ГУЛАГа, стал роман «Архипелаг ГУЛАГ» Александра Солженицына. Это грандиозное историко-художественное исследование, основанное на свидетельствах сотен выживших, обнажило изнанку советской репрессивной машины. Солженицын продемонстрировал, как государственная идеология способна превратить уничтожение миллионов собственных граждан в легитимный бюрократический процесс. В одном ряду с ним стоит лагерная проза Варлама Шаламова («Колымские рассказы»), которая исследует предел человеческого выживания в условиях полного морального и физического распада.

Национальный контекст: отражение социальных кризисов в Центральной Азии

Процессы социальной критики через литературу носят глобальный характер и ярко выражены в национальных литературах Центральной Азии, в частности, Узбекистана. Исторический опыт региона, прошедшего через колониальный период, советскую трансформацию и обретение независимости, зафиксирован в богатейшем литературном наследии.

В начале XX века просветители-джадиды активно использовали художественную литературу для борьбы со средневековой отсталостью, безграмотностью и угнетением. Махмудходжа Бехбуди в своей драме «Падший ангел» (или «Падшая семья») и Абдулла Кадыри в романах «Минувшие дни» и «Скорпион из алтаря» не просто реконструировали историческое прошлое, но анализировали внутренние социальные пороки общества — кумовство, интриги, предательство и угнетение женщин, которые привели к потере национальной независимости.

Во второй половине XX века узбекская литература подняла острые вопросы сохранения национальной идентичности, экологии и морального долга. Поэзия Эркин Вахидова и Абдуллы Арипова, проза Ойбека и Абдуллы Каххара несли в себе скрытый и явный протест против идеологического диктата, уничтожения Аральского моря и разрушения традиционных нравственных ценностей. В

современной узбекской литературе романы нового поколения авторов (например, роман «Не бойся» / *«Qo'rqma»* Исмоила Шонга) продолжают эту традицию, исследуя трагические судьбы национальной интеллигенции, отправленной на учебу в Германию в 1920-х годах и уничтоженной репрессиями, связывая уроки прошлого с вызовами современности.

Методология анализа: как читать социальный подтекст литературы

Для того чтобы литература выступала качественным источником для изучения социальных проблем, исследователю необходим строгий методологический инструментарий. Социология литературы предлагает несколько ключевых подходов к дешифровке художественного текста:

- **Генетический подход (Л. Гольдман):** исследует, какие социально-экономические условия и интересы каких классов сформировали мировоззрение автора и структуру его произведения.
- **Теория отражения (марксистская критика):** рассматривает текст как прямое или опосредованное отражение классовой борьбы своего времени.
- **Культурный и постколониальный анализ (Э. Саид):** изучает, как в литературе конструируются образы «своих» и «чужих», как колониальная зависимость деформирует культуру и сознание угнетенных народов.

Применяя эти методы, исследователь понимает, что даже самый фантастический сюжет или глубоко лирическое стихотворение содержат в себе коды социальной реальности своей эпохи.

Литература — это не просто собрание вымышленных историй, предназначенных для пассивного эстетического созерцания, а живая, динамичная летопись социальных проблем человечества. Обладая колоссальным многообразием источников и бесконечным выбором произведений, мировая и национальная литература предоставляет ученым, социологам и историкам ценнейший качественный материал для понимания внутренних механизмов функционирования общества.

Отражая социальное неравенство, гендерный гнет, ужасы тоталитаризма и духовные тупики урбанизации, писатели выполняют важнейшую гражданскую функцию — они выводят скрытые нарывы общества в публичное пространство, заставляя человечество рефлексировать, сопереживать и меняться. Великие книги не только фиксируют историю общественных болезней, но и предлагают пути их исцеления, напоминая о непреходящей ценности гуманизма, справедливости и свободы.

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Semantic Features of Anthroponyms Used in Atoi's Ghazals

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Abstract. This article discusses the meanings expressed within literary texts by anthroponyms used in selected works of Atoi. It explores the significance of these semes in literary works and analyzes the stylistic and semantic functions they perform.
Keywords: anthroponyms, seme, literary text, ghazal, symbol, characterization, allusion, tendency, classical literature.

Introduction

It is well known that in classical literature, didactic orientation is one of the prevailing ideas, making the criterion of exemplary moral guidance particularly significant. Given this context, understanding the linguistic and artistic means through which such didactic instruction is conveyed is of paramount importance. From this perspective, a distinct tendency to employ anthroponyms emerges. Writers frequently mention the names of legendary figures, alluding to both their physical appearance and inner spiritual character.

In Atoi's poetry, as in the works of other classical writers, the continuation of this rich tradition can be clearly observed.

The study of anthroponyms remains a crucial area within both global and Uzbek linguistics. In Uzbek linguistics, the pioneering contributions of Ernst Begmatov in this field deserve special mention.

From a lexico-semantic point of view, anthroponyms inherently lack explicit situational context; their full semantic capacity can only be interpreted once they are embedded within a textual framework. In classical literature, when anthroponyms are employed, attention is usually directed not merely to the literal etymological root of the name, but to the figure's lifestyle, moral world, and external attributes.

Consider the following example:

Oy yuzluk, Zuhra ko'zluk, zulfi yaldo ko'nglining,
Mehrini kam, javrini bisyor-bisyor aylagan. (Devoni Shayxzoda, p. 20)

According to reference sources:

"Zuhra [capitalized] astron. The Arabic name for Venus, one of the major planets in the Solar System" (Explanatory Dictionary of the Uzbek Language / O'TIL, p. 166).
"Zuhra: This Arabic word originally had the form zuhrat(un)... accepted into Uzbek by dropping the final 't' sound: zuhrat -> zuhra; it is the verbal noun (masdar) of the verb zahara meaning 'shone brightly', signifying 'radiance'. In Arabic, when used with the definite article as al-zuhrat(un), it denotes the planet Venus... In Uzbek, it is also used as a proper name given to the younger of twin girls" (Etymological Dictionary of the Uzbek Language / O'TEL, II, pp. 152–153).
In the aforementioned poetic verse (bayt), this proper name acquires an entirely distinct semantic feature. Beyond expressing the dual meanings of a celestial body and a personal name, the anthroponym serves to evoke the seme of light that illuminates the night and human life. In the darkness of night, besides the Moon, the planet Venus (Zuhra) stands out vividly, evoking in the lover's imagination the image of a light piercing the darkness. In addition to these semes, the lexical unit conveys notions such as "hope" and "solace". In the absence of the Sun or Moon to brighten the lover's night, even the glow of a single star brings comfort. Through the name *Zuhra*, a three-component allusion is established, combining the semes of a star, a person, and beauty.
A poet's use of their pen name (*takhallus*) is not limited solely to indicating authorship; it can also serve various artistic and symbolic purposes. In the following verse, the pen name is introduced to serve an additional stylistic objective:
Qil Atoiyning yuzin oli abo husnidin ol,
Ey Muhammadni iki olamda muxtor aylagan.
Here, the creator alludes to the red color associated with the Prophet's garment, suggesting that Atoi's face should draw color and vitality from it. Simultaneously, the poet emphasizes that Prophet Muhammad (peace be upon him) is the master of both worlds, conveying that a person who strives to achieve spiritual purity like his garment can attain bliss in both realms. Thus, it highlights the principle that every individual should follow this greatness and partake in its blessings.
As is widely recognized, Prophet Joseph (Yusuf) is regarded as the archetype of beauty. In classical literature, he is depicted not only for his peerless facial beauty but also for his inner virtue, presenting his character as a moral standard for others to emulate.
Tilasang jon visol uchun tutay jonimga yuz minnat,
Kishi Yusufni olmasmu matoi roigon birla. (Devoni Shayxzoda, p. 21)
The lover offers his soul to the beloved, yet feels a sense of hesitation, believing that even sacrificing his soul is insufficient, thereby expressing gratitude for being able to offer it. It seems as though even one's own soul falls short for the privilege of seeing

the beloved. Indeed, is there anything more precious to a human being than life itself? Comparing this soul to Joseph (Yusuf), the poet alludes to the absurdity of treating such a precious entity as a worthless trinket. Who would not long to see Joseph, and who could turn away from someone willing to give their life?

The application of anthroponyms in classical poetry embodies psycholinguistic, sociolinguistic, and linguaculturological significance. This can be clearly observed in the following line:

Solib borma meni, Ey Yusufi husn,
Bu kun Ya'qubtek bayt ul-hazanda. (Devoni Shayxzoda, p. 24)

The poet demonstrates remarkable skill in using lexical units that immediately conjure an entire historical epoch and its exemplary events. No parent is immune to the tragedy of losing a child. When Prophet Jacob's (Ya'qub) other sons threw his beloved son into a well out of jealousy and concocted a story that he had been eaten by a wolf, Jacob went blind from endless weeping. Yet his sorrow did not end there; his heart found peace only after being reunited with Joseph. Although similar hardships occur in life, in human history Jacob's grief stands as the ultimate symbol of anguish. The well into which Joseph was cast, the house where Jacob lived, and the space they inhabited all turned into a "house of sorrow" (*bayt ul-hazan*). Drawing from these events, classical literature asserts that no sorrow surpasses this, prompting the lover to beg the beloved not to cast him into such an abyss. He fears becoming like Jacob, just as he views the beloved as Joseph.

In semantic development, concepts such as "eternity" and "immortality" are closely associated with Khizr (Al-Khidr). The poet deliberately chooses this name to construct a gradual progression of meaning in the text:

Ey ko'nglum olgon dilrabo, jonim fido bo'lsun sanga,
Obi hayoti Hizr ila umri baqo bo'lsun sanga.

The lover wishes eternal life for the beloved and finds happiness in sacrificing his soul. This lyrical hero does not forget himself either, alluding to how this devotion binds his soul to eternity. The life the lover offers to the beloved is presented as sweet and life-giving as Khizr's "Water of Life" (*Obi Hayat*).

Unuttirdi Xizr obi hayotin,
O'shal yoquti shakkarxand bizga.

While no force normally rivals Khizr's Water of Life in bestowing unending life, the love for the beloved is so powerful that it makes one forget even the existence of the Water of Life. Through this anthroponym, the seme of "eternal life" plays a dominant role.

Ey begim, valloh, kerakmas tanda jon sizsiz manga,
Ham hayoti Xizr-u umri jovidon sizsiz manga.

This traditional seme continues in the next verse. The lover indicates that without the beloved, neither life nor longevity holds any value. The lover's loyalty to the beloved surpasses both his soul and his lifespan. In this regard, quoting a verse by Hazrat Alisher Navoi helps illustrate the profound level of devotion depicted by Atoi:

Jondin seni ko'p sevarmen, ey umri aziz,
Sondin seni ko'p sevarmen, ey umri aziz.
Har neniki sevmak andin ortiq bo'lmas,
Andin seni ko'p sevarmen, ey umri aziz.

In Alisher Navoi's interpretation, no concept ranks higher than life itself; however, Atoi interprets this differently—nothing exceeds the sight and presence of the beloved.

Men Atoiymen Husayniy, husn ichinda sen Hasan,
Karbalodur razvzai bog'i jinon sizsiz manga.

Here, the source of meaning for the symbol of beauty shifts: it is no longer Joseph, but Hasan. The lyrical hero takes pride in the presence of this dual source of beauty, pairing one concept with another through paired anthroponyms. In the Islamic world, the status of Hazrat Hasan is exceptionally high, which led the poet to incorporate this specific anthroponym.

Nogah nazarim chohi zanaxdoningg'a tushti,
Bog'landi ko'ngul Yusufi zulfing rasanida.

While in earlier examples the name Joseph carried a direct personal reference, in this verse the personal seme is entirely absent. Here, "Yusuf" functions as an attributing adjective, serving as an exquisite metaphor for the incomparable beauty of the beloved's locks (*zulf*). As a core element of the beloved's beauty, the lock of hair is a traditional image in classical literature, and its seme associated with diffusing fragrance persisted even in the lyrics of early 20th-century poets.

Bo'lg'ay erdi Yusufum hajring azobinda shafi',
Holi zorimni ko'rub payg'ambari Kan'on manga

In this final verse, the anthroponym conveys a completely different semantic meaning. Prophet Joseph was thrown into a well, carried away by a caravan, sold in the slave market of Egypt, caught the attention of the Vizier's wife, and earned the affection of the ruler; yet none of these ordeals caused him as much agony as separation from his father. He endured this pain for years in quiet solitude (*xilvat dar anjuman*), unaware of his father's state. Having understood the profound weight of separation, the poet

addresses Joseph in this verse to express the depth of his own longing, wishing that Joseph might convey it to the beloved.

Conclusion. In conclusion, the anthroponyms used in Atoi's ghazals serve to express various states of the lyrical hero, including feelings that often remain nameless. Each mentioned name embodies distinct attributes, and integrating these qualities into literary works elevates the text's artistic power, ensuring its emotional resonance and depth.

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TRAVMATIK QAHRAMON VA URUSH MOTIVI: A. PLATONOVNING «ВОЗВРАЩЕНИЕ» HIKOYASI VA N. ESHONQULNING «URUSH ODAMLARI» QISSASIDA QIYOSIY TAHLIL

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Annotatsiya. Maqolada A. Platonov va N. Eshonqul nasridagi travmatik qahramon obrazi qiyosiy-tipologik jihatdan «Возвращение» hikoyasi (1946) va «Urush odamlari» qissasi (birinchi nashri — 1988) materialida o‘rganiladi. Ikkala matn ham frontdan qaytgan askarning tinch hayotga qaytishi haqida hikoya qilsa-da, travmaning tuzilishi, uning ontologik maqomi va xotimadagi yechilish tarzi ikki muallifda bir-biriga qarama-qarshi, biroq tipologik jihatdan qiyoslanadigan modellarni tashkil etadi.

Kalit so‘zlar: qiyosiy adabiyotshunoslik, travmatik qahramon, holat tashuvchisi, A. Platonov, N. Eshonqul, ekzistensial poetika, xotima-yechim.

Bosh qahramonni harakat subyekti sifatida emas, balki ekzistensial holat tashuvchisi sifatida o‘rganish zamonaviy qiyosiy adabiyotshunoslikning samarali yo‘nalishlaridan biridir. M. Xaydegger va K. Yaspers g‘oyalari, shuningdek ularga tayanuvchi Ye. A. Penkinaning A. Platonov nasriga tatbiq etilgan metodologiyasi asosida ushbu yondashuvni o‘zbek nasriga ham yoyish va N. Eshonqul ijodi bilan tizimli qiyoslash imkoniyati ochiladi. Mazkur ish Ikkinchi jahon urushidan qaytgan askar mavzusi bilan birlashgan, biroq travmani talqin qilishda tubdan farqlanadigan ikki matn materialida ushbu yo‘nalishni davom ettiradi.

Gvardiya kapitani Aleksey Ivanov («Возвращение») va Normat polvon («Urush odamlari») bir xil darajada maqsadli harakat subyekti emas, balki holat tashuvchisi sifatida namoyon bo‘ladi: ularning xatti-harakatlari — Ivanovda yo‘ldosh Masha bilan yaqinlashish, tungi ayblov-suhbat, uydan ketish; Normatda dezertirni otishdan bosh tortish, xotinini urish, tog‘ga ketish, ikki kishini o‘ldirish — iroda emas, balki urushdan keyin qahramon o‘zini topgan mavjudlik modusi tomonidan boshqariladi. Biroq bu holatning tuzilishi ikki muallifda tubdan farq qiladi.

Ivanovda travma ikki qatlamli. Yuzada u reaktiv — tungi sahnadagi rashk portlashi; chuqur qatlamda esa turg‘un bo‘lib, konkret sababdan oldin mavjud: qahramon xotini bilan har qanday izohlashuvdan oldin ham uydan bezor bo‘ladi. Yolg‘izlik ham ikki

qatlamli: tashqi — «armiyasiz yetim qolgan» holat, harbiy birodarlikning uy shakli sifatida yo‘qolishi; ichki — o‘z uyidagi begonalashuv, qaytish quvonchini «butun yuragi bilan» his eta olmaslik. Ziddiyat dastlab tashqi (front/uy, armiya/oila) sifatida ochiladi va kulminatsion tungi sahnada ichki — aql va yurak dixotomiyasiga — ko‘chadi: Ivanovning aqli ayblov mantig‘ini quradi («Sen kasofatsan, boshqa hech narsa emas»), xotimada esa «yurak… erkinlikka yorib chiqadi» — bu sahna birorta ham ironik shtrixsiz yozilgan. «Возвращение» xotimasi modus o‘zgarishidir: qahramon ziddiyatni mantiqiy yo‘l bilan emas, balki borliqni boricha qabul qiladigan yangi ko‘rish qobiliyati orqali hal qiladi.

Normatning travmasi boshidanoq boshqacha tuzilgan. U reaktiv bosqichni bosib o‘tmaydi: dastlabki nuqtadayoq qahramon uni turg‘un, obyektsiz holat sifatida boshdan kechiradi — «Urush — xuddi oyog‘ing ostidagi ko‘chib turgan toshga o‘xshaydi, ko‘tarsang ham o‘lasan, ko‘tarmasang ham». Travmaning ontologik maqomi mifologik tarzda mustahkamlangan: u ajdod Boyhunning o‘lim oldidagi vasiyatiga borib taqaladi, unga ko‘ra avlodlar abadiy «urush odamlari»ga aylanadi — travma bu yerda biografik epizod emas, urug‘ la’natidir. Shunga ko‘ra, Normatning yolg‘izligi ham boshidanoq tashqariga emas, ichkariga qaratilgan: u xotinining xiyonati fosh bo‘lishidan oldin ham mavjud va «men»ning ikkiga bo‘linishi bilan strukturalashgan — xuddi Anzaratning o‘zini «boshqa birov bo‘lib yashayotgandek» his etishi kabi. Ziddiyat ham birinchi sahifadanoq ichki va o‘tishsiz: urushgacha bo‘lgan Normat-polvon va hozirgi Normat-cho‘loq bitta tanada yashaydi, bu esa qishloqdoshlarining uning ozib, mushaklari shalviragan, yara izlari qolgan tanasiga ko‘nika olmasligi orqali tana darajasida qayd etiladi.

Ikki matnning xotimasi bir-biriga ko‘zgudek qarama-qarshi. Ivanov poyezddan sakraydi — bu travmani hal qiluvchi qurbonlik aktidir. Normat esa, aksincha, holat tomonidan yutiladi: hal qiluvchi daqiqada u o‘ylash qobiliyatini yo‘qotadi va front holatiga regressiya qiladi, xotini va qishloqdoshini «Fashist!» deb ataydi — bu so‘z o‘zinikilarni dushman sifatida idrok etishga qaytishni qayd etadi. Qahramonning tog‘da halok bo‘lishi va elegik, katarsissiz epilog (bo‘sh uy, tomida o‘sgan o‘t, yaylovga qaytadan chiqqan poda) shuni ko‘rsatadiki, hayot travmani hal etmaydi, balki uning yonida davom etadi.

Muhimi shundaki, aynan mazkur — travmatik — juftlik ikki mualliflik modelining maksimal yaqinlashuv nuqtasini tashkil etadi: so‘nggi davr A. Platonovi «Возвращение»da ilk matnlariga xos ironik masofani olib tashlaydi va N. Eshonqulning muqobilsiz empatiyasiga tipologik jihatdan yaqinlashadi. Biroq aynan xotima nuqtasida juftlik keskin ajraladi, va bu farq korpusning boshqa

juftliklaridagidek «ironiya — empatiya» chizig‘i bo‘yicha emas, balki ikki boshqa o‘q bo‘yicha kechadi: izlanish yo‘nalishi (Ivanovda — tashqariga, oilaga, ochilgan yurak orqali; Normatda — ichkariga, yo‘qotilgan o‘zlik-o‘xshashlikka) va travmaning ontologik maqomi (Platonovda — qurbonlik orqali hal etiladigan; Eshonqulda — mifologik mustahkamlangan, hal etib bo‘lmaydigan). Muhim jihati shundaki, Eshonqulda travma jamoaviy xarakterga ega: «Urush odamlari» sarlavhasidagi ko‘plik shakli travmatik holatning bir necha personaj (Anzarat, Biydi momo, Malloboy, dezertir Xotam mergon) orasida taqsimlanishini mustahkamlaydi, Platonovda esa travma bitta, ta’kidlangan tarzda tipik ismga — Aleksey Ivanovga — jamlangan.

O‘tkazilgan qiyoslash holat tashuvchisi kategoriyasining XX asr rus va o‘zbek nasrini qiyosiy o‘rganish uchun samaradorligini tasdiqlaydi: u fabula darajasidagi o‘xshashlik («askarning qaytishi») ortida travmaning ikki qarama-qarshi strukturaviy modelini — A. Platonovda qurbonlik akti orqali hal etiluvchi va N. Eshonqulda ontologik jihatdan hal etilmaydigan, mifologik mustahkamlangan modellarni — ochib beradi va shu orqali komparativ poetikada travmatik qahramon tipologiyasini aniqlashtiradi.

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МЕТАФИЗИЧЕСКОЕ СОСТОЯНИЕ ГЕРОЯ: КАТЕГОРИИ ОДИНОЧЕСТВА, СТРАДАНИЯ И КОНФЛИКТА В ПРОЗЕ А. ПЛАТОНОВА И Н. ЭШОНКУЛА

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Аннотация. В статье предлагается сравнительно-типологический анализ метафизического состояния героя в прозе А. Платонова и Н. Эшонкула на основе экзистенциальной триады «одиночество — страдание — конфликт». Показано, что по всем трём осям триады между двумя авторскими моделями устанавливается устойчивая асимметрия, при этом типы триады находятся в отношении структурной взаимообусловленности.

Ключевые слова: сравнительное литературоведение, экзистенциальная поэтика, одиночество, страдание, конфликт, А. Платонов, Н. Эшонкул, М. Хайдеггер, К. Ясперс.

Категория метафизического состояния героя в современном сравнительном литературоведении требует инструмента, позволяющего различать внешне схожие переживания персонажей, принадлежащих разным национальным и языковым традициям. В качестве такого инструмента в настоящей работе используется экзистенциальная триада «одиночество — страдание — конфликт», операционализированная на основе категориального аппарата М. Хайдеггера (Geworfenheit, Das Man, различение Furcht и Angst), типологии пограничных ситуаций К. Ясперса, понятия абсурда А. Камю и категорий «тоска — стыд», «ум — сердце», предложенных Н. В. Пенькиной применительно к прозе А. Платонова. Триада применяется не как философская система, а как диагностическая рамка сравнительного литературоведения, апробированная на корпусе из восьми произведений А. Платонова и Н. Эшонкула.

По первой оси — локализации одиночества — между двумя моделями фиксируется устойчивая асимметрия. У А. Платонова доминирует одиночество среди людей: герой непрерывно социально вовлечён, но онтологически обособлен, и именно эта обособленность структурирует его существование.

Пухов («Сокровенный человек») живёт в гуще коллективов — бригада, отряд, мастерские, — однако именно эта плотность делает его одиночество структурным; формула «Тоска по родному месту взяла его за живое… родина — сердечное дело и не вся земля» фиксирует несводимость «сердечного дела» к идеологической целостности. У Макара («Усомнившийся Макар») та же структура доведена до предела: герой окружён коллективными формулами («трудящиеся массы», «московский народ»), ни одна из которых не вмещает его, — сдвиг от Das Man здесь дан в открытой форме. У Иванова («Возвращение») одиночество приобретает парадоксальнейшую форму — оно возникает не среди врагов, а среди близких, в собственном доме. Структурным исключением внутри платоновского корпуса выступает Фро, чьё одиночество локализовано не в социальном поле, а в памяти о теле мужа, — эта локальная проницаемость не отменяет доминанту, а уточняет её.

У Н. Эшонкула локализация одиночества последовательно смещена внутрь. У старого художника («Человек, ведущий обезьяну») одиночество тематизировано как «последнее убежище» — бегство от невыносимого внутрь собственной памяти при сохранении внешних социальных связей. В «Чёрной книге» одиночество достигает наиболее радикальной формы: герой формулирует его как заключение — «Тридцать лет я жил в заточении, среди стен неведения», — и радикальность заключается во внутреннем расколе самого «я»: вчерашний преступник, жертва и судья оказываются собранными в одном сознании. У Нормата («Люди войны») и Байна-момо («Ветер не поймать») одиночество также обращено внутрь: первый превращает заброшенный сад в форму существования, вторая герметизирует одиночество до полного отсутствия Другого в художественном пространстве.

По второй оси — темпоральному режиму страдания — различение Furcht/Angst позволяет разграничить реактивное страдание, вызванное конкретным событием, от устойчивого, конститутивного модуса бытия. В корпусе А. Платонова, как правило, оба режима сополагаются: страдание Пухова начинается реактивно (смерть жены), но переходит в устойчиво-фоновую модальность; исключение составляет Макар, чья «совестливая рабочая тоска» устойчива с самого начала, что уточняет диспропорциональность распределения пенькинской пары «тоска — стыд» внутри платоновского корпуса. У Н. Эшонкула страдание устойчиво изначально: у старого художника оно тематизировано как страдание, идущее из самой биографии, а не порождаемое отдельным событием; в «Чёрной книге» страдание выходит на онтологический

уровень — тридцатилетнее заточение есть структура прожитой жизни, а не следствие происшествия.

По третьей оси — уровне протекания конфликта — асимметрия наиболее структурно отчётлива. У А. Платонова конфликт развёрнут на уровне мира: герой втянут в столкновение идеи и действительности, утопического проекта и того, что С. Г. Бочаров определил как «вещество существования», — внутри этого столкновения разворачивается дихотомия «ум — сердце», зафиксированная Н. В. Пенькиной. У Н. Эшонкула конфликт собран внутри субъекта — как разрыв между прошлым и нынешним «я», между внешней видимостью и внутренней сущностью; применительно к этому материалу дихотомия «ум — сердце» не работает, и в качестве замещающего инструмента в работе предлагается оппозиция «я-сосуд — я-наблюдатель», ранее не сформулированная системно в эшонкуловедении.

Три оси триады не являются независимыми характеристиками: тип одиночества предопределяет тип страдания, тип страдания — тип конфликта, и именно эта цепь обусловленности обеспечивает аналитическую продуктивность триады. Зафиксированные локальные исключения («Фро» у А. Платонова, замена стыда ненавистью у Байна-момо) не нарушают асимметрию, а описывают модель двух авторских систем не как безальтернативное распределение, а как доминанту с локальной проницаемостью.

Проведённый анализ показывает, что экзистенциальная триада «одиночество — страдание — конфликт», применённая к корпусу из восьми произведений, подтверждает свою продуктивность как инструмент сравнительно-типологического изучения качественно различных литературных традиций и открывает возможность дальнейшей разработки категориального аппарата сравнительного литературоведения на материале русской и узбекской прозы XX века.

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ZAYNIDDIN VOSIFI: HIS LIFE, LITERARY ACTIVITY, AND THE STRUCTURE OF «BADOYE' UL-VAQOYE'»

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Zayniddin Vosifi was a prominent literary figure and intellectual of the late fifteenth and first half of the sixteenth century. His full name was Zayniddin Mahmud ibn Abduljamil. He was born in Herat into a family of munshis (scribes and literary secretaries). He received his early education in Herat and studied at the Shahrukh Madrasa, where he acquired extensive knowledge of Arabic, literature, fiqh, and other fields of learning. From an early age, Vosifi became involved in the literary circles of Herat. At the age of sixteen, he met Alisher Navoi, whose literary school had a significant influence on the formation of his creative activities. Owing to the political instability in Khorasan and the persecution under Shah Ismail, Vosifi eventually moved to Movarounnahr.

Between 1512 and 1515, he lived in Samarkand and Bukhara, and later stayed in areas such as Farkat (present-day Parkent), Tashkent, and Shahrisabz. In 1518, his invitation to Shahrukhiya by Keldi Muhammad Khan strengthened his connections with the court and political circles. From 1525 until the end of his life, he lived in Tashkent, where he continued his scholarly, literary, and governmental activities. Vosifi's activities were not limited to literature. He participated in Keldi Muhammad Khan's campaigns in Khorasan in 1528–1529, and from 1540 he was engaged in preparing state documents at the court of Barak Khan. His life journey and his activities in various political, scholarly, and literary environments were subsequently reflected in the works he produced. Vosifi's literary activity began at approximately the age of twelve or thirteen. He worked in prose genres such as letters, petitions, and stories, and skillfully employed various artistic devices, particularly the saj' style. His mastery in creating diverse similes and employing the art of muammo was also highly praised by Alisher Navoi.

The most important example of Vosifi's literary heritage is his work Badoye' ul-vaqoye'. Alongside the author's personal observations, the work reflects the scholarly, literary, historical, and cultural processes of the first half of the sixteenth century in the regions of Khorasan, Movarounnahr, Turkestan, and Iran. In addition to prominent scholars such as Ibn Sina, Abdurahman Jami, and Alisher Navoi, the work contains information about representatives of the literature and music of the period, statesmen, and other notable figures. The work also contains significant information

concerning the political and cultural life of Tashkent and its surrounding areas. In particular, the Kaykavus chorbog‘ is described as one of the important centers of the literary and intellectual environment, where poets and writers gathered and held discussions. The work also provides information about poets, artists, calligraphers, and other prominent figures who lived and pursued their creative activities in Tashkent and its surrounding areas.

Among the information concerning Tashkent in the work, the city’s natural and urban environment is also given due attention. In particular, a masnavi consisting of 83 couplets artistically depicts the beauty of Tashkent, its gardens, climate, and clear waters. These accounts are important for understanding not only the political and cultural life of sixteenth-century Tashkent, but also its urban environment and living conditions. The work Badoye’ ul-vaqoye’ possesses distinctive structural and thematic features. The work presents the author’s personal memories, historical events that he witnessed, the activities of various rulers and statesmen, the scholarly and literary milieu, the lives of prominent figures, as well as various aspects of social life through stories, narrative poems, and conversations. Therefore, the content of the work is not limited to an account of political events but also reflects the broader socio-cultural landscape of its period.

At the beginning of the work, information related to the author himself, his life journey, and his literary activity occupies an important place. In the Peshguftor, significant episodes concerning Vosifi’s origins, the events he experienced, the political and social situation in Khorasan, his arrival in Movarounnahr, and the subsequent course of his life are presented. This section is important for understanding the subsequent content of the work, as it reveals the author’s attitude toward historical events and provides an opportunity to observe the environment of his time. In the subsequent sections of the work, events related to life in Samarkand and Bukhara occupy a prominent place. Information concerning the severe winter, famine, and high prices in Samarkand, the lives of scholars and students, the author’s relations with learned individuals, and the literary and intellectual environment enriches the social content of the work. The journey to Bukhara and the events that took place there are likewise presented on the basis of the author’s direct observations. Such information is of considerable importance for studying the everyday life and social environment of the cities of Movarounnahr in the early sixteenth century.

The work also provides extensive coverage of episodes related to rulers and the court environment. Information concerning events associated with Ubaydullah Khan, gatherings of the ruler, statesmen, and the scholarly and literary milieu at the court

demonstrates that the author maintained close relations with the circles of the rulers. At the same time, Vosifi provides information, based on his direct observations, about the system of governance of his time and the relations between rulers and scholars and literary figures. In particular, the sections devoted to Mirza Ulugh Beg and Amir Alisher Navoi contain various stories and reflections concerning their virtues, scholarly and literary activities, and personal characteristics. Information about Mavlono Binoi, Pahlavon Muhammad, Ibn Sina, and other prominent figures further enhances the scholarly and literary value of the work. Through these accounts, the author not only portrays historical figures but also draws attention to their contributions to the development of science, literature, and culture.

In the subsequent sections of the work, individual figures and events associated with them are presented in the form of stories and narrative poems. These include accounts of such figures as Amir Sayyid Jalal al-Din Marg‘inoniy, Tajunnasab, Khoja Nizam al-Mulk Khafi, Keldi Muhammad Sultan, Mavlono Ogahi, and Khoja Shihab al-Din Ishaq. Alongside historical events, these stories and narrative poems also contain details concerning people’s character, behavior, relationships, and way of life. The use of forms such as Guftor, Hikoyat, and Doston in the structure of the work contributes to the diversity of its narrative style. The author presents some events directly in the form of personal recollections, others as conversations and discussions, and still others as stories or narrative poems. As a result, historical reality, artistic representation, personal observation, and literary tradition are closely integrated throughout the work. In the structural organization of Badoye’ ul-vaqoye’, events are not always presented in a strictly chronological order. The inclusion of several events, stories, or accounts of historical figures within a single thematic framework strengthens the memoir-like character of the work.

Conclusion. The life and literary activity of Zayniddin Vosifi are of considerable importance for the study of the scholarly, literary, and social environment of the sixteenth century. His work Badoye’ ul-vaqoye’ incorporates historical events, personal memories, and various narratives, providing valuable information about life in Movarounnahr and Khorasan. The thematic and structural diversity of the work makes it possible to regard it as one of the important historical sources for studying the political, social, and cultural life of the period.

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O‘ZBEKISTONNING XALQARO IQTISODIY INTEGRATSIYASI: SAVDO-SIYOSAT ISLOHOTLARI VA TASHQI BOZORLARGA CHIQISH IMKONIYATLARI

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Annotatsiya: Mazkur tezisda O‘zbekistonning xalqaro iqtisodiy integratsiya jarayonidagi zamonaviy tendensiyalari, tashqi savdo siyosatini liberallashtirish bo‘yicha amalga oshirilayotgan institutsional islohotlar hamda milliy iqtisodiyotning tashqi bozorlarga chiqish imkoniyatlari tahlil qilinadi. Ayniqsa, O‘zbekistonning Jahon savdo tashkilotiga (JST) a’zo bo‘lish jarayoni, milliy qonunchilikni xalqaro savdo qoidalariga muvofiqlashtirish, bojxona va texnik tartibga solish tizimlarini takomillashtirish masalalariga alohida e’tibor qaratiladi. 2025-yilda mamlakat tashqi savdo aylanmasining 81,2 mlrd AQSh dollariga yetgani va eksport hajmining 33,8 mlrd dollarni tashkil etgani O‘zbekistonning global iqtisodiy aloqalari kengayib borayotganini ko‘rsatadi. Tadqiqot natijasida tashqi bozorlarga chiqishni kengaytirish uchun eksport geografiyasini diversifikatsiya qilish, yuqori qo‘shilgan qiymatga ega mahsulotlar ulushini oshirish, xalqaro standartlarni joriy etish va savdo infratuzilmasini raqamlashtirish muhim yo‘nalishlar sifatida asoslanadi.

Kalit so‘zlar: xalqaro iqtisodiy integratsiya, tashqi savdo, eksport, JST, savdo siyosati, institutsional islohotlar, tashqi bozor, eksport diversifikatsiyasi, O‘zbekiston.

KIRISH. Bugungi kunda jahon iqtisodiyotida globallashuv jarayonlarining chuqurlashuvi mamlakatlarning xalqaro iqtisodiy integratsiyadagi ishtirokini kengaytirishni talab qilmoqda. Xalqaro savdo, investitsiyalar, global qiymat zanjirlari va xizmatlar eksportining rivojlanishi milliy iqtisodiyotlarning raqobatbardoshligini belgilovchi muhim omillardan biriga aylanmoqda. Shu nuqtayi nazardan, O‘zbekiston uchun tashqi savdo siyosatini liberallashtirish va xalqaro savdo tizimiga yanada chuqurroq integratsiyalashish iqtisodiy islohotlarning muhim yo‘nalishlaridan hisoblanadi.

So‘nggi yillarda O‘zbekistonda tashqi iqtisodiy faoliyatni liberallashtirish, bojxona tartib-taomillarini soddalashtirish, eksportchilar faoliyatini qo‘llab-quvvatlash va milliy qonunchilikni xalqaro savdo qoidalariga moslashtirish bo‘yicha tizimli choralar amalga oshirilmoqda. Ayniqsa, O‘zbekistonning Jahon savdo tashkilotiga a’zo bo‘lish

jarayonining jadallashuvi mamlakatning xalqaro iqtisodiy integratsiyasida yangi bosqichni shakllantirmoqda. O‘zbekiston tashqi savdosining so‘nggi yillardagi dinamikasi mamlakatning xalqaro iqtisodiy aloqalari kengayib borayotganini ko‘rsatadi. Milliy statistika qo‘mitasining dastlabki ma’lumotlariga ko‘ra, 2025-yilda O‘zbekistonning tashqi savdo aylanmasi 81,2 mlrd AQSh dollarini tashkil etib, 2024-yilga nisbatan 20,7 foizga oshgan. Ushbu davrda eksport hajmi 33,8 mlrd dollar, import hajmi esa 47,4 mlrd dollarni tashkil qilgan. Mamlakat 2025-yilda dunyoning 210 ta mamlakati bilan savdo aloqalarini amalga oshirgan. Tashqi savdo geografiyasida ham muhim o‘zgarishlar kuzatilmoqda. 2025-yilda O‘zbekiston tashqi savdo aylanmasida Xitoyning ulushi 21,2 foizni, Rossiyaning 16,0 foizni, Qozog‘istonning 6,1 foizni, Turkiyaning 3,7 foizni va Koreya Respublikasining 2,1 foizni tashkil etgan. Mazkur ko‘rsatkichlar O‘zbekistonning asosiy savdo hamkorlari bilan iqtisodiy aloqalari yuqori darajada ekanligini ko‘rsatish bilan birga, yangi bozorlarga chiqish va eksport geografiyasini yanada diversifikatsiya qilish zarurligini ham ko‘rsatadi. Xalqaro iqtisodiy integratsiyaning muhim institutsional yo‘nalishlaridan biri O‘zbekistonning JSTga a’zo bo‘lish jarayonidir. 2026-yil iyul oyida JSTning O‘zbekistonning a’zoligi bo‘yicha Ishchi guruhi yig‘ilishida mamlakatning 2026-yil davomida a’zolik jarayonini yakunlash maqsadi yana bir bor tasdiqlandi. JST ma’lumotlariga ko‘ra, 2026-yil iyul holatiga O‘zbekiston tomonidan 31 ta ikki tomonlama bozor ochish to‘g‘risidagi kelishuv JST Kotibiyatiga topshirilgan. Shuningdek, 2026-yil martidan boshlab JST talablariga muvofiqlashtirilgan huquqiy hujjatlar soni 190 taga yetgan. JSTga integratsiyalashuv faqat tashqi savdo hajmini oshirish masalasi bilan cheklanmaydi. Ushbu jarayon milliy iqtisodiyotning institutsional muhitini takomillashtirishni, raqobat mexanizmlarini rivojlantirishni, texnik reglamentlar va sanitariya-fitosanitariya talablarini xalqaro standartlarga muvofiqlashtirishni ham talab qiladi. 2025–2026-yillarda ushbu yo‘nalishda bir qator amaliy islohotlar amalga oshirildi. Jumladan, JST talablariga muvofiqlashtirish doirasida eksport cheklovlari bekor qilindi, ayrim mahsulotlar bo‘yicha minimal eksport narxlarini belgilash amaliyoti tugatildi, intellektual mulk obyektlarini ro‘yxatdan o‘tkazish tartiblari takomillashtirildi. Oziq-ovqat xavfsizligi va texnik tartibga solish sohalarida ham xalqaro standartlarga yaqinlashishga qaratilgan o‘zgarishlar amalga oshirildi. Bojxona tizimining raqamlashtirilishi ham xalqaro iqtisodiy integratsiyani chuqurlashtirishning muhim omilidir. 2025-yil fevral oyida taqdim etilgan ma’lumotlarga ko‘ra, tadbirkorlar uchun 35 ta axborot tizimi joriy etilgan, eksport operatsiyalarini rasmiylashtirish bosqichlari 9 tadan 3 tagacha qisqartirilgan. Eksport yuklarini rasmiylashtirish va ma’lumotlarni qayta ishlash jarayonlarini takomillashtirish natijasida eksport yuklarini

bojxona rasmiylashtiruvi vaqti 20 daqiqagacha qisqargani qayd etilgan. Bunday islohotlar tashqi bozorlarga chiqishda korxonalar uchun tranzaksiya xarajatlarini kamaytirish, vaqtni tejash va savdo operatsiyalarining shaffofligini oshirish imkonini beradi. Shu bilan birga, xalqaro bozorlarda raqobat kuchayib borayotgan sharoitda faqat bojxona jarayonlarini soddalashtirishning o‘zi yetarli emas. Eksport qilinadigan mahsulotlarning sifati, xalqaro sertifikatlashtirish, logistika xarajatlari, brendlash va marketing salohiyati ham muhim ahamiyat kasb etadi. Jahon bankining mamlakat bo‘yicha ma’lumotlariga ko‘ra, O‘zbekiston iqtisodiyoti 2025-yilda 7,7 foiz real o‘sishni qayd etgan. Shu davrda eksport AQSh dollari hisobida 24 foizga oshgan bo‘lib, o‘sishda oltin, mis, rux, uran mahsulotlari, oziq-ovqat, o‘g‘itlar va xizmatlar eksporti muhim rol o‘ynagan. Jahon banki O‘zbekistonning JSTga qo‘shilishini iqtisodiy islohotlarni mustahkamlovchi omil sifatida baholaydi va uning uzoq muddatli ta’siri investitsiyalar hamda savdo imkoniyatlari orqali iqtisodiy o‘sishga ijobiy ta’sir ko‘rsatishi mumkinligini qayd etadi. Shu bilan birga, O‘zbekiston eksportining tarkibiy diversifikatsiyasi dolzarb masala bo‘lib qolmoqda. 2024-yil ma’lumotlariga ko‘ra, beshta yirik mahsulot guruhi — qimmatbaho metallar, xizmatlar, paxta, mineral yoqilg‘i va moylar, shuningdek mis va unga oid mahsulotlar — mamlakat eksportining qariyb 70 foizini tashkil etgan. Bu holat tashqi bozorlardagi narx o‘zgarishlari va tashqi talab dinamikasiga nisbatan sezgirlikni saqlab qolayotganini ko‘rsatadi. Shu sababli yuqori qo‘shilgan qiymatga ega tayyor mahsulotlar va xizmatlar eksportini kengaytirish xalqaro iqtisodiy integratsiyaning istiqbolli yo‘nalishlaridan biridir. O‘zbekistonning tashqi bozorlarga chiqish imkoniyatlarini kengaytirishda xizmatlar eksportining ahamiyati ham ortib bormoqda. Xususan, IT xizmatlari, turizm, transport-logistika, moliyaviy va professional xizmatlar xalqaro bozorlarda yangi eksport segmentlarini shakllantirishi mumkin. 2025-yil yakunlari bo‘yicha rasmiy ma’lumotlarda eksport geografiyasi 131 mamlakatni qamrab olgani va IT xizmatlari eksporti 940 mln AQSh dollariga yetgani qayd etilgan.

Xulosa. O‘zbekistonning xalqaro iqtisodiy integratsiyasi so‘nggi yillarda tashqi savdo hajmining o‘sishi, savdo geografiyasining kengayishi va institutsional islohotlarning jadallashuvi bilan tavsiflanmoqda. 2025-yilda tashqi savdo aylanmasining 81,2 mlrd AQSh dollariga yetishi hamda eksportning 33,8 mlrd dollarni tashkil etishi mamlakatning global savdo tizimidagi faolligi ortib borayotganini ko‘rsatadi. JSTga a’zo bo‘lish jarayoni esa tashqi savdo siyosatini takomillashtirish bilan bir qatorda, iqtisodiyotda raqobat muhitini kuchaytirish, texnik va sanitariya standartlarini xalqaro talablar bilan uyg‘unlashtirish hamda savdo tartib-taomillarining shaffofligini oshirish uchun institutsional asos yaratmoqda. 2026-yil iyul holatiga ko‘ra, O‘zbekiston JSTga

a’zo bo‘lish jarayonini 2026-yilda yakunlash maqsadini saqlab qolgan va ikki tomonlama bozor ochish bo‘yicha 31 ta kelishuvni JST Kotibiyatiga topshirgan.
Kelgusida tashqi bozorlarga chiqish imkoniyatlarini kengaytirish uchun eksportni xomashyo yo‘nalishidan yuqori qo‘shilgan qiymatga ega mahsulot va xizmatlar tomon diversifikatsiya qilish, xalqaro sertifikatlashtirish tizimlarini rivojlantirish, logistika va bojxona jarayonlarini raqamlashtirish, kichik va o‘rta biznesning eksport salohiyatini oshirish hamda yangi savdo hamkorlari bilan iqtisodiy aloqalarni kengaytirish muhim hisoblanadi.

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Yumshoq va namokopli pishloq ishlab chiqarish liniyalarida avtomatlashgan CIP-yuvish va HACCP tizimini integratsiyalashning texnologik va iqtisodiy samaradorligi

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Annotatsiya. Maqolada yumshoq rassolni syrlar (brynza, feti va sulsuguni turi) ishlab chiqarish texnologik liniyalarida oziq-ovqat xavfsizligini ta’minlash va mikrobiologik xavflarni minimallashtirish mexanizmlari tizimli ravishda tadqiq etilgan. Elektr o‘tkazuvchanlik (conductivity) datchiklariga asoslangan avtomatlashtirilgan CIP-yuvish algoritmi va uning HACCP (ISO 22000) tizimi bilan raqamli integratsiyasi "Pure Milky Works" MChJ korxonasi misolida tahlil qilingan. Tadqiqot natijasida korxonada texnologik brak hajmi 1.5% dan 0.1% gacha kamaytirilgani, yillik suv iste’moli 35% ga va kimyoviy moddalar sarfi 25% ga tejalgani aniqlangan. Mazkur texnologik yechim yumshoq rassolni syrlar ishlab chiqarishda mikrobiologik xavfsizlikni kafolatlash bilan birga, jarayondan ajraladigan ikkilamchi xomashyo (sut zardobi) oqimining tozaligini barqaror saqlash hamda undan kelgusida bioaktiv oqsil-peptid konsentratlari olish uchun fundamental ilmiy-amaliy poydevor bo‘lib xizmat qiladi.

Kalit so‘zlar: yumshoq rassolni syr, brynza, oziq-ovqat xavfsizligi, HACCP, Kritik Nazorat Nuqtalari (KNN), CIP-yuvish, SCADA, sut zardobi, bioaktiv peptidlar, iqtisodiy samaradorlik.

Kirish. O‘zbekiston Respublikasida oziq-ovqat xavfsizligini ta’minlash va aholini yuqori sifatli, ekologik toza va parhezbop sut mahsulotlari bilan uzluksiz ta’minlash agrosanoat majmuasining strategik vazifalaridan biridir. So‘nggi yillarda respublikamizda protein va mineral moddalarga boy bo‘lgan mahsulotlar — Yumshoq va namokopli pishloq (brinza, feta, suluguni va b.) ishlab chiqarish hajmi va ularga bo‘lgan iste’mol talabi keskin ortib bormoqda.

Yumshoq va namokopli pishloq o‘zining yuqori namlik darajasi (50-60%), neytralga yaqin pH ko‘rsatkichi va ozuqaviy qiymati tufayli patogen mikroorganizmlarning (*Listeria monocytogenes*, *Salmonella spp.*, *Staphylococcus aureus*) va mog‘or

zamburug‘larining rivojlanishi uchun o‘ta qulay biologik muhit hisoblanadi. Rassolni syrlar texnologiyasining o‘ziga xosligi (sutni laxtalash, zardobni ajratish, syr massasini presslash va rassolda yetiltirish) ishlab chiqarish zanjirining har bir bosqichida mikrobiologik va kimyoviy ifloslanish (kontaminatsiya) xavfini o‘ta yuqori darajaga ko‘taradi.

Ayniqsa, yopiq siklli avtomatlashtirilgan tanklar, pasterizatorlar va syr tayyorlash qozonlarida (cheese vats) inson omilini kamaytirish, tozalash jarayonlarini raqamlashtirish hamda avtomatik Cleaning-in-Place (CIP) yuvish tizimlarini xalqaro HACCP (ISO 22000) standartlari va SCADA dasturlari bilan integratsiyalash dolzarb ilmiy-amaliy muammo hisoblanadi.

Ushbu tadqiqot ishi "Pure Milky Works" MChJ korxonasi bazasida yumshoq rassolni syrlar ishlab chiqarish liniyalarida xavflarni minimallashtiruvchi kompleks texnologik yechimlarni va CIP-yuvish xavfsizligi algoritmlarini ishlab chiqish hamda uning kelajakda syrdan ajraladigan ikkilamchi xomashyo — sut zardobidan bioaktiv oqsil-peptid konsentratlari olish texnologiyasiga ta’sirini ilmiy asoslashga bag‘ishlangan.

Tadqiqot obyekti va usullari. Tadqiqot obyekti sifatida "Pure Milky Works" MChJ korxonasi bazasidagi yumshoq rassolni syrlar (brynza turi) ishlab chiqarish texnologik liniyalari kompleksi tanlab olindi. Tadqiqot predmeti — texnologik liniyalardagi jarayonlarning mikrobiologik, fizik-kimyoviy parametrlari, avtomatik CIP-yuvish tizimining xavfsizligi va xalqaro HACCP tizimining boshqaruv algoritmlaridan iforat. Tadqiqotlarni o‘tkazishda quyidagi uslublar majmuasidan foydalanildi:

1.HACCP metodologiyasi va "Qarorlar daraxti": Syr ishlab chiqarish liniyasidagi xavf omillarini tahlil qilish va Kritik Nazorat Nuqtalarini (KNN) aniqlashda qo‘llanildi.

2.Mikrobiologik tahlillar: Syr, tuzlama (rassol) va zardob tarkibidagi umumiy bakteriyalar soni (KMAFnM), ichak tayoqchasi guruhi bakteriyalari (BGKP) hamda patogen mikroorganizmlarni aniqlash standart mikrobiologik uslublar (GOST) asosida amalga oshirildi.

3.Konduktometrik usul: Quvurlarda va syr qozonlarida yuvish eritmalarining ishqor (NaOH) va kislota (HNO_3) konsentratsiyasini hamda ularning mahsulotga va zardobga aralashib ketish xavfini onlayn nazorat qilish elektr o‘tkazuvchanlik (conductivity) datchiklari yordamida amalga oshirildi.

Natijalar va ularning tahlili. Olib borilgan tadqiqotlar natijasida yumshoq rassolni syrlar ishlab chiqarish zanjirida toza xomashyo ta’minotidan tortib, yetilish jarayonigacha bo‘lgan bosqichlarni qamrab oluvchi kompleks texnologik xavfsizlik modeli ishlab chiqildi.

Pishloq ishlab chiqarishda eng katta texnologik xavf — pasterizatsiyalash va laxtalash (koagulyatsiya) bosqichlarida sutga yoki ajralayotgan zardobga CIP-yuvish tizimidan qolgan agressiv kimyoviy eritmalarning aralashib ketishidir. Bu nafaqat tayyor syrning sifatini buzadi va zaxarlanish xavfini tug‘diradi, balki syr mayasining (rennet) aktivligini pasaytirib, laxta hosil bo‘lish jarayonini buzadi. Ushbu xavfni mutloq cheklash maqsadida, elektr o‘tkazuvchanlik datchiklariga (conductivity sensors) asoslangan avtomatik CIP-yuvish xavfsizligi algoritmi optimallashtirildi.

Kompaniyaning pishloq ishlab chiqarish quvvatlari uchun oziq-ovqat xavfsizligi monitoringini onlayn rejimda amalga oshiruvchi, raqamlashtirilgan SCADA dasturiy majmuasiga integratsiyalashgan raqamli KNN (Kritik Nazorat Nuqtalari) xaritasi ishlab chiqildi. Yumshoq rassolni syrlar liniyasi uchun quyidagi asosiy KNNlar va ularning tanqidiy chegaralari tizimlashtirildi:

1. *KNN-1 (Sutni pasterizatsiyalash):* +72...+76 °C haroratda 15-20 soniya. Bu rejim rassolni syrlar uchun laxtaning elastikligini va zardobning yaxshi ajralishini ta’minlaydi, patogenlarni 99.9% yo‘qotadi.
2. *KNN-2 (Pishloq tayyorlash qozonlarini (Cheese vats) sanitar holati):* Har bir sikldan keyin avtomatlashgan yuvish va kimyoviy moddalar qoldig‘i elektr o‘tkazuvchanligi $\chi \leq \chi_{\text{toza suv}}$ ko‘rsatkichigacha tozalash.
3. *KNN-3 (Rassolda yetiltirish va saqlash):* Rassol (tuzlama) tarkibidagi osh tuzi konsentratsiyasi 16-18%, harorati $\leq +8$ °C.

Kiritilgan kompleks texnologik va raqamli yechimlar "Pure Milky Works" MChJ zavodiga real amaliyotga joriy etildi va rasmiy dalolatnoma bilan tasdiqlandi. Natijada korxonada mikrobiologik sabablar yoki rejimlarning buzilishi tufayli yuzaga keladigan texnologik brak (isrof, syr massasining shishishi, achchiq ta’m berishi) hajmi **1.5% dan 0.1% gacha** pasaytirildi (1-jadval).

1-jadval. Yumshoq syrlar liniyasida texnologik yechimlarni joriy etish natijalari

Ko‘rsatkichlar nomi	**Joriy etishgacha**	**Joriy etishdan keyin**	**Samaradorlik / Tejamkorlik**
Texnologik brak (syr nuqsonlari), %	1.5%	0.1%	**15 barobar kamaydi**
Yillik toza suv iste’moli, %	100%	65%	**35% ga tejaldi**
Kimyoviy yuvish moddalari sarfi, %	100%	75%	**25% ga tejaldi**
Kapital investitsiyalarning qaytishi	—	11 oy	Yoki 0.95 yilda to‘liq oqlandi

Avtomatik CIP-yuvish zanjirining optimallashuvi hisobiga korxonada yillik suv iste'moli 35% ga, kimyoviy moddalar sarfi esa 25% ga tejaldi, bu esa korxonaning ekologik yuklamasini (oqova suvlar hajmini) keskin kamaytirish imkonini berdi. Kiritilgan investitsiya va kapital xarajatlar jami 11 oy ichida o'zini to'liq oqladi.

Yumshoq va namokopli pishloq ishlab chiqarish texnologiyasining eng katta xususiyati — xomashyoning (sutning) deyarli 80-85% qismi ikkilamchi xomashyo — sut zardobi (whey) holatida ajralib chiqishidir. Rassolni syrlar zardobi tarkibida o'ta qimmatli biologik aktiv zardob oqsillari (β-laktoqlobulin, a -laktoalbulmin, glikomakropeptidlar) va mineral moddalar saqlanib qoladi.

Biz tomonimizdan joriy etilgan SCADA va conductivity datchiklariga asoslangan xavfsizlik modeli zardob oqimining mutloq kimyoviy va mikrobiologik tozaligini (yuvish vositalari qoldiqlarisiz va patogenlarsiz) kafolatlaydi. Bu esa kelgusi doktorlik ilmiy tadqiqotining asosi hisoblanadi.

Xulosa. 1.Yumshoq va namokopli pishloq ishlab chiqarish liniyasida raqamli SCADA va conductivity datchiklariga asoslangan CIP-yuvish va HACCP integratsiyasi texnologik brakni 0.1% gacha kamaytirdi va resurslarni (suv 35%, kimyoviy moddalar 25%) sezilarli tejaladi.

2.Kiritilgan texnologik modernizatsiya loyihasi iqtisodiy jihatdan yuqori samaradorlik ko'rsatib, 11 oyda o'zini to'liq oqladi.

3.Loyihaning amaliy qiymati syr zavodida ekologik va kimyoviy toza sut zardobi bazasini yaratganligidir. Bu esa doktorantura yo'nalishidagi maqsadimiz — sut zardobidan bioaktiv oqsil-peptid konsentratlari olish va funksional oziq-ovqat ingredientlari ishlab chiqarish texnologiyasini takomillashtirishga to'liq zamin yaratadi.

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SUTNI QAYTA ISHLASH KORXONALARIDA MAHSULOT SIFATI VA XAVFSIZLIGINI TA'MINLASHNING TEXNOLOGIK VA RAQAMLI YECHIMLARI

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Annotatsiya. Maqolada "Pure Milky Works" MChJ sut korxonasi misolida sutni chuqur qayta ishlash va muzqaymoq ishlab chiqarish liniyalarida oziq-ovqat xavfsizligini ta'minlash mexanizmlari tizimli ravishda tadqiq etilgan. Elektr o'tkazuvchanlik (conductivity) datchiklariga asoslangan avtomatlashtirilgan CIP-yuvish algoritmi va uning HACCP (ISO 22000) tizimi bilan raqamli integratsiyasi tahlil qilingan. Tadqiqot natijasida korxonada texnologik brak hajmi 1.5% dan 0.1% gacha kamaytirilgani, yillik suv iste'moli 35% ga va kimyoviy moddalar sarfi 25% ga tejalgani aniqlangan. Kiritilgan kapital xarajatlarning o'zini oqlash muddati 11 oyni tashkil etdi. Mazkur ekologik va texnologik yechim ikkilamchi xomashyo (sut zardobi) oqimining mikrobiologik va kimyoviy tozaligini barqaror saqlash hamda undan kelgusida bioaktiv oqsil-peptid konsentratlari olish uchun fundamental ilmiy-amaliy poydevor bo'lib xizmat qiladi.

Kalit so'zlar: sutni chuqur qayta ishlash, oziq-ovqat xavfsizligi, HACCP, Kritik Nazorat Nuqtalari (KNN), CIP-yuvish, SCADA, iqtisodiy samaradorlik, ekologik menejment, sut zardobi, bioaktiv peptidlar.

Kirish. Hozirgi globallashuv va keskin raqobatbardosh bozor iqtisodiyoti sharoitida oziq-ovqat mahsulotlarining sifati va xavfsizligi ishlab chiqaruvchi korxonalar faoliyatining strategik ko'rsatkichi hisoblanadi. O'zbekiston Respublikasida oziq-ovqat xavfsizligini ta'minlash va ichki hamda tashqi bozorlarga yuqori sifatli, ekologik toza va raqobatbardosh mahsulotlarni yetkazib berish agrosanoat majmuasining ustuvor vazifalaridan biridir. Sut va sut mahsulotlari o'zining biologik tabiati, namlik darajasi hamda ozuqaviy qiymatiga ko'ra patogen mikroorganizmlarning (masalan, *Listeria monocytogenes*, *Salmonella spp.*) rivojlanishi uchun juda qulay muhit hisoblanadi. Shu sababli, xomashyoni qabul qilish, transportirovka qilish, pasterizatsiyalash, sovitish va tayyor mahsulotni qadoqlashgacha bo'lgan barcha

texnologik zanjir bosqichlarida mikrobiologik, kimyoviy va fizik ifloslanish (kontaminatsiya) xavfi keskin ortadi.

Muzqaymoq sanoati va sutni chuqur qayta ishlash liniyalari o‘zining texnologik xususiyatiga ko‘ra, bir vaqtning o‘zida ham yuqori haroratni (pasterizatsiya +85 °C), ham shok muzlatishni (-40 °C) talab qiluvchi energiya va resurs sig‘imi o‘ta yuqori bo‘lgan tarmoqdir. Bugungi kunda o‘rta va yirik sut korxonalarida texnologik jarayonlarni avtomatlashtirish, inson omilini nolga tushirish hamda Cleaning-in-Place (CIP) avtomatik yuvish tizimlarini xalqaro HACCP (ISO 22000) standartlari bilan raqamlashtirilgan SCADA dasturlari asosida integratsiya qilish dolzarb ilmiy va amaliy muammo hisoblanadi.

Ushbu tadqiqot ishi "Pure Milky Works" MChJ yirik oziq-ovqat korxonasi bazasida sutni qayta ishlash liniyalarida biologik, kimyoviy va fizik xavflarni minimallashtiruvchi kompleks texnologik yechimlarni va CIP-yuvish xavfsizligi algoritmlarini ishlab chiqish hamda uning kelajakda ikkilamchi xomashyo – sut zardobidan bioaktiv oqsil-peptid konsentratlari olish texnologiyasiga ta’sirini baholashga bag‘ishlangan.

Tadqiqot obyekti va usullari. Tadqiqot obyekti sifatida "Pure Milky Works" MChJ korxonasining sutni chuqur qayta ishlash, pasterizatsiyalangan va UHT sut hamda tayyor sut mahsulotlari (muzqaymoq) ishlab chiqarish texnologik liniyalari kompleksi tanlab olindi. Tadqiqot predmeti — texnologik liniyalardagi jarayonlarning mikrobiologik, fizik-kimyoviy parametrlari, avtomatik CIP-yuvish tizimining xavfsizligi va xalqaro HACCP tizimining boshqaruv algoritmlaridan iborat.

Tadqiqotlarni o‘tkazishda quyidagi uslubiyotlar majmuasidan foydalanildi:

HACCP prinsiplari va "Qarorlar daraxti" (Decision Tree): Liniyadagi xavf omillarini tahlil qilish va Kritik Nazorat Nuqtalarini (KNN) aniqlash uchun foydalanildi.

Mikrobiologik tahlillar: Sut va tayyor mahsulot tarkibidagi umumiy bakteriyalar soni (KMAFnM), ichak tayoqchasi guruhi bakteriyalari (BGKP) hamda patogen mikroorganizmlarni aniqlash standart mikrobiologik uslublar (GOST) asosida amalga oshirildi.

Konduktometrik usul: Quvurlarda yuvish eritmalarining (ishqor va kislota) konsentratsiyasini va ularning mahsulotga aralashib ketish xavfini nazorat qilish elektr o‘tkazuvchanlik (conductivity) datchiklari yordamida amalga oshirildi.

Iqtisodiy-matematik modellashtirish: Kiritilgan kapital investitsiyalarning samaradorligi va o‘zini oqlash muddatini (ROI) hisoblash uchun kombinatsiyalashgan moliyaviy-texnik modellar qo‘llanildi.

Natijalar va ularning tahlili. Olib borilgan tadqiqotlar natijasida sut klasterlari sharoitida toza xomashyo ta’minoti zanjiri hamda pasterizatsiyalash-sovitish jarayonlarining o‘zaro bog‘liqligini ta’minlovchi kompleks texnologik xavfsizlik modeli ishlab chiqildi.

Sutni chuqur qayta ishlash liniyalarida eng jiddiy xavf omillaridan biri — an’anaviy yuvish tizimlarida inson omili tufayli mahsulot quvurlariga yuvish eritmalarining (ishqoriy NaOH va kislotali HNO_3 eritmalari) yoki texnik suvning qolib ketishi va tayyor mahsulotga aralashib ketishidir. Ushbu xavfni mutloq cheklash maqsadida, elektr o‘tkazuvchanlik datchiklariga (conductivity sensors) asoslangan avtomatik CIP-yuvish xavfsizligi algoritmi optimallashtirildi. Mazkur algoritm quvurdagi suyuqlikning solishtirma elektr o‘tkazuvchanligini (χ, mSm/sm) onlayn rejimda o‘lchaydi:

$$\chi_{mahsulot} < \chi_{suv} < \chi_{kislota} < \chi_{ishqor}$$

Dastur quvurdagi muhit o‘zgarishini millisekundlarda aniqlab, klapanlar tizimini avtomatik bloklaydi va eritmalarning mahsulot oqimiga o‘tishini to‘liq to‘sadi. Zavodning ishlab chiqarish quvvatlari uchun oziq-ovqat xavfsizligi monitoringini onlayn rejimda amalga oshiruvchi, raqamlashtirilgan SCADA dasturiy majmuasiga integratsiyalashgan raqamli KNN (Kritik Nazorat Nuqtalari) xaritasi ishlab chiqildi. Texnologik parametrlardan chekinish holati yuzaga kelganda (masalan, pasterizatsiya harorati

+85 °C dan pasayganda), SCADA tizimi avtomatik ravishda korreksiyalovchi (tuzatuvchi) harakatlar dasturini ishga tushirib, mahsulot oqimini qayta pasterizatsiyalash uchun ortga qaytaradi.

Kiritilgan kompleks texnologik va raqamli yechimlar "Pure Milky Works" MChJ zavodiga real amaliyotga joriy etildi va rasmiy dalolatnoma (akt vnedreniya) bilan tasdiqlandi. Natijada korxonada mikrobiologik sabablar yoki rejimlarning buzilishi tufayli yuzaga keladigan texnologik brak (isrof) hajmi 1.5% dan 0.1% gacha pasaytirildi (1-jadval).

1-jadval. Texnologik yechimlarni joriy etishgacha va undan keyingi asosiy ko‘rsatkichlar tahlili

Ko‘rsatkichlar nomi	**Joriy etishgacha**	**Joriy etishdan keyin**	**Samaradorlik / Tejamkorlik**
Texnologik brak (isrof) hajmi, %	1.5%	0.1%	15 barobar kamaydi
Yillik suv iste’moli, %	100%	65%	35% ga tejaldi

Kimyoviy yuvish moddalari sarfi, %	100%	75%	25% ga tejaldi
Mahsulotning yaroqlilik muddati	Standart	Uzaytirildi	Qaytarilgan mahsulot kamaydi

Avtomatik CIP-yuvish zanjirining gidrodinamik va vaqt ko‘rsatkichlari optimallashuvi hisobiga korxonada yillik suv iste’moli 35% ga, kimyoviy moddalar sarfi esa 25% ga tejaldi. Bu korxonaning ekologik yuklamasini (oqova suvlar hajmini) keskin kamaytirish imkonini berdi. Kiritilgan investitsiya va kapital xarajatlar jami 11 oy ichida (0.95 yilda) o‘zini to‘liq oqladi.

Ushbu tadqiqot ishi doirasida erishilgan eng muhim texnologik natija — ishlab chiqarish liniyalarining mutloq mikrobiologik va kimyoviy tozaligiga erishilganidir. Bu holat sutni qayta ishlashda hosil bo‘ladigan asosiy ikkilamchi xomashyo — sut zardobining (whey) ekologik toza, begona yuvish vositalarisiz va mikrobiologik barqaror oqimini alohida ajratib olish imkonini beradi. Sut zardobi tarkibida biologik o‘ta qiymatli zardob oqsillari (□□□-laktoqlobulin, □□-laktoalbulmin, immunoglobulinlar va sarsub biltsiri) mavjud. Biroq, agar yuvish tizimi noto‘g‘ri ishlasa, zardobga ishqor, kislota yoki patogen mikroblar o‘tib ketadi, bu esa undan bioaktiv oqsil komponentlarini ajratishni imkonsiz qiladi.

Biz tomonimizdan joriy etilgan xavfsizlik modeli kelgusi doktorlik ilmiy tadqiqotining poydevori hisoblanadi. Doktorantura bosqichida ushbu toza zardob oqimidan ultrafiltratsiya (UF) va nano-filtratsiya (NF) membranali texnologiyalar yordamida bioaktiv oqsil-peptid konsentratlarini (BOPK) ajratib olish, ularni maqsadli fermentativ gidroliz qilish hamda antioksidant, immunomodulyator va antimikrob xususiyatga ega bo‘lgan funksional oziq-ovqat ingredientlari ishlab chiqish texnologiyasini mukammallashtirish rejalashtirilmoqda.

Xulosa:

1. "Pure Milky Works" MChJ zavodida raqamli SCADA va conductivity datchiklariga asoslangan avtomatlashtirilgan CIP-yuvish va HACCP integratsiyasi texnologik brakni 0.1% gacha kamaytirdi va resurslarni (suv 35%, kimyoviy moddalar 25%) sezilarli tejaladi.
2. Kiritilgan texnologik modernizatsiya loyihasi iqtisodiy jihatdan yuqori samaradorlik ko‘rsatib, 11 oyda o‘zini to‘liq oqladi.
3. Loyihaning amaliy ahamiyati sut zavodida toza ikkilamchi xomashyo (zardob) bazasini yaratganligidir. Bu esa doktorlik tadqiqotida sut zardobidan bioaktiv oqsil-peptid konsentratlari olish va funksional oziq-ovqat ingredientlari ishlab chiqarish texnologiyasini takomillashtirishga to‘liq zamin yaratadi.

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LINGUOCOGNITIVE FEATURES OF THE CONCEPT "HOMELAND" IN ENGLISH AND UZBEK

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Abstract. This paper reconstructs the cognitive architecture of the concept HOMELAND in English and VATAN in Uzbek. Drawing on corpus evidence, paremiological material and a free association experiment with 120 respondents, I argue that the two concepts share only a narrow zone of overlap and diverge in their nuclear features. English profiles the homeland through the frame HOUSE - INDIVIDUAL - COMFORT, whereas Uzbek profiles it through the frame SOIL - ANCESTORS - COLLECTIVE DUTY. The asymmetry, I claim, is cognitive rather than lexical, and it has direct consequences for translation and for English language teaching in Uzbekistan.

Keywords: concept, linguocognitive analysis, conceptual metaphor, nominative field, associative experiment, contrastive linguistics, homeland, Vatan.

1. The problem

Bilingual dictionaries equate English homeland with Uzbek Vatan, and translators follow this equivalence almost automatically. My observations of authentic usage suggest that the two units organise different mental spaces. An English speaker who says homeland usually points at a territory of origin, frequently someone else's territory, as in homeland security or the homeland of the Basques. An Uzbek speaker who says Vatan names a value rather than a point on the map.

Contrastive studies published over the last two decades describe the lexemes reliably enough. They compare dictionary glosses, list a handful of proverbs and conclude that both peoples love their country. Such a conclusion explains nothing. The interesting question begins where the description stops: which cognitive features

occupy the nucleus of each concept, which remain peripheral, and why do speakers of the two languages activate different inferential chains when the same referent is named?

This gap has practical costs. Uzbek learners of English transfer the sacral weight of Vatan onto homeland and produce sentences that strike native speakers as political or archaic. Translators of Uzbek patriotic poetry lose the kinship component of the original and gain an administrative colouring absent from it. Neither problem can be solved at the level of word equivalence, because the source of the difficulty lies deeper, in the structure of knowledge attached to the word.

I therefore treat the concept as a mental unit with a field organisation - a nucleus of the most salient features, a near periphery of derived associations and a far periphery of individual and occasional connections. The task is to reconstruct these layers for each language and to establish the exact boundary of their intersection.

2. Aim and objectives

My aim is to reconstruct the field structure of the concept HOMELAND / VATAN in the two linguocultures and to determine the cognitive source of the asymmetry between them.

Four objectives follow from this aim. First, to establish the nominative field of the concept in each language, that is, the full inventory of units capable of naming it. Second, to identify the conceptual metaphors that organise the concept and to rank them by frequency of realisation. Third, to verify the reconstructed structures against the linguistic consciousness of speakers through an associative experiment. Fourth, to define the shared zone of the two concepts and to formulate recommendations for translation and teaching.

3. Method

My analysis rests on five procedures applied consecutively.

Componential analysis of dictionary definitions opens the investigation. I worked with the Oxford English Dictionary, Merriam-Webster and the five-volume Explanatory Dictionary of the Uzbek Language, extracting semantic components from every relevant entry and arranging them by frequency of appearance across sources.

Frame modelling followed. Contexts came from the Corpus of Contemporary American English, the British National Corpus and the National Corpus of the Uzbek Language. I sampled 400 contexts per language, discarded metatextual occurrences and coded the remainder for the participant roles the concept activates.

Metaphorical analysis in the terms proposed by Lakoff and Johnson allowed me to move from surface expressions to the source domains that generate them. Each metaphorical context received a source-domain label, and the labels were then grouped.

Paremiological analysis covered 180 English and 210 Uzbek proverbs and sayings selected from academic collections. Proverbs preserve older layers of conceptualisation and therefore serve as a diachronic control on the corpus data.

A free association experiment completed the procedure. One hundred and twenty respondents took part: 60 students in Tashkent aged 18 to 24 and 60 respondents from Britain and the United States of comparable age. Each participant gave the first five reactions to the stimulus word - homeland for the English group, Vatan for the Uzbek group. Reactions were ranked by frequency and assigned to nuclear, near-peripheral and far-peripheral zones.

4. Results

4.1. The English nominative field. The field turns out to be dispersed among home, homeland, motherland, fatherland, native land and country. No single unit dominates. The emotional load concentrates on home, which is also the most frequent by a wide margin. Associative reactions confirm this distribution: family, house,

childhood, comfort and safety occupy the nucleus, while territory, nation and flag appear only on the near periphery.

The leading metaphor reads HOMELAND IS A PRIVATE SPACE. The homeland is conceptualised as a space one may leave and return to by personal choice, and the choice carries no moral charge. Expressions such as to leave home for good or to make a home elsewhere would sound neutral to an English speaker and disloyal in Uzbek translation.

My corpus data reveal a further specialisation. Motherland and fatherland have acquired a distancing and partly ideological colouring: native speakers apply them to Russia, Germany or Africa far more readily than to their own country. Homeland, in turn, has been captured by institutional discourse. After 2002 the collocation homeland security accounts for a substantial share of all occurrences in American material, which pulls the lexeme towards the semantics of defence and surveillance and away from personal attachment.

4.2. The Uzbek nominative field. Uzbek behaves differently. The lexeme Vatan, an Arabic borrowing, absorbed the semantics of the Turkic yurt, el and o'lka and turned into an axiological dominant. Rather than competing with the native units, it subordinated them: yurt retains a territorial reading, el a social one, while Vatan accumulates the evaluative meaning.

Associations cluster around ona (mother), tuproq (soil), muqaddas (sacred), bayroq (flag) and ota-bobolar (ancestors). Three metaphors form the nucleus: VATAN IS A MOTHER, VATAN IS SACRED, VATAN IS ANCESTRAL SOIL. Each of them has an extensive lexical realisation, and the first two have no functional counterpart in the English material.

The religious formula hubbul vatani minal iymon, love of the homeland belongs to faith, gives the concept a sacral dimension that English simply lacks. This component is not decorative. It converts attachment into obligation and makes

emigration a morally marked act, which explains why Uzbek discourse about labour migration is saturated with the vocabulary of guilt and temporary absence.

Paremiological material supports the same conclusion. The proverb Vatani borning baxti bor ties the homeland to personal fortune, presenting it as a precondition of happiness rather than its object. English East or West, home is best ties comfort to the private house and makes no claim beyond preference. The Uzbek saying Kishi yurtida sulton bo'lguncha, o'z yurtingda cho'pon bo'l goes further and subordinates social success to belonging, a hierarchy for which the English corpus offers no parallel.

4.3. The asymmetry. I therefore argue that the difference is not lexical but cognitive. English profiles the homeland through the frame HOUSE - INDIVIDUAL - COMFORT. Uzbek profiles it through the frame SOIL - ANCESTORS - COLLECTIVE DUTY. The shared zone covers only two features, place of birth and attachment, and even attachment differs in modality: voluntary in one case, obligatory in the other.

The associative data quantify this gap. Among English reactions, 68 per cent belong to the domain of private life; among Uzbek reactions, 71 per cent belong to the domains of kinship, sacredness and ancestry. Only 14 per cent of reactions in the two samples coincide in domain, and none coincide in rank.

5. Discussion

Two objections deserve an answer. The first concerns the age of the respondents. My sample consists of young speakers, and one might suspect that the results reflect a generational state rather than a stable structure. The paremiological material argues against this reading: the same metaphors that dominate the associations of twenty-year-olds organise proverbs recorded a century ago. Stability across such a distance is unlikely to be accidental.

The second objection concerns ideology. Uzbek patriotic discourse is institutionally supported, and the sacral component might be an artefact of that support rather than a property of the concept. I take this possibility seriously, yet the same component appears in private speech genres, in wedding and funeral formulas and in emigrant letters, where institutional pressure is minimal. A feature that survives outside official discourse belongs to the language, not to the campaign.

6. Conclusion

Treating homeland and Vatan as full equivalents erases a substantial part of the Uzbek concept and adds to the English one a sacral component it never possessed. The practical implications are specific. Translators working with patriotic discourse need compensatory strategies rather than lexical substitution, and in many contexts native land or home will convey more of the original than homeland. Textbook authors should present home as the emotional counterpart of Vatan and reserve homeland for administrative and political registers.

My next step is to test whether Uzbek bilinguals living abroad retain the sacral core of the concept or shift towards the English model. If the core proves unstable under prolonged contact, the asymmetry described here will need to be reformulated as a cline rather than an opposition.

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THEORETICAL FOUNDATIONS AND IMPLEMENTATION OPPORTUNITIES OF ARTIFICIAL INTELLIGENCE AND COMPUTER VISION TECHNOLOGIES IN AUTOMATING METROPOLITAN ESCALATORS.

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Abstract. This study examines real-time monitoring and automatic management of passenger flow on metropolitan escalators using artificial intelligence and computer vision technologies. The aim is to develop the conceptual foundations of an automatic hazard detection system based on deep learning algorithms (CNN, YOLO, transformer). Systematic literature analysis based on PRISMA principles, comparative analysis, and conceptual modeling were employed, with 25 international sources analyzed. A three-layered system architecture integrating Edge AI and Fog Computing is proposed. The daily passenger flow of Tashkent Metropolitan exceeding one million in 2025 confirms the urgency of implementation.

Keywords: artificial intelligence, computer vision, deep learning, YOLO, metropolitan, escalator, Edge AI, video analytics, safety.

Introduction

The intensification of urbanization and the growth of megacity populations is significantly increasing the burden on urban transport, particularly on metropolitan

infrastructure. The Tashkent Metropolitan — the only metro network in Central Asia — saw its passenger flow grow from 38.8 million in 2020 to 290 million in 2025, i.e., more than sevenfold over five years [1, 2]. The daily passenger flow has exceeded 1 million, with the “Pakhtakor” station alone serving 77,000 passengers per day [3].

Under these conditions, the problem of congestion and accidents on escalators has become an urgent research topic. Traditional video surveillance systems rely on operator control, and due to the limitations of the human factor, real-time detection of hazardous situations is difficult [4]. Integrating artificial intelligence and computer vision technologies into metropolitan infrastructure is a promising solution [5, 6]. The aim of this study is to analyze the theoretical foundations of these technologies and to develop a conceptual model for their implementation in the conditions of the Tashkent Metropolitan.

Literature Review

The revolution in computer vision began with Krizhevsky et al.’s AlexNet convolutional model [7]. Subsequently, Vaswani et al. proposed the transformer architecture [8], which was later adapted for images by Dosovitskiy (ViT) [9]. Carion et al. developed DETR for object detection [10]. The YOLO family has evolved from YOLOv3 in 2018 [11] through YOLOv5, v7, v8, v9, and v11; Akkaya and Halici compared the accuracy and speed of the various versions [12], and a recent study confirmed the superiority of YOLOv7 and v11 in crowd detection [13].

In the metropolitan environment, Xu et al. developed the transformer-based MPDNet [14]. Wu et al. presented a bidirectional flow-counting system using improved DeepSORT at Shanghai and Shenzhen stations [15]. Pawar et al. performed real-time crowd assessment at stations based on YOLOv8s [16]. A distributed deep learning system demonstrated 94–99% accuracy [17]. Osipov et al. published an escalator safety system based on CNN and recurrent neural networks in the journal Nature [18]. Wang et al. analyzed the cascading spread of escalator accidents [19].

Palestinian researchers detected falls with 94.99% accuracy using the LRCN model [20]. The EN 115-1:2017 [21] and ISO 8102-6:2019 [22] standards regulate escalator safety at the normative level.

Research Methodology

A four-stage mixed methodology was applied in the study. In the first stage, a systematic literature review based on PRISMA principles was conducted: 25 Q1–Q2-level sources from 2019–2026 were selected from the IEEE Xplore, Springer Link, Elsevier, MDPI, Frontiers, Nature, and arXiv databases. In the second stage, a comparative analysis of YOLO and other models was carried out in terms of accuracy (mAP), speed (FPS), and resource requirements. In the third stage, official statistics of the Tashkent Metropolitan for 2020–2025 were studied. In the fourth stage, a conceptual model based on the Edge–Fog–Cloud architecture was developed.

Results and Discussion

Theoretical Foundations and Mathematical Modeling

Convolutional neural networks (CNN) automatically learn the spatial hierarchical features of an image. The convolution operation is expressed by the following formula:

$$(I * K)(i,j) = \sum_{m=0}^{M-1}\sum_{n=0}^{N-1} I(i+m,\ j+n)\cdot K(m,n) \quad (1)$$

where I is the input image, K is the kernel (filter), and M and N are the dimensions of the kernel. In the YOLO algorithm, the IoU (Intersection over Union) metric is used to evaluate object detection accuracy:

$$IoU = \frac{Area(B_{pred} \cap B_{gt})}{Area(B_{pred} \cup B_{gt})} \quad (2)$$

where B_pred is the bounding box predicted by the model and B_gt is the ground-truth bounding box. Detection is considered correct when IoU ≥ 0.5. Crowd density and the risk index on the escalator are determined as follows:

$$\rho(t) = \frac{N(t)}{A_{escalator}}, \quad R_{risk} = \alpha \cdot \rho(t) + \beta \cdot v(t) \tag{3}$$

where ρ(t) is the density at time t, N(t) is the number of passengers, A is the escalator surface area, v(t) is the speed of movement, and α and β are weighting coefficients. The total latency for real-time monitoring is calculated as follows:

$$T_{latency} = T_{capture} + T_{inference} + T_{transfer} + T_{decision} \tag{4}$$

For real-time monitoring, T_latency must be ≤ 200 ms; otherwise, timely detection of a fallen passenger becomes impossible.

Comparative Analysis of YOLO Models

Model	Accuracy (mAP)	Speed (FPS)	Model Size	Main Advantage
YOLOv5s	56.8%	125	14 MB	Highest speed, suitable for Edge devices
YOLOv7	69.7%	96	36 MB	High performance in crowd detection
YOLOv8	70.3%	110	22 MB	Balance of accuracy and speed

Model	Accuracy (mAP)	Speed (FPS)	Model Size	Main Advantage
YOLOv11	73.5%	105	19 MB	Most advanced, efficient compact module

Table 1. Comparative technical analysis of YOLO models

As shown in Table 1, the YOLOv8 and YOLOv11 models provide the best balance of accuracy and speed for real-time monitoring.

4.3. Passenger Flow of the Tashkent Metropolitan

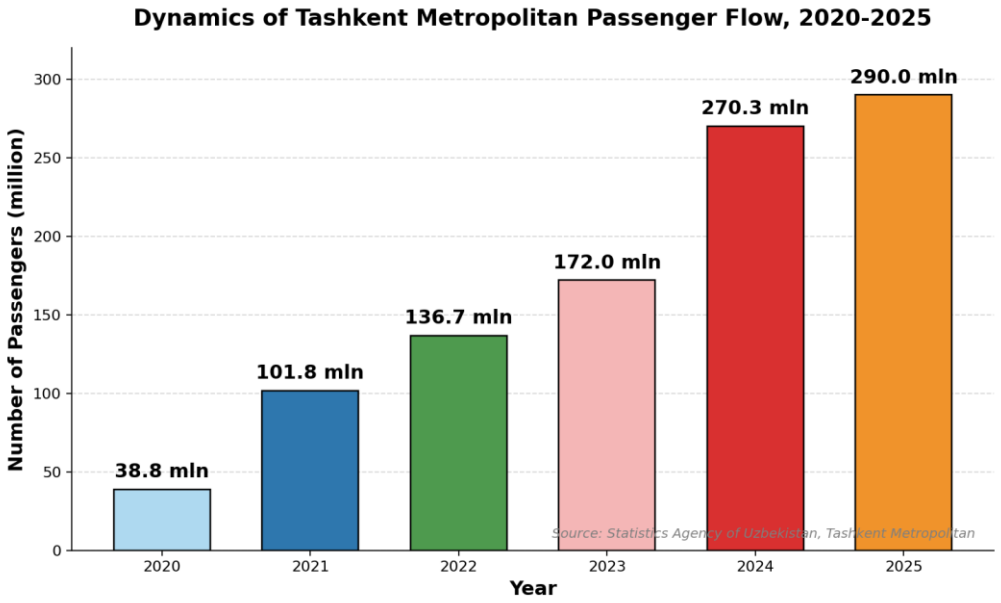


Figure 1. Dynamics of Tashkent Metropolitan passenger flow, 2020–2025.

No.	Station Name	Daily Passengers	Direction
1	Pakhtakor	77,272	Chilanzar
2	Amir Temur Avenue	60,048	Yunusabad

No.	Station Name	Daily Passengers	Direction
3	Chilanzar	58,754	Chilanzar
4	Buyuk Ipak Yoli (Great Silk Road)	54,195	Uzbekiston

Table 2. Most heavily loaded stations of the Tashkent Metropolitan (October 2024).

Given such high loads, it is advisable to begin the pilot system precisely at these stations.

Proposed System Architecture

Based on the analysis results, a three-layer intelligent monitoring system architecture is proposed (Figure 2). The Edge layer includes local computing devices near the escalator (NVIDIA Jetson, Google Coral), equipped with YOLOv8n or YOLOv5s models, processing video streams with 50–100 ms latency. The Fog layer consists of station-level servers that aggregate data and make autonomous decisions. The Cloud layer is located in a central data center and performs long-term analysis and model retraining tasks.

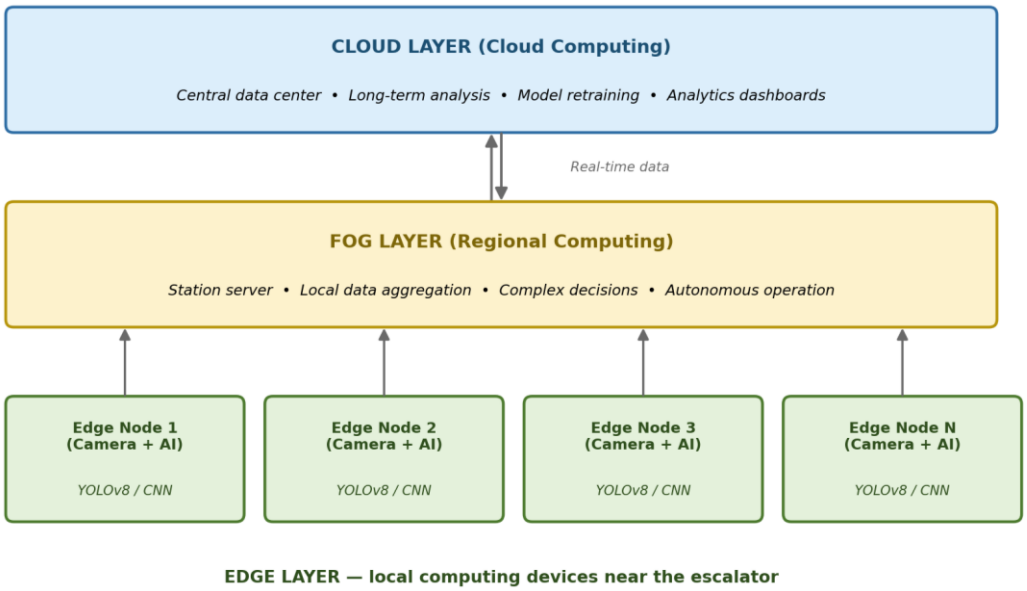


Figure 2. Three-layer architecture of the escalator monitoring system.

Hazardous Situations on Escalators and Detection Methods

Hazardous Situation	Detection Method	Accuracy	Source
Fall	Pose estimation (OpenPose, HRNet)	94.99%	[20, 23]
Crowd congestion	Density map regression	92-95%	[16, 17]
Walking against direction	Optical flow + CNN	90-93%	[18]
Anomalous behavior	Autoencoder + LSTM	88-92%	[18]

Table 3. Hazardous situations on escalators and artificial intelligence methods.

The advantage of the pose estimation approach is that, since it operates on a skeletal basis, it requires fewer computational resources and preserves privacy [23].

Implementation Opportunities in the Tashkent Metropolitan

A phased implementation of the system is proposed: Phase 1 (6–12 months) — pilot project at the Pakhtakor and Khalqlar Do'stligi stations; Phase 2 (12–24 months) — expansion to all stations of the Chilanzar line; Phase 3 (24–36 months) — full integration across all 50 stations and connection with the city management system. From the standpoint of personal data protection, the skeleton-based pose estimation approach is preferable [23].

Conclusion

The study shows that artificial intelligence and computer vision technologies — CNN, YOLO, transformer, and pose estimation methods — provide high efficiency in automating metropolitan escalators. The integration of Edge AI, Fog Computing, and Cloud Computing technologies ensures high response speed, reliability, and scalability. For the implementation of an intelligent monitoring system in the conditions of the Tashkent Metropolitan, the following is recommended: (1) launch a pilot project at the most heavily loaded stations; (2) create a local dataset and retrain models; (3) align with international standards (EN 115, ISO 8102-6); (4) comply with personal data protection norms. Future research should be directed toward creating a dedicated dataset for Tashkent Metropolitan escalators and developing hybrid model architectures.

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AKADEMIK LITSEYLARDA BIOLOGIYA FANINI O‘QITISHDA VIRTUAL LABORATORIYA VA RAQAMLI TA’LIM RESURSLARIDAN FOYDALANISH METODIKASI

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Annotatsiya: Ushbu maqola akademik litseylarda biologiya fanini o‘qitish jarayonida virtual laboratoriya va raqamli ta’lim resurslaridan foydalanishning pedagogik-metodik imkoniyatlari haqida bo’lib, biologiya fanining tajriba, kuzatish, modellashtirish va amaliy faoliyat bilan uzviy bog‘liqligigi haqida fikr yuritilgan. Laboratoriya mashg‘ulotlarini samarali tashkil etish muhim metodik vazifalardan biri hisoblanadi. Maqolada virtual laboratoriyaning didaktik xususiyatlari, raqamli ta’lim resurslarining turlari, ulardan foydalanish bosqichlari hamda o‘quvchilarning mustaqil va kreativ faoliyatini tashkil etish mexanizmlari tahlil qilingan.

Annotation: This article examines the pedagogical and methodological possibilities of using virtual laboratories and digital educational resources in the process of teaching biology at academic lyceums. Particular attention is paid to the close relationship of biology with experimentation, observation, modeling, and practical activities. The effective organization of laboratory activities is considered one of the important methodological tasks in biology education. The article analyzes the didactic features of virtual laboratories, types of digital educational resources, the stages of their application, as well as the mechanisms for organizing students’ independent and creative activities.

Аннотация: В данной статье рассматриваются педагогико-методические возможности использования виртуальных лабораторий и цифровых образовательных ресурсов в процессе преподавания биологии в академических лицеях. Особое внимание уделяется тесной взаимосвязи биологической науки с экспериментом, наблюдением, моделированием и практической деятельностью. Эффективная организация лабораторных занятий рассматривается как одна из важных методических задач обучения биологии. В статье проанализированы дидактические особенности виртуальных лабораторий, виды цифровых образовательных ресурсов, этапы их использования, а также механизмы организации самостоятельной и творческой деятельности учащихся.

Kalit so‘zlar: biologiya ta’limi, akademik litsey, virtual laboratoriya, raqamli ta’lim resurslari, masofaviy ta’lim, aralash ta’lim, kreativ yondashuv, laboratoriya mashg‘uloti, raqamli texnologiyalar, biologik modellashtirish, mustaqil ta’lim.

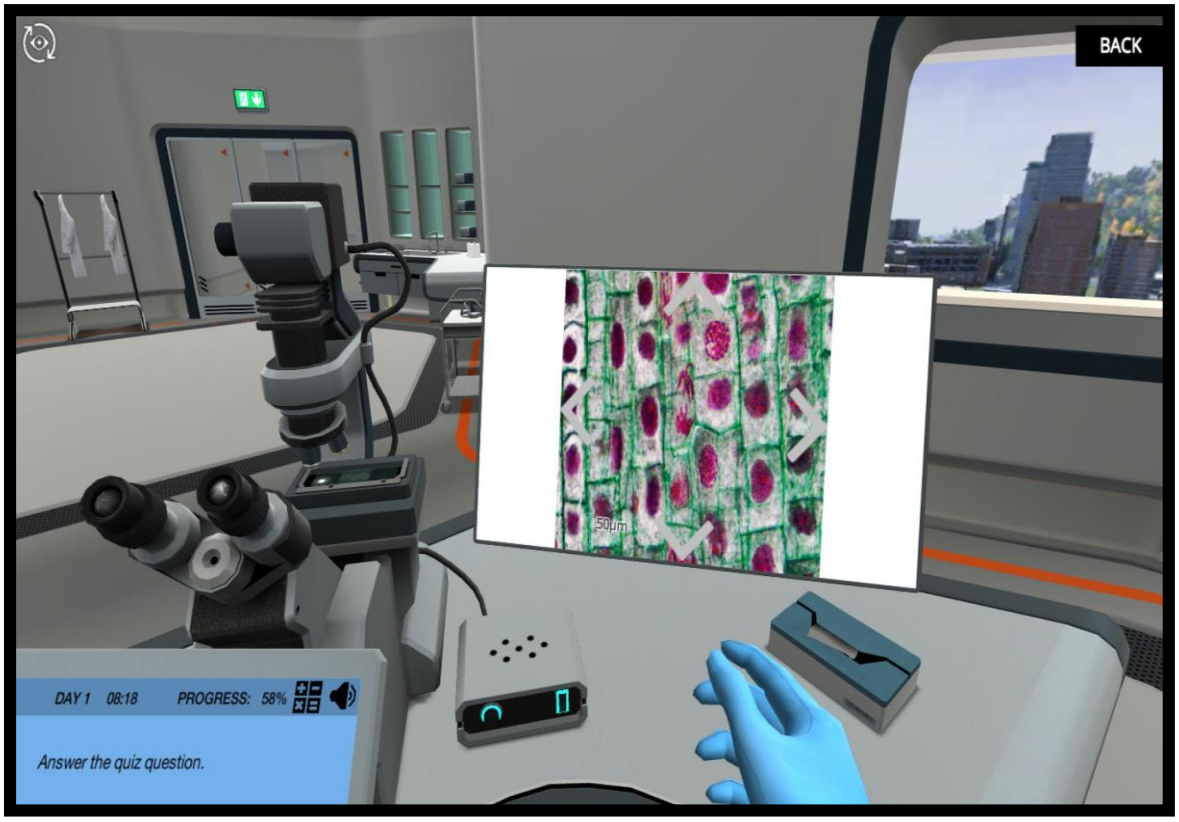
Biologiya ta’limining o‘ziga xos jihati shundaki, ko‘plab hodisa va jarayonlarni faqat matn yoki statik tasvir orqali to‘liq tushuntirish qiyin. Hujayra membranasining faoliyati, osmos va diffuziya, fermentlar faolligi, fotosintez, nafas olish, qon aylanishi, genetik jarayonlar, populyatsiya dinamikasi kabi hodisalar o‘zgaruvchan va dinamik xarakterga ega. Shu sababli ularni modellashtirish, animatsiya va virtual tajribalar orqali namoyish etish o‘quvchilarning biologik tushunchalarni shakllantirish jarayoni yaxshilashi mumkin.

Virtual laboratoriyalar ilmiy ta’limda eksperimental faoliyatni raqamli muhitga ko‘chirish imkonini beradi. Ilmiy adabiyotlarda virtual laboratoriyalarni fan, texnologiya va muhandislik ta’limida qo‘llash bo‘yicha tadqiqotlar ularning ta’lim jarayonidagi imkoniyatlari, texnologik yechimlari va didaktik mezonlarini alohida yo‘nalish sifatida ko‘rsatadi.

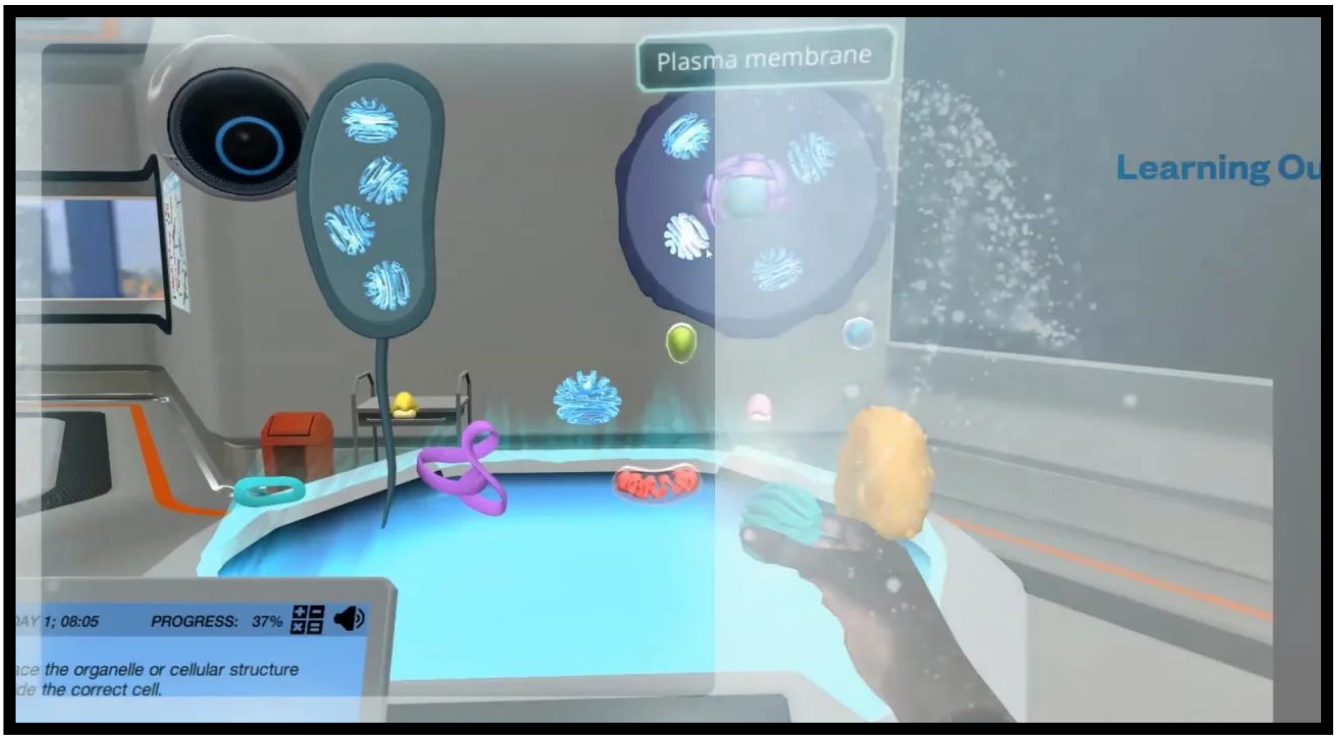
Virtual laboratoriya – tajriba va laboratoriya jarayonlarini raqamli muhitda modellashtirish, o‘quvchiga tajriba shartlarini o‘zgartirish, jarayonni kuzatish va olingan natijalarni tahlil qilish imkonini beruvchi ta’limiy raqamli muhitdir.

Navoiy davlat universiteti akademik litseyida biologiya fanini o‘qitish jarayonida zamonaviy raqamli ta’lim texnologiyalaridan, xususan, virtual laboratoriyalar, raqamli baholash vositalaridan foydalanishga alohida e’tibor qaratilmoqda. Akademik litseyda laboratoriya mashg‘ulotlarini faqat an’anaviy jihozlar asosida emas, balki raqamli ta’lim resurslari bilan uyg‘unlashtirishga yo‘naltirilgan metodik yondashuvdan foydalanilmoqdamiz. Bunda virtual laboratoriya o‘quvchiga biologik jarayonni kuzatish, tajriba shartlarini o‘zgartirish, natijalarni qayd etish va ularni tahlil qilish imkonini beruvchi qo‘shimcha didaktik vosita sifatida qo‘llanadi.

Labster Virtual Labs — biologiya, molekulyar biologiya, genetika, fiziologiya, mikrobiologiya va boshqa yo‘nalishlar bo‘yicha interaktiv virtual laboratoriyalarni taqdim etuvchi platforma hisoblanadi. Unda o‘quvchi virtual laboratoriya muhitida turli



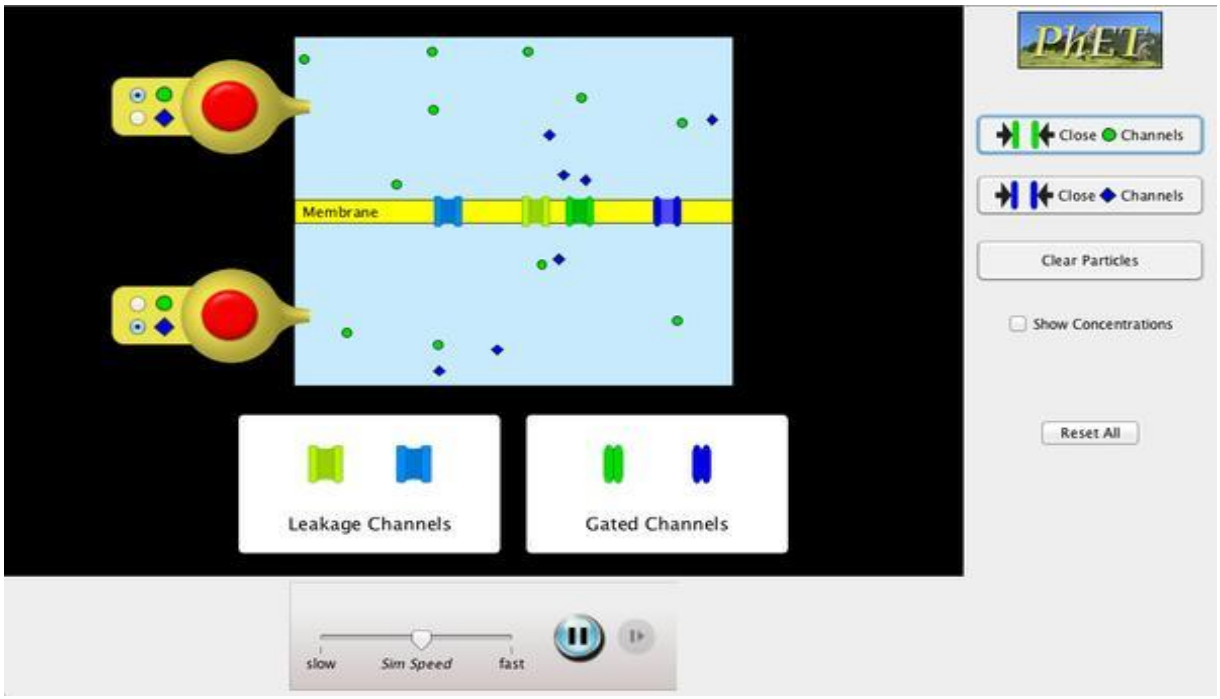
jihozlardan foydalanadi, tajriba bosqichlarini bajaradi va natijalarni tahlil qiladi. Platformada hujayra tuzilishi, immunologiya, gen ekspressiyasi kabi mavzular

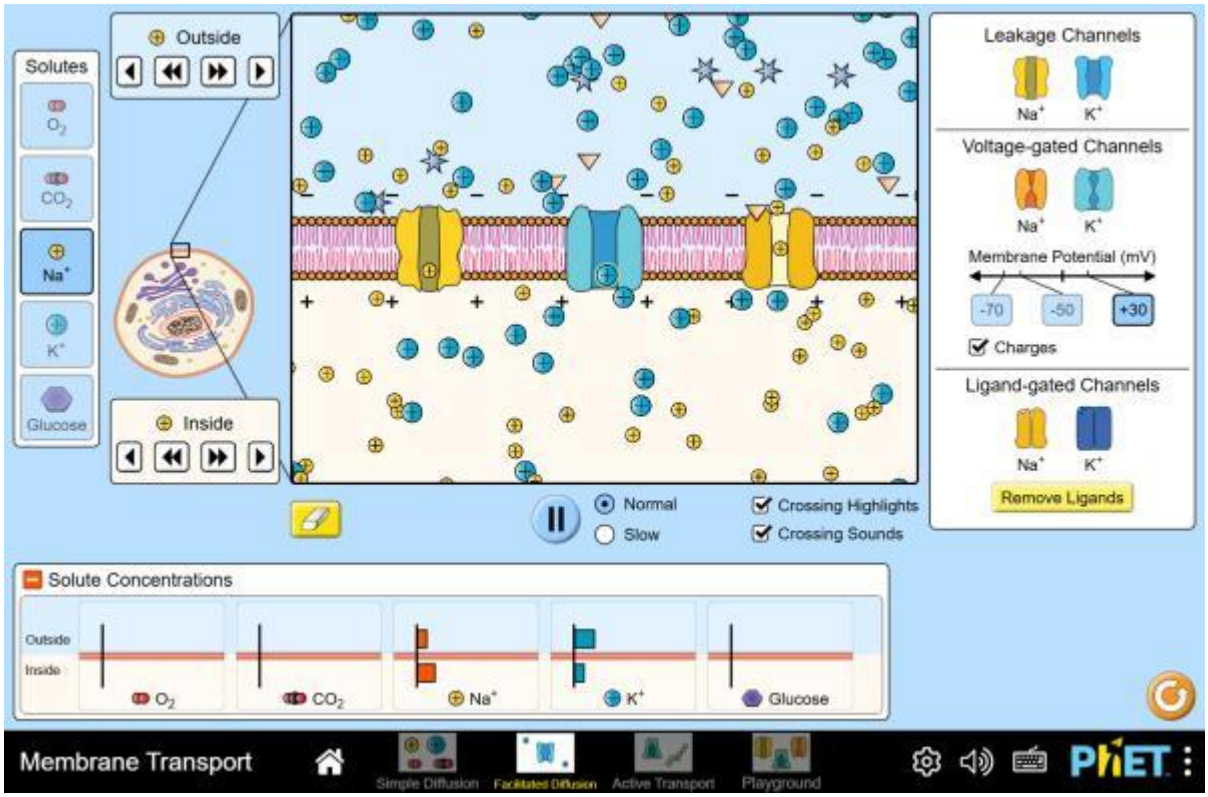


bo‘yicha simulyatsiyalar mavjud.

PhET Interactive Simulations — Kolorado universiteti tomonidan ishlab chiqilgan interaktiv simulyatsiyalar platformasi. Biologiya uchun ayniqsa “Membrane Transport” simulyatsiyasi foydali hisoblanib, unda modda konsentratsiyasini

o‘zgartirish va natijani kuzatish imkoniyati mavjud.





Biologiya fanini o‘qitishda virtual laboratoriyalardan foydalanish o‘quvchilarga biologik jarayonlarni raqamli muhitda modellashtirish, tajriba parametrlarini

o‘zgartirish, kuzatish natijalarini qayd etish va olingan ma’lumotlarni tahlil qilish imkonini beradi. Jumladan, Labster, PhET Interactive Simulations, HHMI BioInteractive, LabXchange, Virtual Biology Lab, Biology Labs Online, BioMan Biology va SimBio kabi platformalarda hujayra biologiyasi, genetika, ekologiya, evolyutsiya, fiziologiya, fotosintez, osmos va boshqa biologik jarayonlarga oid interaktiv laboratoriya hamda simulyatsiyalar mavjud. Ushbu resurslarning didaktik qiymati o‘quvchini tayyor axborotni qabul qiluvchi emas, balki tajriba shartlarini o‘zgartiruvchi, kuzatuv olib boruvchi, ma’lumotlarni tahlil qiluvchi imkoniyati bilan belgilanadi.

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ХАЛҚАРО ИҚТИСОДИЙ ИНТЕГРАЦИЯНИНГ ЎЗБЕКИСТОН МИНТАҚАЛАРИ ИЖТИМОИЙ-ИҚТИСОДИЙ РИВОЖЛАНИШИГА ТАЪСИРИ

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Аннотация

Мазкур мақолада халқаро иқтисодий интеграция жараёнларининг Ўзбекистон минтақалари ижтимоий-иқтисодий ривожланишига таъсири таҳлил қилинган. Халқаро иқтисодий интеграция ташқи савдо алоқаларининг кенгайиши, хорижий инвестицияларни жалб қилиш, экспорт салоҳиятини ошириш, янги иш ўринларини яратиш, технологик янгиланиш ва ҳудудлар иқтисодий ихтисослашувини кучайтиришнинг муҳим омилларидан бири сифатида кўриб чиқилган. Тадқиқотда Ўзбекистон миллий статистика маълумотлари, минтақаларнинг ялпи ҳудудий маҳсулоти, ташқи савдо айланмаси ва экспорт кўрсаткичлари таҳлил қилинди. 2025 йилда Ўзбекистон ташқи савдо айланмаси 81,2 млрд АҚШ долларини ташкил этиб, экспорт ҳажми 33,8 млрд долларга етган. Шу билан бирга, минтақалар ўртасида ташқи иқтисодий фаоллик даражасида сезиларли фарқлар мавжудлиги аниқланди. Мақолада интеграциянинг ижобий таъсирлари билан бир қаторда транспорт-логистика харажатлари, ҳудудлар иқтисодий салоҳиятининг нотекис тақсимланиши, экспорт маҳсулотлари таркибининг диверсификацияси ва ташқи бозорларга боғлиқлик каби муаммолар ҳам ёритилган. Тадқиқот натижалари минтақаларнинг экспорт салоҳиятини ошириш, саноат кооперациясини ривожлантириш ва ташқи иқтисодий алоқаларни ҳудудий жиҳатдан диверсификация қилиш зарурлигини кўрсатади.

Калит сўзлар: халқаро иқтисодий интеграция, минтақавий ривожланиш, Ўзбекистон, ташқи савдо, экспорт, импорт, инвестиция, иқтисодий ўсиш, ҳудудий иқтисодиёт, саноат кооперацияси, логистика, экспорт салоҳияти.

Аннотация

В статье анализируется влияние процессов международной экономической интеграции на социально-экономическое развитие регионов Узбекистана. Международная экономическая интеграция рассматривается как один из факторов расширения внешнеторговых связей, привлечения иностранных инвестиций, повышения экспортного потенциала, создания новых рабочих мест, технологического обновления и усиления экономической специализации регионов. В исследовании использованы данные Национального комитета Республики Узбекистан по статистике, а также показатели валового регионального продукта, внешнеторгового оборота и экспорта регионов. В 2025 году внешнеторговый оборот Узбекистана составил 81,2 млрд долларов США, а экспорт достиг 33,8 млрд долларов. Одновременно сохраняются существенные различия между регионами по уровню внешнеэкономической активности. В статье рассматриваются как положительные эффекты интеграции, так и существующие ограничения, включая транспортно-логистические издержки, неравномерность экономического потенциала регионов, необходимость диверсификации экспортной структуры и зависимость отдельных отраслей от внешних рынков. Сделан вывод о необходимости дальнейшего развития экспортного потенциала регионов, промышленной кооперации и диверсификации внешнеэкономических связей.

Ключевые слова: международная экономическая интеграция, региональное развитие, Узбекистан, внешняя торговля, экспорт, импорт, инвестиции, экономический рост, региональная экономика, промышленная кооперация, логистика, экспортный потенциал.

Abstract

This article examines the impact of international economic integration on the socio-economic development of Uzbekistan's regions. International economic integration is considered an important factor in expanding foreign trade relations, attracting foreign investment, increasing export potential, creating new employment opportunities, promoting technological modernization, and strengthening regional economic specialization. The study analyzes data from the National Statistics Committee of Uzbekistan, including gross regional product, foreign trade turnover, and regional export indicators. In 2025, Uzbekistan's foreign trade turnover reached 81.2 billion US dollars, while exports amounted to 33.8 billion US dollars. At the same time, significant differences remain among regions in terms of foreign economic activity. The article examines both the positive effects of integration and the existing challenges, including transport and logistics costs, uneven distribution of regional economic potential, the need to diversify export structures, and dependence on external markets. The findings emphasize the importance of strengthening regional export capacity, developing industrial cooperation, improving logistics infrastructure, and diversifying foreign economic relations.

Keywords: international economic integration, regional development, Uzbekistan, foreign trade, exports, imports, investment, economic growth, regional economy, industrial cooperation, logistics, export potential.

Кириш

Жаҳон иқтисодиётида глобаллашув ва минтақавий интеграция жараёнларининг чуқурлашуви мамлакатлар иқтисодий тараққиётига бевосита таъсир кўрсатмоқда. Айниқса, ташқи савдо муносабатларининг кенгайиши, инвестиция оқимларининг ортиши, трансмиллий ишлаб чиқариш занжирларининг шаклланиши ва транспорт-логистика тизимларининг ривожланиши миллий иқтисодиёт билан бир қаторда алоҳида минтақаларнинг ҳам ижтимоий-иқтисодий ривожланишига таъсир этувчи муҳим омилларга айланмоқда.

Ўзбекистон учун халқаро иқтисодий интеграциянинг аҳамияти мамлакатнинг Марказий Осиёдаги географик ўрни, ички бозорининг

катталиги, табиий ва меҳнат ресурслари, саноат ҳамда қишлоқ хўжалиги салоҳияти билан боғлиқ. Ташқи иқтисодий алоқаларнинг ривожланиши минтақаларда ишлаб чиқаришни модернизация қилиш, янги технологияларни жорий этиш, экспортбоп маҳсулотлар ишлаб чиқариш ва инвестицияларни жалб қилиш имкониятларини кенгайтириши мумкин.

Ўзбекистоннинг ташқи савдо кўрсаткичларида ҳам сўнгги йилларда сезиларли ўсиш кузатилмоқда. Миллий статистика қўмитасининг дастлабки маълумотларига кўра, 2025 йилда мамлакат ташқи савдо айланмаси 81,2 млрд АҚШ долларини ташкил этган ва 2024 йилга нисбатан 20,7 фоизга ошган. Экспорт 33,8 млрд долларга, импорт эса 47,4 млрд долларга етган. Ўзбекистон 2025 йилда 210 та давлат билан савдо алоқаларини амалга оширган. SStatistika Malumotlari

Бироқ халқаро интеграция имкониятларидан фойдаланиш минтақаларда бир хил даражада эмас. Айрим ҳудудлар юқори саноат ва экспорт салоҳиятига эга бўлса, бошқа минтақаларда ташқи бозорларга чиқиш, логистика, инвестиция ва ишлаб чиқариш инфратузилмаси билан боғлиқ чекловлар мавжуд.

Шу нуқтаи назардан халқаро иқтисодий интеграциянинг минтақавий иқтисодий ўсиш, бандлик, экспорт, инвестиция ва аҳоли фаровонлигига таъсирини ўрганиш муҳим илмий ва амалий аҳамиятга эга.

Мавзунинг долзарблиги

Мавзунинг долзарблиги шундаки, халқаро иқтисодий интеграция мамлакат иқтисодиёти учун умумий имкониятларни кенгайтириши билан бирга, уларнинг минтақалар ўртасида қандай тақсимланиши масаласини ҳам кун тартибига қўяди.

2025 йилда Ўзбекистоннинг ялпи ички маҳсулоти 1 849,7 трлн сўмни ташкил этиб, реал ўсиш суръати 7,7 фоиз бўлган. Минтақалар кесимида ҳам иқтисодий ўсиш кузатилган, аммо унинг суръатлари турлича бўлган. Масалан, Тошкент шаҳрида ялпи ҳудудий маҳсулот

11,3 фоизга, Сирдарё вилоятида 9,8 фоизга, Наманган ва Жиззах вилоятларида 8,2 фоизга ўсган. SStatistika Malumotlari+1

Бу ҳолат халқаро иқтисодий интеграциянинг минтақавий ривожланишга таъсирини алоҳида таҳлил қилиш зарурлигини кўрсатади.

Тадқиқот мақсади

Тадқиқотнинг асосий мақсади халқаро иқтисодий интеграция жараёнларининг Ўзбекистон минтақаларининг ижтимоий-иқтисодий ривожланишига таъсирини таҳлил қилиш ҳамда ташқи иқтисодий алоқалардан самарали фойдаланиш бўйича амалий таклифлар ишлаб чиқишдан иборат.

Тадқиқот вазифалари

Тадқиқот мақсадидан келиб чиқиб қуйидаги вазифалар белгиланди:

- халқаро иқтисодий интеграциянинг назарий мазмунини ўрганиш;
- ташқи савдонинг минтақалар иқтисодий ривожланишидаги ўрнини аниқлаш;
- Ўзбекистон минтақаларининг экспорт салоҳиятини таҳлил қилиш;
- халқаро интеграциянинг инвестиция ва иш билан таъминлашга таъсирини ўрганиш;
- минтақалар ўртасидаги ташқи иқтисодий фаоллик фарқларини аниқлаш;
- экспорт салоҳиятини ошириш ва ҳудудий интеграцияни кучайтириш бўйича таклифлар ишлаб чиқиш.

Методология

Тадқиқотда тизимли таҳлил, қиёсий таҳлил, статистик таҳлил, динамик қаторларни ўрганиш ва минтақавий иқтисодий таҳлил усулларидан фойдаланилди.

Тадқиқотнинг ахборот базасини Ўзбекистон Республикаси Миллий статистика қўмитасининг расмий маълумотлари, халқаро

ташкилотларнинг таҳлилий материаллари ва илмий адабиётлар ташкил этди.

Минтақаларнинг иқтисодий ҳолатини баҳолашда қуйидаги асосий кўрсаткичлардан фойдаланилди:

- ялпи ҳудудий маҳсулот ҳажми;
- ялпи ҳудудий маҳсулотнинг ўсиш суръати;
- ташқи савдо айланмаси;
- экспорт ва импорт ҳажми;
- экспортнинг товар таркиби;
- инвестиция фаоллиги;
- саноат ишлаб чиқариши;
- ташқи бозорларга чиқиш имкониятлари.

Мақолада 2025 йил маълумотлари асосий таҳлил даври сифатида олинди.

Натижалар ва таҳлил

Ўзбекистон ташқи иқтисодий алоқаларининг кенгайиши мамлакат минтақаларининг иқтисодий фаоллигига турлича таъсир кўрсатмоқда. Миллий статистика қўмитаси маълумотларига кўра, 2025 йилда Ўзбекистон ташқи савдо айланмаси 81,2 млрд долларни ташкил этган. Унинг таркибида экспорт 33,8 млрд доллар, импорт эса 47,4 млрд доллар бўлган. SStatistika Malumotlari

1-жадвал. Ўзбекистон ташқи савдосининг асосий кўрсаткичлари

Кўрсаткич	2025 йил
Ташқи савдо айланмаси	81,2 млрд АҚШ долл.
Экспорт	33,8 млрд АҚШ долл.
Импорт	47,4 млрд АҚШ долл.
Ташқи савдо ўсиши	20,7 %
Экспорт ўсиши	24,0 %
Импорт ўсиши	18,5 %
Савдо ҳамкорлари	210 та давлат

Манба: Ўзбекистон Республикаси Миллий статистика қўмитаси маълумотлари асосида тузилди. SStatistika Malumotlari

Мазкур кўрсаткичлар мамлакатнинг жаҳон иқтисодиёти билан интеграциялашуви кучайиб бораётганини кўрсатади. Бироқ ташқи савдонинг ўсиши минтақалар бўйича бир хил тақсимланмаган.

2025 йилда ялпи ҳудудий маҳсулот ҳажми бўйича Тошкент шаҳри, Тошкент вилояти ва Навоий вилояти юқори кўрсаткичларга эга бўлган. Тошкент шаҳрининг ялпи ҳудудий маҳсулоти 367,2 трлн сўм, Тошкент вилоятиники 180,2 трлн сўм, Навоий вилоятиники 168,0 трлн сўмни ташкил этган. SStatistika Malumotlari+1

2-жадвал. Ўзбекистон минтақаларининг ялпи ҳудудий маҳсулоти, 2025 йил

Минтақа	ЯҲМ, млрд сўм	Ўсиш суръати
Тошкент шаҳри	367 222,3	111,3 %
Тошкент вилояти	180 177,4	107,2 %
Навоий вилояти	167 964,6	107,7 %
Самарқанд вилояти	121 489,5	108,0 %
Фарғона вилояти	111 305,3	108,1 %
Андижон вилояти	107 717,6	106,8 %
Қашқадарё вилояти	98 783,4	106,8 %
Бухоро вилояти	86 608,1	107,2 %
Наманган вилояти	85 419,0	108,2 %
Сурхондарё вилояти	66 186,5	106,6 %
Хоразм вилояти	62 987,5	107,9 %
Қорақалпоғистон Республикаси	54 076,9	107,2 %
Жиззах вилояти	52 956,7	108,2 %
Сирдарё вилояти	35 794,4	109,8 %

Манба: Миллий статистика қўмитаси. SStatistika Malumotlari

Жадвалдан кўриниб турибдики, минтақаларнинг иқтисодий ҳажми ва ўсиш суръатлари ўртасида фарқ мавжуд. 2025 йилда Тошкент шаҳри республика ялпи ички маҳсулотининг 19,9 фоизини шакллантирган бўлса, Тошкент вилояти 9,7 фоиз ва Навоий вилояти 9,1 фоиз улушга эга бўлган. Сирдарё вилоятининг улуши 1,9 фоизни, Қорақалпоғистон Республикаси ва Жиззах вилоятиники 2,9 фоизни ташкил этган. SStatistika Malumotlari

Бу ҳолат халқаро иқтисодий интеграциядан олинадиган самара кўп жиҳатдан минтақанинг саноат базаси, транспорт инфратузилмаси, экспортбоп маҳсулотлари ва инвестициявий жозибадорлигига боғлиқлигини кўрсатади.

Экспортнинг минтақавий ривожланишга таъсири

Экспорт халқаро иқтисодий интеграциянинг энг муҳим каналларидан биридир. Экспорт ҳажмининг ортиши корхоналарнинг ишлаб чиқариш қувватларини кенгайтириш, янги иш ўринларини яратиш ва маҳаллий маҳсулотларни халқаро стандартларга мослаштиришга туртки бериши мумкин.

Ўзбекистоннинг умумий экспорт ҳажми 2025 йилда 34,25 млрд долларга яқинлашган. 2024 йилда бу кўрсаткич 27,27 млрд доллар эди. Демак, 2024–2025 йилларда экспорт ҳажми сезиларли даражада ошган. SSIAT

Бироқ экспорт фаоллиги ҳудудлар бўйича бир хил эмас. Масалан, 2024 йил январь–июль ойларида Тошкент шаҳрининг экспорт ҳажми 3,13 млрд долларни ташкил этган ва республика экспортида 21,2 фоиз улушга эга бўлган. Тошкент вилоятининг экспорти 1,04 млрд доллар, Навоий вилоятиники 630,4 млн доллар, Андижон вилоятиники 614,4 млн доллар бўлган. SStatistika Malumotlari

Бу маълумотлар ташқи иқтисодий интеграциянинг минтақавий иқтисодиётга таъсирида саноатлашув даражаси, экспорт инфратузилмаси ва йирик корхоналарнинг мавжудлиги муҳим ўрин тутишини кўрсатади.

Халқаро интеграциянинг ижобий таъсирлари

Халқаро иқтисодий интеграция Ўзбекистон минтақалари учун бир қатор иқтисодий имкониятларни яратади.

Биринчидан, ташқи бозорларнинг кенгайиши минтақавий корхоналар учун маҳсулот сотиш имкониятларини оширади.

Иккинчидан, хорижий инвестицияларни жалб қилиш орқали янги ишлаб чиқариш корхоналари ташкил этилиши ва мавжуд корхоналар модернизация қилиниши мумкин.

Учинчидан, ташқи бозорда рақобатнинг кучайиши маҳаллий ишлаб чиқарувчиларни маҳсулот сифати ва меҳнат унумдорлигини оширишга ундайди.

Тўртинчидан, халқаро ҳамкорлик замонавий технологиялар ва бошқарув тажрибасининг минтақаларга кириб келишини рағбатлантиради.

Бешинчидан, экспортга йўналтирилган ишлаб чиқаришнинг ривожланиши янги иш ўринлари ва аҳоли даромадларининг ошишига хизмат қилиши мумкин.

Халқаро интеграциянинг минтақалар учун мавжуд муаммолари

Интеграция жараёнлари билан бирга айрим иқтисодий хавф ва чекловлар ҳам мавжуд.

Биринчидан, минтақаларнинг ташқи бозорларга чиқиш имкониятлари бир хил эмас. Транспорт инфратузилмаси ва логистика харажатлари айрим ҳудудлар учун рақобатбардошликни пасайтириши мумкин.

Иккинчидан, экспортнинг айрим товар ва бозорларга юқори даражада концентрациялашуви ташқи талаб, нархлар ёки геосиёсий ўзгаришларга сезувчанликни оширади.

Учинчидан, кичик ва ўрта бизнес субъектларининг халқаро стандартлар, сертификатлаштириш ва ташқи бозор маркетинги бўйича

имкониятлари йирик корхоналарга нисбатан чекланган бўлиши мумкин.

Тўртинчидан, иқтисодий интеграциядан келадиган фойданинг минтақалар ўртасида нотекис тақсимланиши ҳудудий иқтисодий тафовутларни кучайтириш эҳтимолини юзага келтиради.

Шу сабабли интеграция сиёсати фақат ташқи савдо ҳажмини оширишга эмас, балки минтақаларнинг иқтисодий салоҳиятини тенгроқ ривожлантиришга ҳам қаратилган бўлиши лозим.

Ўзбекистоннинг халқаро иқтисодий интеграция жараёнлари

Ўзбекистоннинг халқаро иқтисодий интеграцияси ташқи савдо муносабатлари, инвестиция ҳамкорлиги, минтақавий транспорт-логистика лойиҳалари ва кўп томонлама савдо тизимида иштирок этиш каби йўналишларда амалга ошмоқда.

Жаҳон савдо ташкилотига аъзо бўлиш жараёни ҳам мамлакатнинг халқаро савдо тизимига интеграциялашувида муҳим йўналиш ҳисобланади. 2026 йил июль ойида ЖСТ Ўзбекистоннинг аъзо бўлиш жараёнини 2026 йилда якунлаш мақсадини яна бир бор тасдиқлаганини маълум қилди. DDunyo Savdo Tashkiloti

Бу жараён минтақалар учун ҳам аҳамиятли, чунки ташқи савдо қоидаларининг шаффофлашуви, техник стандартларни халқаро талабларга яқинлаштириш ва рақобат муҳитининг ривожланиши экспортчи корхоналарнинг ташқи бозорларда фаоллашувига таъсир қилиши мумкин.

Минтақалар кесимида интеграцияни ривожлантириш йўналишлари

Ўзбекистон минтақаларининг халқаро иқтисодий интеграциядан самарали фойдаланиши учун қуйидаги йўналишларга эътибор қаратиш мақсадга мувофиқ:

1. **Минтақалар экспорт салоҳиятини ошириш.** Ҳар бир ҳудуднинг табиий, меҳнат ва ишлаб чиқариш имкониятларидан

келиб чиқиб экспортбоп маҳсулотлар ишлаб чиқаришни кенгайтириш.

2. **Қайта ишлаш саноатини ривожлантириш.** Хомашёни экспорт қилиш ўрнига юқори қўшилган қийматга эга тайёр ва ярим тайёр маҳсулотлар улушини ошириш.
3. **Транспорт-логистика инфратузилмасини модернизация қилиш.** Минтақаларнинг халқаро бозорларга чиқиш харажатларини камайтириш учун логистика марказлари, автомобиль ва темир йўл инфратузилмасини ривожлантириш.
4. **Кичик ва ўрта бизнеснинг экспорт имкониятларини кенгайтириш.** Экспорт сертификатлари, маркетинг, электрон савдо ва ташқи бозорлар ҳақидаги ахборотдан фойдаланиш имкониятларини ошириш.
5. **Хорижий инвестицияларни минтақаларга жалб қилиш.** Инвестиция лойиҳаларини нафақат иқтисодий марказларга, балки инвестиция салоҳияти етарлича фойдаланилмаётган ҳудудларга ҳам йўналтириш.
6. **Саноат кооперациясини кучайтириш.** Ўзбекистон минтақаларидаги корхоналарни хорижий ишлаб чиқариш занжирларига жалб қилиш.
7. **Рақамли ташқи савдони ривожлантириш.** Электрон тижорат ва рақамли экспорт платформаларидан фойдаланиш орқали кичик бизнеснинг хорижий харидорларга чиқиш имкониятларини ошириш.

Муҳокама

Тадқиқот натижалари халқаро иқтисодий интеграция Ўзбекистон минтақалари учун ташқи бозорлар, инвестициялар, технологиялар ва ишлаб чиқариш кооперациясига кириш имкониятларини кенгайтиришини кўрсатади. Бироқ интеграция самараси автоматик равишда барча минтақаларда бир хил даражада шаклланмайди.

2025 йилда Ўзбекистон минтақаларининг барчасида ялпи ҳудудий маҳсулот ўсиши қайд этилган бўлса-да, иқтисодий ҳажм ва ўсиш суръатлари ўртасида фарқлар сақланиб қолган. SStatistika Malumotlari+1

Шунингдек, ташқи савдо кўрсаткичларида ҳам минтақалар кесимида сезиларли тафовут мавжуд. Бу эса ташқи иқтисодий интеграция сиёсатини умуммиллий ёндашув билан бир қаторда ҳудудларнинг ўзига хос иқтисодий хусусиятларини ҳисобга олган ҳолда амалга ошириш зарурлигини кўрсатади.

Минтақавий сиёсатда экспорт ҳажмининг ўзи эмас, балки экспортнинг қўшилган қиймати, диверсификация даражаси, яратилган иш ўринлари, маҳаллий корхоналарнинг халқаро қиймат занжирларига қўшилиши ва аҳоли даромадларига таъсири ҳам муҳим мезон сифатида қаралиши лозим.

Хулоса

Халқаро иқтисодий интеграция Ўзбекистон минтақаларининг ижтимоий-иқтисодий ривожланишини рағбатлантирувчи муҳим омиллардан бири ҳисобланади. Ташқи савдо алоқаларининг кенгайиши, экспорт ҳажмининг ўсиши, хорижий инвестициялар ва технологик ҳамкорлик минтақаларда ишлаб чиқариш салоҳиятини ошириш учун янги имкониятлар яратади.

Тадқиқот натижалари Ўзбекистон ташқи иқтисодий фаоллигининг сўнгги йилларда сезиларли даражада кенгайганини кўрсатди. 2025 йилда мамлакат ташқи савдо айланмаси 81,2 млрд долларга етган, экспорт 33,8 млрд долларни ташкил этган. SStatistika Malumotlari

Шу билан бирга, халқаро иқтисодий интеграциянинг минтақаларга таъсири бир хил эмас. Тошкент шаҳри, Тошкент ва Навоий вилоятлари каби юқори иқтисодий салоҳиятга эга ҳудудлар ташқи иқтисодий фаолликда катта ўрин эгалламоқда. Бошқа минтақаларда эса экспорт инфратузилмаси, логистика, инвестиция ва ишлаб чиқариш имкониятларини янада ривожлантириш зарурати мавжуд. SStatistika Malumotlari+1

Шунинг учун келгусида Ўзбекистоннинг халқаро иқтисодий интеграция сиёсати минтақаларнинг экспорт салоҳиятини ошириш, ташқи савдони диверсификация қилиш, юқори қўшилган қийматли маҳсулотлар ишлаб чиқаришни кенгайтириш, транспорт-логистика

тизимини модернизация қилиш ва ҳудудларга хорижий инвестицияларни кенгроқ жалб этишга йўналтирилиши мақсадга мувофиқ.

Умуман олганда, халқаро иқтисодий интеграциянинг ижтимоий-иқтисодий самараси нафақат ташқи савдо ҳажмининг ўсиши, балки минтақаларда янги иш ўринларининг яратилиши, аҳоли даромадларининг ошиши, маҳаллий ишлаб чиқарувчиларнинг рақобатбардошлиги кучайиши ва ҳудудларнинг глобал иқтисодий қиймат занжирларига интеграциялашуви билан баҳоланиши лозим.

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GENERATIV SUN’IY INTELLEKT YORDAMIDA ILMIY MATNNI DIAGRAMMAGA AYLANTIRISHDA SEMANTIK MUVOFIQLIK: PROMPT, VIZUAL MUNOSABAT VA TALQIN CHEGARALARI

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Annotatsiya. Maqolada generativ sun’iy intellekt bilan yozma muloqotda ilmiy matnni diagrammaga aylantirish jarayonining lingvosemiotik xususiyatlari o‘rganiladi. Tadqiqot materiali bitta muloqot doirasida shakllangan uchta manba matn–diagramma juftligidan iborat. Materiallar mazmuniy birlik, mantiqiy munosabat, modallik, amal qilish doirasi va talqinning manbaga mansubligi mezonlari asosida sifat jihatidan qiyoslandi. Tahlilda terminlarning saqlanishi diagrammaning manba matnga to‘liq muvofiqligini kafolatlamasligi aniqlandi: bloklar orasidagi yo‘nalish va guruhlanish matnda tasdiqlanmagan bog‘lanishni yuzaga keltirishi mumkin. Bosqichli tahlil bayonida ketma-ketlikning grafik ifodasi manbaga mos kelgan bo‘lsa, parallel mezonlarni alohida misollarga biriktirishda talqin doirasining torayish xavfi kuzatildi. Ehtimollik bildiruvchi birliklar hamda sharh maqomini saqlashning ahamiyati asoslandi. Diagrammani tekshirish uchun grafik munosabatlarni qayta gap shaklida ifodalash va manba bilan solishtirish tartibi taklif qilindi. Natijalar cheklangan materialning analitik talqini bo‘lib, modellar samaradorligi yoki o‘quvchi idrokiga ta’sir haqidagi eksperimental xulosalarni anglatmaydi.

Kalit so‘zlar: prompt, intersemiotik transformatsiya, ilmiy diagramma, semantik muvofiqlik, vizual munosabat, modallik, multimodal diskurs…

СЕМАНТИЧЕСКОЕ СООТВЕТСТВИЕ ПРИ ПРЕОБРАЗОВАНИИ НАУЧНОГО ТЕКСТА В ДИАГРАММУ С ПОМОЩЬЮ ГЕНЕРАТИВНОГО ИСКУССТВЕННОГО ИНТЕЛЛЕКТА: ПРОМПТ, ВИЗУАЛЬНОЕ ОТНОШЕНИЕ И ГРАНИЦЫ ИНТЕРПРЕТАЦИИ

Аннотация. В статье рассматриваются лингвосемиотические особенности преобразования научного текста в диаграмму в письменном взаимодействии с генеративным искусственным интеллектом. Материал составляют три пары «исходный текст — диаграмма», сформированные в рамках одного диалога. Качественное сопоставление проведено по пяти критериям: содержание, логическое отношение, модальность, область действия и принадлежность интерпретации источнику. Анализ показал, что сохранение терминов не обеспечивает полного семантического соответствия: направление стрелок и группировка блоков могут создавать связи, не подтверждённые исходным текстом. В описании этапов исследования последовательность была сохранена,

тогда как распределение параллельных критериев по отдельным примерам создало риск сужения интерпретации. Обоснована необходимость сохранения показателей возможности и разграничения исходного содержания и аналитического комментария. Предложена процедура обратной вербализации графических отношений с последующим сопоставлением с источником. Полученные выводы относятся к ограниченному материалу и не являются экспериментальной оценкой эффективности моделей или восприятия диаграмм читателями.

Ключевые слова: промпт, интерсемиотическая трансформация, научная диаграмма, семантическое соответствие, визуальное отношение, модальность, мультимодальный дискурс.

SEMANTIC FIDELITY IN GENERATIVE AI–ASSISTED TRANSFORMATION OF SCIENTIFIC TEXT INTO DIAGRAMS: PROMPTS, VISUAL RELATIONS AND INTERPRETIVE LIMITS

Abstract. This article examines the linguosemiotic features of transforming scientific prose into diagrams through written interaction with generative artificial intelligence. The material comprises three source-text–diagram pairs produced within a single conversation. A qualitative comparison addresses five dimensions: propositional content, logical relations, modality, scope and the attribution of interpretation to its source. The analysis shows that preserving terminology does not ensure semantic fidelity: arrow direction and block grouping may introduce relations unsupported by the source text. A procedural diagram preserved the explicitly stated sequence, whereas assigning parallel analytical criteria to separate examples created a risk of narrowing their scope. The findings highlight the importance of preserving possibility markers and distinguishing source content from analytical commentary. A verification procedure is proposed in which graphical relations are verbalized and compared with the source. The findings constitute an analysis of a limited set of artifacts rather than experimental evidence of model performance or effects on reader comprehension.

Keywords: prompt, intersemiotic transformation, scientific diagram, semantic fidelity, visual relation, modality, multimodal discourse…

KIRISH

Ilmiy matnni diagramma shaklida taqdim etish mazmunni tanlash, qisqartirish va qayta tashkil etishni talab qiladi. Matnda gaplar orqali ifodalangan munosabatlar diagrammada bloklarning joylashuvi, o‘zaro tutashishi, strelkalarning yo‘nalishi va grafik chegaralar yordamida beriladi. Shu sababli matnni vizuallashtirish jarayonida tekshiriladigan masala terminlarning to‘g‘ri ko‘chirilishi bilan cheklanmaydi. Ushbu terminlar o‘rtasida qanday munosabat hosil qilingani ham ilmiy aniqlik uchun ahamiyatlidir.

Generativ sun’iy intellekt bilan muloqotda bu jarayon ko‘pincha kundalik ifodalangan qisqa topshiriqdan boshlanadi. Foydalanuvchi ilmiy parcha yuborib, uni

maqolaga mos diagramma shakliga keltirishni so‘raydi. Bunday talab yakuniy mahsulotning turini belgilaydi, biroq matndagi qaysi munosabatni strelka bilan, qaysi birini yonma-yon joylashuv orqali ifodalash lozimligini har doim ochiq ko‘rsatmaydi. Grafik yechim tanlanayotganda mazmunni qayta talqin qilish ehtimoli aynan shu nuqtada yuzaga keladi.

R. Jakobsonning intersemiotik tarjima haqidagi qarashi verbal belgilarni boshqa belgi tizimi vositasida talqin qilish masalasini nazariy jihatdan ajratib beradi. Mazkur yondashuv ilmiy matn va diagramma munosabatini o‘rganishga asos bo‘la oladi. Biroq tahlil qilinayotgan diagrammalarda so‘zlar ham saqlanadi: transformatsiya verbal ifodaning butunlay yo‘qolishida emas, mazmunning bir qismi fazoviy va grafik vositalarga ko‘chishida namoyon bo‘ladi. [1]

G. Kress va Th. van Leeuwenning vizual dizayn grammatikasiga oid ishlari tasvirni ma’no tashkil etuvchi tuzilma sifatida o‘rganish imkonini beradi. Ushbu nuqtayi nazardan, diagrammadagi joylashuv va guruhlanish matndan ajratilgan bezak sifatida qaralmaydi; ular mazmunning qanday o‘qilishiga daxldor vositalardir. [2]

Jill H. Larkin va Herbert A. Simon diagrammatik ifodaning ayrim vazifalarda axborotni izlash va undan xulosa chiqarishni yengillashtirish imkoniyatlarini tahlil qilgan. Bu imkoniyat diagrammaning tuzilishiga bog‘liq. Mazkur maqola uchun bundan kelib chiqadigan savol quyidagicha: grafik shakl axborot bilan ishlashni osonlashtirayotgan bo‘lsa ham, undagi munosabatlar manba mazmuniga mos qolganmi? [3]

Sh. Ainsworthning DeFT konsepsiyasida ko‘p reprezentatsiyali taqdimotning samarasi dizayn, bajariladigan vazifa va reprezentatsiyalarning funksiyalari bilan bog‘liq holda ko‘rib chiqiladi. Ushbu qarash matnga diagramma qo‘shilishini o‘z-o‘zidan ijobiy natija deb baholamaslik uchun nazariy asos beradi. [4]

Tadqiqotning maqsadi — generativ sun’iy intellekt yordamida tayyorlangan ilmiy diagrammalarda manba matn mazmuni va mantiqiy munosabatlarining saqlanishini tekshirish mezonlarini ishlab chiqish.

Tadqiqot quyidagi savollarga qaratildi:

1. Diagrammadagi atamalar saqlangan holda ular o‘rtasidagi munosabat o‘zgarishi mumkinmi?
2. Ketma-ketlik, parallel tasnif va ehtimoliy oqibat grafik shaklda qanday farqlanishi kerak?
3. Manba mazmuni bilan diagrammani tuzish jarayonida qo‘shilgan sharhni qanday ajratish mumkin?

Maqolaning taklif etilayotgan analitik hissasi mazmuniy muvofiqlikni alohida so‘zlar darajasida tekshirishni munosabat, modallik, amal qilish doirasi va manbaga mansublik tahlili bilan birlashtirishdan iborat.

MATERIALLAR VA METODLAR

Tadqiqot materiali bitta yozma muloqotda shakllangan uchta manba matn–diagramma juftligidan tashkil topdi. Har bir juftlikda foydalanuvchi taqdim etgan ilmiy

parcha, uni diagrammaga aylantirish topshirig‘i va shu topshiriq asosida tayyorlangan grafik material mavjud.

Birinchi juftlik prompt komponentlari va ularning tillararo muvofiqligi haqidagi matn hamda tegishli diagrammadan iborat. Ikkinchi juftlikda epistemik yo‘naltirish haqidagi matnning uch ustunli diagrammaga aylantirilishi ko‘rib chiqildi. Uchinchi juftlik madaniy birliklarni tahlil qilishning to‘rt bosqichi bayon qilingan parcha va uning ketma-ket grafik ifodasini qamrab oldi.

Topshiriqlarda uchragan *“diagramma canvada dissertasiya bob qilib qil”*, *“diagramma yquridgai sharlrda qil”* va *“shuni ham”* shakllari real murojaatlar sifatida qabul qilindi. Ularning imlosi sun’iy ravishda me’yorlashtirilib, yangi tajriba prompti sifatida taqdim etilmadi. Ushbu maqolada mazkur replikalarning suhbatdagi elliptik tuzilishi emas, ular asosida yaratilgan diagrammaning manbaga muvofiqligi tekshirildi.

Materiallar maqsadli tanlandi: ularda grafik ifodalanishi turlicha bo‘lgan munosabatlar — parallel mezonlar, ehtimoliy oqibat va metodik ketma-ketlik — mavjud. Tanlov chastotaviy hisob-kitob yoki foydalanuvchilar guruhini reprezentativ tavsiflashga qaratilmagan.

1-jadval. Tahlil materiallarining tarkibi

Kod	Manba matnning markaziy mazmuni	Diagrammada tekshirilgan munosabat
M1	Prompt talablari va tillararo muvofiqlik	Parallel mezonlarning misollarga biriktirilishi
M2	Epistemik yo‘naltirishning uch ko‘rinishi	Lisoniy mexanizm va ehtimoliy siljish munosabati
M3	Tahlilning to‘rt bosqichi	Metodik ketma-ketlik va qo‘shimcha natija tavsiflari

Tahlil birligi sifatida faqat diagramma bloki emas, ikki mazmuniy birlik va ular o‘rtasidagi grafik bog‘lanish ham olindi. Bu tanlov mazmuniy xato alohida blok ichida emas, bloklar o‘rtasida paydo bo‘lishi mumkinligi bilan izohlanadi.

Qiyoslash besh mezon asosida bajarildi:

- Mazmuniy muvofiqlik: blok manbadagi qaysi fikrni ifodalaydi?
- Munosabat muvofiqligi: strelka yoki guruhlanish manbadagi qanday bog‘lanishga mos?
- Modal muvofiqlik: imkoniyat, shartlilik yoki cheklov saqlanganmi?
- Amal qilish doirasi: mezon manbada qaysi birliklarga tegishli bo‘lsa, diagrammada ham o‘sha doirada qo‘llanganmi?
- Manbaga mansublik: ifoda manbadan olinganmi yoki diagramma tuzuvchining sharhimi?

Dastlab, manba matnlardagi asosiy hukmlar va munosabat ko‘rsatkichlari ajratildi. Keyin ular diagrammadagi bloklar, sarlavhalar va bog‘lanishlarga moslashtirildi. Yakunda grafik bog‘lanishlar qayta gap shaklida ifodalanib, manba bilan solishtirildi. Maqolada bu tekshiruv amali teskari verbalizatsiya deb yuritiladi.

Masalan, ikki blok orasidagi strelkani “*birinchi amal bajarilgach, ikkinchisi amalga oshiriladi”* tarzida o‘qish mumkin bo‘lsa, manbada aynan ketma-ketlik mavjudligi tekshirildi. Uni “*birinchi hodisa ikkinchisini keltirib chiqaradi*” deb ifodalash zarur bo‘lsa, sababiy munosabat uchun matniy asos qidirildi. Grafik bog‘lanishning ma’nosi noaniq qolgan holatlarda yagona talqin majburan belgilab qo‘yilmadi.

Tadqiqot retrospektiv sifat tahlilidir. Unda mustaqil baholovchilar kelishuvi, o‘quvchilarning tushunish tezligi yoki turli modellar samaradorligi o‘lchanmagan.

NATIJALAR

Terminlarning saqlanishi munosabatlarning saqlanishini kafolatlamaydi. M1 materialining manba matnida promptdagi talabning nimaga tatbiq etilishi va tarjimada qanday saqlanishi o‘zaro bog‘liq tahliliy vazifalar sifatida ko‘rsatilgan. Shuningdek, ilmiy manbadan foydalanish talabi bilan ilmiy uslubda yozish talabi bir xil emasligi tushuntirilgan.

Diagrammada ushbu mazmun quyidagi bloklar orqali berilgan:

- “Talabning amal qilish doirasi”;
- “Tillararo saqlanish”;
- “Manbaviy talab”;
- “Uslubiy talab”.

Bloklarning nomlari manba mazmuniga mos. Biroq grafik bog‘lanishda “Talabning amal qilish doirasi” blokidan “Manbaviy talab”ga, “Tillararo saqlanish” blokidan esa “Uslubiy talab”ga alohida strelka tushirilgan.

Ushbu joylashuv ikki mezon bilan ikki talab turi o‘rtasida maxsus juftlik mavjudligi haqidagi talqinni yuzaga keltirishi mumkin. Manba matn esa talabning amal qilish doirasini faqat manbaviy talabga, tillararo saqlanishni faqat uslubiy talabga biriktirmaydi. Ikkala mezon ham ikkala talab turini tekshirishda qo‘llanishi mumkin.

Bu holatda aniqlangan muammo terminologik xato emas. Grafik bog‘lanish tahliliy mezonning qo‘llanish doirasini manbada ko‘rsatilmagan tarzda toraytirishga yo‘l ochgan. Diagrammada “faqat” so‘zi yozilmaganligi sababli uni mutlaq eksklyuziv tasnif deb baholash ham to‘g‘ri bo‘lmaydi. Kuzatilgan holat — cheklovchi talqinga imkon beruvchi grafik tuzilishdir.

Mazkur farqni quyidagi matritsa aniqroq ko‘rsatadi.

2-jadval. Talab turlari va tahliliy mezonlarning munosabati

Talab turi	Amal qilish doirasini tekshirish	Tillararo saqlanishni tekshirish
Manbaviy talab	Qaysi manbalardan foydalanish talab qilingan?	Manba haqidagi cheklov tarjimada saqlanganmi?
Uslubiy talab	Uslub talabi matnning qaysi qismiga tegishli?	Uslub haqidagi ko‘rsatma tarjimada saqlanganmi?

Jadvaldagi munosabatlar manbada ajratilgan ikki tahliliy mezonning ikki talab turiga ham tatbiq etilishini ifodalaydi. Demak, ushbu materialda ikki parallel misolni joylashtirish bilan mezonlarni ularga alohida biriktirish o‘rtasidagi farqni saqlash zarur.

Modallik grafik xulosaning kuchini chegaralaydi

M2 materialida uchta holat: baholovchi pozitsiya, dalilsiz e’tiroz va oldindan taklif qilingan javob ko‘rib chiqilgan. Diagrammaning tegishli qatorlari “Epistemik siljish xavfi” sarlavhasi bilan ajratilgan. Ulardagi hukmlar *“almashtirilishi mumkin”*, *“qabul qilinishi mumkin”* va *“tayanchga aylanishi mumkin”* shakllarida yakunlangan.

Bu birliklar natijaning muqarrarligini bildirmaydi. Ular tasvirlanayotgan mexanizmning ehtimoliy oqibatini chegaralaydi. Shuning uchun “mumkin” so‘zining saqlanishi diagrammadagi ikkilamchi uslubiy xususiyat emas, hukmning kuchini belgilovchi semantik shartdir.

Masalan, “*shubha bildirilishi javobning xatoligiga dalil sifatida qabul qilinishi mumkin*” degan ifoda muayyan xato talqin ehtimolini bildiradi. Ushbu gapdan modal birlik olib tashlansa, ifoda umumiy qonuniyatga yaqinlashadi: shubha bildirish bilan javobni xato deb qabul qilish o‘rtasida bevosita bog‘lanish bordek ko‘rinadi.

Diagrammada lisoniy mexanizmdan xavf tavsifiga qarab yo‘nalgan strelkalar mavjud. Ularning mazmuni tegishli sarlavha va modal birliklar bilan birgalikda o‘qilishi kerak. Strelka yakka holda sababiy bog‘lanishni isbotlamaydi.

Ushbu materialda ehtimollikning verbal ifodasi saqlangan. Shu bilan birga, o‘quvchi strelkani qanday tushunishi mazkur tadqiqotda tekshirilmagan. Natija diagrammadagi modal cheklovning mavjudligi haqidagi xulosani asoslaydi; barcha o‘quvchilar uni bir xil talqin qilishi haqidagi xulosani asoslamaydi.

Ketma-ketlik uchun manbaning o‘zida asos bo‘lishi kerak. M3 materialining manba matnida tahlil to‘rt bosqichdan iboratligi ochiq ifodalangan. *“Dastlab”*, *“keyin”*, *“uchinchi bosqichda”* va *“yakunda”* birliklari amallarning bayon etilish tartibini belgilagan.

Diagrammada shu tartib raqamlangan to‘rtta blok va ularni bog‘lovchi pastga yo‘nalgan strelkalar orqali berilgan:

- Lug‘aviy ma’nolarni ajratish.
- Kontekstual ma’noni farqlash.
- Tarjima variantlarini qiyoslash.
- Ikki tilda prompt ishlab chiqish.

Mazkur holatda grafik ketma-ketlik manbadagi verbal ko‘rsatkichlarga mos keladi. Uni “lug‘aviy ma’nolar ajratilgach, kontekstual ma’no tekshiriladi” kabi gaplar orqali qayta ifodalash mumkin.

Biroq metodik tartibni sababiy zarurat bilan tenglashtirish mumkin emas. Manba tahlilning qanday olib borilganini bayon qiladi; birinchi amal keyingi amalni avtomatik ravishda yuzaga keltirishini da’vo qilmaydi. Shuning uchun diagrammadagi strelkalar bu o‘rinda bajarilish yoki bayon ketma-ketligini ifodalaydi.

Natija strelkaning semantik qiymati grafik shaklning o‘zidan emas, manba matn va diagrammadagi izohlar bilan munosabatidan aniqlanishini ko‘rsatadi.

Qo‘shimcha sharh alohida natija sifatida ko‘rinishi mumkin.

M3 diagrammasida har bir bosqich ostida “Natija” belgisi bilan qo‘shimcha ifodalar berilgan. Jumladan, “**semantik belgilar majmui”, “asoslangan talqin chegarasi**” va “**ma’no siljishlari tavsifi**” kabi birikmalar qo‘llangan.

Ushbu ifodalar bosqichlarning vazifasini umumlashtirishga xizmat qiladi. Biroq ular foydalanuvchi yuborgan qisqa metodik parchada aynan shu shaklda keltirilmagan. Demak, diagrammada manba mazmuni bilan birga uni talqin qilish orqali hosil qilingan qo‘shimcha tavsif ham mavjud.

Qo‘shimcha tavsifning o‘zi asossiz deb baholanmaydi. Muammo uning maqomidadir. “Natija” yorlig‘i ostidagi ifoda tadqiqotda alohida qayd etilgan mahsulot yoki tekshirilgan xulosa sifatida tushunilishi mumkin. Manbada bunday maqom ko‘rsatilmagan bo‘lsa, diagramma matndan kuchliroq da’vo bildiradi.

Shu sababli bunday qo‘shimchalarni “**Bosqichning analitik vazifasi”** kabi aniqroq belgi bilan berish yoki rasm izohida ular sxemalashtirish jarayonidagi umumlashtirish ekanini ko‘rsatish maqsadga muvofiq.

Bu natija qisqartirish va kengaytirish bir diagrammada bir vaqtda yuz berishi mumkinligini ko‘rsatadi. Manbadagi ayrim jumlalar qisqaradi, ayni paytda yangi sarlavha va umumlashtirishlar qo‘shiladi. Tekshiruv ikkala yo‘nalishni ham qamrab olishi kerak.

Tekshirish mezonlarining birgalikdagi qo‘llanishi

Uch materialning qiyosiy tahlili muvofiqlikni bitta “mazmun saqlangan” hukmi bilan baholash yetarli emasligini ko‘rsatdi.

3-jadval. Diagramma muvofiqligini tekshirish mezonlari

Mezon	**Tekshiruv savoli**	**Tahlildagi tayanch holat**
Mazmun	Blokdagi fikr manbada bormi?	Asosiy talab va bosqich nomlarining saqlanishi
Munosabat	Bog‘lanish manbadagi qaysi aloqani ifodalaydi?	M1 dagi alohida juftlash va M3 dagi ketma-ketlik
Modallik	Hukmning ehtimollik yoki qat’iylik darajasi o‘zgarmaganmi?	M2 dagi “mumkin” shakllari
Amal qilish doirasi	Mezon tegishli birliklarning barchasiga tatbiq etilganmi?	M1 dagi mezon va talab turlari
Manbaga mansublik	Qo‘shimcha sharh asl bayondan ajratilganmi?	M3 dagi “Natija” yorliqli umumlashtirishlar

Mazkur mezonlar diagrammalarni sonli reytingga ajratish uchun ishlab chiqilmadi. Ularning vazifasi muvofiqlik yoki tafovut aynan qaysi sathda yuzaga kelganini ko‘rsatishdir.

MUHOKAMA

Tahlil ilmiy matnni diagrammaga aylantirishda leksik qisqartirish bilan mantiqiy qayta tashkil etishni farqlash zarurligini ko‘rsatadi. Jumladagi ayrim so‘zlarning tushirilishi mazmunni saqlashi mumkin. Biroq bloklar o‘rtasidagi bitta bog‘lanishning o‘zgartirilishi yangi munosabatni yuzaga keltiradi. Shu sababli diagrammani tekshirishda faqat imlo, termin va sarlavhalarning to‘g‘riligiga tayanish yetarli emas.

Y. Jakobsonning intersemiotik tarjima tushunchasi mazmunning turli belgi vositalari orqali qayta ifodalanishini tushuntirishga xizmat qiladi. Mazkur tahlilda esa bu jarayonning tekshiriladigan jihati ajratildi: matndagi bog‘lovchi va modal birliklarning vazifasi grafik vositaga ko‘chganida ularning semantik chegarasi saqlanishi kerak. Bu xulosa Jakobson tasnifining mazkur materialga tatbiqi bo‘lib, uning ishida sun’iy intellekt diagrammalari o‘rganilganini anglatmaydi. [1]

Kress va van Leeuwenning vizual ma’no tashkil etilishiga oid yondashuvi bloklarning joylashuvi mazmun tahlilining bir qismi ekanini asoslashga yordam beradi. M1 materialida aynan joylashuv va bog‘lanish terminlardan tashqari qo‘shimcha talqin imkonini yaratgan. Biroq bu imkoniyatning real o‘quvchi tomonidan qay darajada amalga oshirilishi alohida empirik tekshiruvni talab qiladi. [2]

Larkin va Simon muhokama qilgan diagrammatik ifodaning qulayligi bilan manbaga muvofiqlik bir xil mezon emas. Ma’lumotni tez topish imkonini beruvchi sxema manbadagi tasnifni noto‘g‘ri tashkil etishi ham mumkin. Shuning uchun diagrammaning o‘qilishi qulay ekanini ko‘rsatish uning ilmiy jihatdan aniq ekanini tekshirish o‘rnini bosa olmaydi. [3]

Ainsworthning yondashuvi asosida qaralganda, diagramma qanday vazifani bajarishi oldindan aniqlanishi lozim: u bosqichlarni ko‘rsatadimi, mezonlarni qiyoslaydimi yoki ehtimoliy oqibatlarni ajratadimi? Tahlil qilingan materiallarda ushbu funksiyalar bir xil bo‘lmagan. Demak, barcha ilmiy parchalarni yagona blok–strelka andazasiga joylashtirish mazmuniy munosabatlar farqini yo‘qotishi mumkin. [4]

Bu natijalar prompt tuzishga ham taalluqlidir. Real murojaatdagi “**diagramma qilib ber**” talabi foydalanuvchining amaliy ehtiyojini tabiiy ifodalaydi. Uni murakkab terminlar bilan ortiqcha kengaytirish shart emas, ammo manbaning muayyan xususiyati uchun qisqa va tekshiriladigan cheklov qo‘shilishi mumkin.

Quyidagi ko‘rsatmalar tadqiqot materialidan olingan asl replikalar emas, aniqlangan muammolar asosida tuzilgan tahririy takliflardir: *“Shu matnni maqolaga mos diagramma qiling. Bosqichlarni tartib bilan bering, yonma-yon turgan fikrlarni esa bir-birining natijasi qilib ko‘rsatmang.”*

“*«Mumkin», «ayrim hollarda» degan joylarini qisqartirmang. Diagrammada ham xulosa matndagidan qat’iyroq chiqmasin*.”

“*O‘zingiz qo‘shgan tushuntirishni alohida izohda bering*.”

Bunday ko‘rsatmalar umumiy “**ilmiy va mukammal diagramma tayyorlang”** talabiga qaraganda tekshirish uchun aniqroq asos beradi. Ularning mazmuni foydalanuvchidan diagrammalar nazariyasini bilishni talab qilmaydi; bajariladigan ish va saqlanishi kerak bo‘lgan shart oddiy tilda ifodalanadi. Shu bilan birga, ushbu promptlarning samaradorligi turli modellarda tajriba orqali o‘lchanmagan.



1-rasm. Ilmiy matnni diagrammaga aylantirishda semantik muvofiqlikni tekshirish bosqichlari va mezonlari

Teskari verbalizatsiyaning amaliy qiymati grafik vositada yashirin qolgan munosabatni gap shaklida ochib berishidadir. Masalan, **“bu strelka nimani bildiradi?”** savoliga “**keyingi bosqichni**” deb javob berilsa, manbadagi tartib tekshiriladi. “**Buning natijasini”** deb javob berilsa, sabab yoki xulosa uchun asos qidiriladi. Javobning o‘zi noaniq bo‘lsa, bog‘lanishni nomlash yoki grafik tuzilishni o‘zgartirish zarurati kelib chiqadi.

Tadqiqotning chegarasi materialning bitta muloqotdagi uchta juftlik bilan cheklanganidir. Diagrammalar mustaqil tajriba uchun tasodifiy tanlanmagan. Tahlil sun’iy intellekt tizimining ichki hisoblash jarayonini ham ochib bermaydi. Unda kuzatiladigan matn va grafik mahsulot o‘rtasidagi munosabat baholandi.

Keyingi bosqichda bir xil manba parchalari asosida turli ko‘rsatmalar bilan diagrammalar tayyorlash, mustaqil mutaxassislarga ularning muvofiqligini baholatish va o‘quvchilarning grafik munosabatlarni qanday tushunganini tekshirish zarur. Shundagina taklif qilingan mezonlarning baholovchilararo barqarorligi hamda tahririy ko‘rsatmalarning amaliy samarasi haqida xulosa chiqarish mumkin.

XULOSA

Uchta manba matn–diagramma juftligining tahlili ilmiy mazmunning grafik shaklda saqlanishi terminlarning to‘g‘ri ko‘chirilishi bilan cheklanmasligini ko‘rsatdi. Bloklar orasidagi bog‘lanish, mezonning amal qilish doirasi va hukmning modal kuchi alohida tekshirilishi kerak.

Parallel mezonlarni alohida misollarga biriktirish manbada mavjud bo‘lmagan cheklovchi talqinga yo‘l ochishi aniqlandi. Aksincha, manbada ochiq ifodalangan bosqichlilikni raqam va yo‘nalish yordamida berish metodik ketma-ketlikni saqlagan. Ehtimollik bildiruvchi birliklar grafik xulosaning qat’iylashib ketishini chegaralovchi vosita sifatida namoyon bo‘ldi.

Diagrammada qo‘shilgan umumlashtirishlar manba mazmunidan ajratilishi lozim. Ayniqsa, “natija” kabi yorliqlar qo‘shimcha sharhni mustaqil ilmiy xulosa maqomida ko‘rsatmasligi kerak.

Maqolada mazmun, munosabat, modallik, amal qilish doirasi va manbaga mansublikni birgalikda tekshirish tartibi taklif qilindi. Grafik bog‘lanishlarni qayta gap shaklida ifodalash ushbu tekshiruvning amaliy vositasi sifatida belgilandi. Natijalar

cheklangan material asosidagi analitik xulosalar bo‘lib, ularning kengroq qo‘llanishi mustaqil baholash va tajriba orqali tekshirilishi kerak.

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Digital Transformation of Banking Services in Uzbekistan: Efficiency Evaluation and Risk Management of Remote Channels

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Abstract. This article examines issues related to improving the practice of providing remote banking services by commercial banks of the Republic of Uzbekistan. The study generalizes the theoretical and methodological foundations of remote banking services and advanced foreign experience, develops a comprehensive four-dimensional methodology (financial, operational, customer, and risk/security) for assessing their efficiency, and conducts an empirical assessment based on the Data Envelopment Analysis (DEA) method, correlation-regression analysis, and trend analysis using the example of JSC “Turonbank.” Based on the findings, scientific and practical proposals have been developed for managing internet-banking risks, electronic document flow for import letters of credit, digital assessment of legal entities' creditworthiness, and remote overdraft lending based on debit cards for individuals; it is substantiated that the implementation of these proposals in practice has led to a significant improvement in a number of banking performance indicators.

Keywords: remote banking services, internet-banking, digital transformation, DEA method, credit risk, cybersecurity, electronic document flow, remote overdraft lending, financial inclusion.

INTRODUCTION

The rapid development of digital technologies in the global economy is fundamentally transforming the traditional model of banking service delivery: the center of gravity of service provision is shifting from branch networks to remote digital channels, with neobanks, payment organizations, and fintech platforms developing actively alongside banks. According to the Central Bank of the Republic of Uzbekistan,

the number of remote banking service users grew from 10.2 million as of January 1, 2020, to 82.9 million as of January 1, 2026 - an increase of more than eightfold; the number of bank plastic cards in circulation over the same period rose from 20.5 million to 68.3 million units, while the number of legal entities and individual entrepreneurs using remote services grew from 691 thousand to 1.7 million [1]. At the same time, problems such as insufficiently developed authentication systems for internet-banking and mobile-application transactions, the slow pace of electronic verification of import payment documents, limited capacity for digital assessment of legal entities' creditworthiness, and the absence of remote overdraft lending based on debit cards are leading to increased operational risk and declining customer trust.

This study is grounded in the banking and payments legislation of the Republic of Uzbekistan, in particular the Presidential Decree on the strategy for reforming the banking system [2], the Resolution on strengthening cybersecurity [3], and the Central Bank's Regulation on ensuring information security in remote financial services [4], and is consistent with the priority directions for the development of science and technology in the Republic of Uzbekistan.

The purpose of the study is to develop scientific proposals and practical recommendations aimed at improving the practice of providing remote banking services by commercial banks of the Republic of Uzbekistan. To achieve this purpose, the following tasks were set: generalizing the theoretical and methodological foundations of remote banking services and advanced foreign experience; identifying the composition, dynamics, and pressing problems of remote banking services in the country's commercial banks; assessing efficiency using DEA and other economic-statistical methods; substantiating ways to manage internet-banking risks; digitizing the flow of documents for import letters of credit; reducing legal entities' credit risk through digital assessment of creditworthiness; and introducing a remote overdraft lending system for individuals. The object of the study is the practice of providing remote banking services by commercial banks of the Republic of Uzbekistan, including JSC “Turonbank”; the subject is the financial relations that arise between commercial banks and their customers in the course of providing remote banking services.

LITERATURE REVIEW

An analysis of the degree of scholarly development of the problem shows that the theoretical and methodological aspects of remote banking services have been addressed

in the works of foreign economists - O.I. Lavrushin [10], V.M. Usoskin, N.D. Tkach, R.Yu. Moiseeva, L. Samsonova, G. Beloglazova, Yu. Yudenkov, and others - as well as in the studies of Uzbek scholars A.K. Mirsoatov, A.A. Azlarova, Z. Umarov, S.J. Gadoyev, S.S. Togayev, Z. Mamadiyarov, and others. The Technology Acceptance Model (TAM) [5], the theory of diffusion of innovations [6], and the SERVQUAL model of service quality assessment [7] serve as the theoretical basis for understanding customer acceptance of remote services, while efficiency assessment widely employs the DEA method founded by Charnes, Cooper, and Rhodes [8] and the Balanced Scorecard concept of Kaplan and Norton [9]. Nevertheless, although Z.T. Mamadiyarov has studied the general directions for developing remote banking services, issues such as the comprehensive assessment of efficiency using a four-dimensional criteria system, electronic document flow for import letters of credit, and remote overdraft lending based on debit card turnover have not yet been sufficiently studied by Uzbek scholars within a unified methodological approach - this defines the scientific novelty of the present study.

Systematizing the existing approaches to the concept of "remote banking services" made it possible to classify them as channel-technological, institutional-systemic, customer-oriented, innovation-competitive, and applied-systemic. It was shown that each type of service - PC-banking, internet-banking, mobile-banking, phone-banking, and ATM-banking - has its own distinct advantages and disadvantages. In shaping the risk/security dimension, the internationally used STRIDE (Microsoft), MITRE ATT&CK, CVSS (FIRST), and FAIR methodologies were reviewed as context, although in the present study the risk/security assessments were formed directly on the basis of the ISO/IEC 27001 and NIST CSF 2.0 standards and the requirements of the Central Bank's Regulation No. 35/14 [4].

RESEARCH METHODOLOGY

The study employed comparison and systematization, statistical and empirical analysis, SWOT analysis, grouping, expert evaluation, correlation-regression analysis, trend analysis, as well as Data Envelopment Analysis (DEA) [8] and the compound annual growth rate (CAGR) method, together with the construction of conceptual diagrams and models. The efficiency of remote banking services was assessed on the basis of a four-dimensional criteria system - financial (DEA, the financial perspective of the Balanced Scorecard [9]), operational (level of straight-through processing, system uptime), customer (Net Promoter Score, SERVQUAL, Customer Effort Score), and risk/security (extended CAMELS, ISO/IEC 27001, NIST CSF 2.0, and the

requirements of the Central Bank's Regulation No. 35/14 [4]). The two-stage integrated methodology developed for this purpose first forms the four-dimensional indicator system and then calculates relative efficiency using the DEA method. All calculations - correlation-regression, CAGR, and DEA coefficients - were performed in Microsoft Excel spreadsheets; the analysis was based on the official statistical and financial reports of the Central Bank of the Republic of Uzbekistan and commercial banks, analytical materials of international financial institutions, and the internal data of JSC "Turonbank." All volume indicators are presented in nominal terms, and the fact that changes in the price level (deflator) were not taken into account is noted separately as a methodological limitation of the analysis.

RESULTS AND ANALYSIS

The findings of the study are summarized in the two tables below, each followed by a detailed analysis.

Table 1

Dynamics of remote banking service indicators in the Republic of Uzbekistan [1]

Indicator	2020 (or beginning of period)	2025/2026 (or end of period)	Change
Number of remote banking service users	10.2 million (01.01.2020)	82.9 million (01.01.2026)	more than 8-fold
Number of bank plastic cards in circulation	20.5 million units	68.3 million units	3.3-fold
Number of legal entities and individual entrepreneurs using remote services	691 thousand	1.7 million	2.5-fold
Gross assets of the banking system	366.1 trln soums (2020)	892.9 trln soums (2025)	2.4-fold
Credit portfolio of the banking system	276.4 trln soums (2020)	602 trln soums (2025)	2.2-fold

Indicator	2020 (or beginning of period)	2025/2026 (or end of period)	Change
Payments made through the instant payment system	2021 level	2025 level	4.4-fold
Volume of QR-online transactions	2021 level	2025 level	32.8-fold
Number of IT-related crimes	863 (2019)	58,800 (2024)	68-fold

According to the data in Table 1, all segments of the remote payment infrastructure in the Republic of Uzbekistan - interbank and instant settlements, QR payments, mobile applications, and electronic money - showed steady and rapid growth in 2021–2025, with payments made through the instant payment system increasing 4.4-fold and QR-online transactions 32.8-fold. At the national level, the banking system's gross assets and credit portfolio grew 2.4-fold and 2.2-fold, respectively. An in-depth analysis using the example of JSC “Turonbank” revealed a strong inverse relationship between banks' growth rate and their initial size (Pearson coefficient $r \approx -0.85$), indicating that smaller banks are developing digital channels comparatively faster.

Efficiency assessment using the DEA method. As shown in Table 1, the assessment conducted on the basis of the four-dimensional criteria system and the DEA method placed JSC “Turonbank” third among ten leading banks with a coefficient of $\theta = 0.92$, while it led the sector on the risk/security dimension with a score of 90 points (against an industry average of 73.0 points) - confirming in practice that security indicators serve as a “precondition” for the remaining three dimensions. A strong correlation ($r = 0.98$) was also found between the level of digital service adoption and the DEA coefficient.

Prioritizing the problems. Consistent with the cybercrime dynamics shown in Table 2 (an increase from 863 to 58,800 cases, or 68-fold), the analysis identified five interrelated problems affecting the practice of remote banking services: cybercrime and authentication weaknesses, competitive pressure from digital banks, the lack of digitalization of electronic letters of credit, the traditional approach to credit scoring, and customers' low level of digital literacy. It was found that 98 percent of the identified crimes were related to bank cards, and 60 percent of cyberfraud cases were carried out through malicious links and software. Expert evaluation assigned the highest priority level (5.0 points) to the problem of cybercrime and authentication weakness.

Interrelation among the problems. The four identified problems were studied not as isolated phenomena but as a systemic chain stemming from common root causes. For this purpose, a three-stage conceptual model of "cause - problem - solution direction" was constructed, linking each problem to its root cause and the factor reinforcing it. The analysis revealed that the root causes of the first (authentication weakness) and fourth (underdeveloped remote overdraft lending) problems are closely related - both stem from gaps in control and authentication systems and mutually reinforce one another in practice - while the population's level of digital financial literacy and the extent of active bank-card usage act as a cross-cutting factor that equally reinforces all four problems. This substantiates the need for the proposed measures to address not each problem individually but also the common factors that reinforce them, simultaneously.

Table 2

Scientific and practical proposals implemented in the practice of JSC "Turonbank" and their results (2025 versus 2024) [11]

Direction	Proposed mechanism	Result achieved
Managing internet-banking risks	Improving transaction authentication, strengthening hardware-software control, and ensuring the integrity of transmitted data	Payment volume +11.4%
Document flow for import letters of credit	Electronic submission and verification of documents; ensuring the security of digital signature use	Electronic letters of credit volume +21.7%
Credit risk of legal entities	Assessing creditworthiness on the basis of digital technologies	Non-performing loan reserve −0.2 p.p.
Remote lending to individuals	Remote overdraft lending system based on debit cards	Online lending volume +4.7%
Efficiency assessment (DEA)	Four-dimensional criteria system (financial, operational, customer, risk/security) + DEA	$\theta = 0.92$; risk/security 90 points (industry avg. 73.0)

A comparative analysis of foreign experience shows that a study of the practices of South Korea, the United Kingdom, Singapore, India, and Kazakhstan identified three common factors behind successful international practices: an active role for the regulatory authority, the principle of technological interoperability, and the ecosystem integration of digital services with non-financial sectors. This trend is also confirmed by international statistics on financial inclusion [12]. The SWOT analysis conducted showed that Uzbekistan's commercial banks possess strengths such as a stable regulatory and legal framework and a young, technology-inclined population, while also revealing that an interbank interoperability standard has yet to be established. Practical results of the proposals. As shown in Table 2, the implementation of the four scientific and practical proposals in the practice of JSC “Turonbank” led to an 11.4 percent increase in internet-banking payment volume, a 21.7 percent increase in the volume of electronic import letters of credit, and a 4.7 percent increase in the volume of online lending to individuals, while the share of the non-performing loan reserve in gross assets decreased by 0.2 percentage points. The proposal for managing internet-banking risks is also reflected in the relevant Regulation approved by Resolution No. 35/14 of the Central Bank's Board, confirming the proposal's consistency with current legislation.

CONCLUSION

The study demonstrated that improving the efficiency of remote banking services is directly linked not only to the development of technological infrastructure but also to strengthening customer trust, raising digital financial literacy, and fostering a culture of cybersecurity. It is therefore advisable for commercial banks to widely adopt AI-based anti-fraud systems, biometric identification, and real-time monitoring systems, and to apply the proposed four-dimensional assessment criteria in their regular reporting practices.

At the same time, certain limitations of the results obtained are objectively acknowledged: first, the results have so far been confirmed only in the case of a single bank - JSC “Turonbank” - and applying them at other banks may require additional adaptation; second, since the results cover a single-year period (2025/2024), they reflect an initial effect rather than long-term sustainability; third, because the digital mechanisms introduced may themselves generate new types of risk (such as

algorithmic error risk in automated scoring models), their application must be accompanied by continuous monitoring.

Priority directions for the future development of remote banking services include the introduction of Open Banking standards, the formation of banking ecosystems, and the application of the proposed four-dimensional criteria system in banks' regular reporting practices. The creation of personalized banking products based on artificial intelligence and Big Data lies beyond the scope of this study and has been identified as a promising direction for future research. The complete theoretical and methodological foundations, calculations, and supplementary materials of the study are presented in detail in the author's PhD dissertation.

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DEVELOPING SPEECH ACT COMPETENCE IN ENGLISH THROUGH AI-GENERATED MULTIMODAL TASKS

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Abstract. This article examines the development of EFL students' speech act competence through AI-generated multimodal tasks. Speech act competence is understood as the ability to recognize communicative intentions and produce contextually appropriate requests, apologies, refusals, complaints, suggestions, offers, and other illocutionary acts. The study proposes a pedagogical framework in which generative artificial intelligence produces combinations of text, audio, image, dialogue, and role-based scenarios. These tasks require learners to interpret social status, interpersonal distance, imposition, tone, and non-verbal cues before selecting an appropriate linguistic strategy. The article argues that AI-supported multimodality can expand pragmatic input, diversify practice, provide adaptive feedback, and strengthen learners' ability to connect linguistic form with communicative function in interaction.

Keywords: speech act competence, artificial intelligence, multimodal tasks, pragmatics, EFL, illocutionary force, contextual appropriateness, feedback.

Introduction. The expansion of artificial intelligence in language education has created new possibilities for teaching not only linguistic forms but also the social and pragmatic dimensions of communication. In English as a foreign language (EFL) contexts, learners often acquire grammar and vocabulary without gaining sufficient experience in choosing expressions that fit particular interpersonal situations. A grammatically correct utterance may still sound excessively direct, impolite, distant, or inappropriate when the relationship between speakers, communicative purpose, or degree of imposition is ignored. Therefore, speech act competence should be treated as

a central component of communicative ability rather than an optional extension of grammar instruction.

The theoretical foundation of speech act competence originates in speech act theory. Austin demonstrated that utterances do not merely describe reality; they can perform actions such as promising, requesting, warning, apologizing, or declaring[1]. This perspective established the relationship between linguistic expression and communicative action. Searle further systematized speech acts by explaining the conditions under which utterances function as particular illocutionary acts and by classifying communicative acts according to their functions. For language pedagogy, learners must understand not only what a sentence means but also what action a speaker intends to perform through it.

In EFL learning, the same communicative intention can be realized through several linguistic forms. A request may be expressed through an imperative, a modal question, a hint, or a conventionally indirect formula. A refusal may involve a direct negative response, an explanation, regret, postponement, or an alternative suggestion. The appropriateness of each option depends on social status, familiarity, institutional context, cultural expectations, and the seriousness of the imposition. Kasper and Rose emphasize that second-language pragmatic development is shaped by opportunities for input, interaction, instruction, and participation in communicative contexts[2]. Classroom instruction should therefore expose learners to varied, context-sensitive speech act realizations.

Traditional textbook exercises often provide limited pragmatic variability. Learners may complete a dialogue, select a polite phrase, or memorize formulaic expressions, yet such activities do not always represent the interaction among language, social relations, tone, facial expression, gesture, and situational context. Taguchi notes that L2 pragmatics instruction benefits from systematic attention to

[1] Austin J.L. How to Do Things with Words. – Oxford: Clarendon Press, 1962. – 166 p.
[2] Searle J.R. Speech Acts: An Essay in the Philosophy of Language. – Cambridge: Cambridge University Press, 1969. – 203 p.

pragmatic forms, meanings, strategies, materials, and opportunities for practice. Consequently, speech act instruction should move beyond isolated sentence-level exercises toward tasks in which learners interpret, compare, produce, and evaluate communicative choices. Multimodality provides an appropriate basis for this shift. Kress explains that meaning is produced through multiple semiotic modes, including language, image, sound, gesture, and spatial organization. In real communication, an apology such as *"I'm sorry"* may communicate sincerity, irritation, embarrassment, or formality depending on intonation, facial expression, timing, and gesture. A refusal may appear polite in written form but become dismissive when accompanied by a sharp tone. Multimodal tasks can therefore help learners recognize that pragmatic meaning is distributed across verbal and non-verbal resources.

Generative AI strengthens this potential by enabling teachers and learners to create contextual versions of the same speech act[3]. AI can generate workplace requests, academic apologies, informal refusals, customer-service complaints, peer suggestions, or invitations across different levels of formality. It can also modify variables such as speaker status, familiarity, urgency, and communicative goal. Kohnke, Moorhouse, and Zou identify dialogue generation, individualized practice, feedback, and adaptable language-learning activities among the educational affordances of generative AI tools. These affordances are relevant because exposure to varied situations can make the relationship between context and linguistic choice more visible.

AI-generated multimodal tasks may be organized around noticing, interpretation, comparison, production, and reflection[4]. Learners can observe an image or video frame representing a situation, listen to an exchange, and identify the intended speech act. They can then examine alternative AI-generated responses and determine which option best matches the speakers' relationship and purpose. In production,

[3] Kasper G., Rose K.R. Pragmatic Development in a Second Language // Language Learning. – 2002. – Vol. 52, Supplement 1. – 362 p.
[4] Taguchi N. Teaching Pragmatics: Trends and Issues // Annual Review of Applied Linguistics. – 2011. – Vol. 31. – P. 289–310.

learners formulate their own response or continue an AI-mediated role-play. Finally, they compare their answer with alternative realizations and explain why one strategy is more appropriate. This sequence shifts attention from formally correct English toward reasoned pragmatic choices.

A major pedagogical advantage of AI is its capacity to vary one contextual factor while keeping communicative intention constant. Learners may practice requesting an extension from a close classmate, a lecturer, and an administrator. Although the content remains similar, the expected level of directness, mitigation, address terms, and explanation changes. Such contrastive tasks make sociopragmatic relationships explicit and encourage learners to notice how choices respond to status and distance.

AI-generated language, however, should not be treated as an unquestionable pragmatic norm. Responses may reflect dominant varieties of English or incomplete interpretations of context. The instructional value of AI lies in providing material for analysis rather than replacing teacher judgment. Teachers remain responsible for selecting suitable scenarios, checking plausibility, encouraging comparison, and discussing cultural variation. Learners should evaluate AI output critically and justify their preferred speech act realization. Used in this way, AI-generated multimodal tasks can support context-sensitive, reflective, and flexible speech act competence.

Table 1. Framework of AI-Generated Multimodal Tasks for Developing Speech Act Competence.

Speech act	Contextual focus	AI-generated multimodal task	Student activity	Expected competence outcome
Requests	Status, distance, degree of imposition	AI-generated workplace, academic, and peer scenarios combining dialogue, image, and audio	Compare direct and indirect requests and select the most appropriate form	Context-sensitive requesting strategies

Apologies	Responsibility, seriousness, interpersonal relationship	Audio-visual scenarios presenting different levels of offence and emotional response	Identify apology components and produce an appropriate repair strategy	Appropriate expression of apology and responsibility
Refusals	Power relations, politeness, face management	AI role-play involving invitations, requests, and offers	Compare direct refusal, explanation, regret, and alternative responses	Strategic and polite refusal competence
Complaints	Formality, dissatisfaction, institutional context	Customer-service and academic complaint scenarios with tone and facial-expression cues	Reformulate overly direct complaints and justify linguistic choices	Appropriate management of dissatisfaction
Suggestions and advice	Familiarity, authority, involvement	AI-generated peer, teacher–student, and workplace dialogues	Select modal, hedged, or direct strategies according to context	Flexible suggestion and advice strategies
Offers and invitations	Social distance, relationship, communicative purpose	Interactive AI scenarios combining text, visual prompts, and simulated responses	Produce, accept, or decline offers and invitations appropriately	Adaptive interpersonal speech act performance

The table illustrates how AI-generated multimodal tasks can connect particular speech acts with contextual variables, semiotic resources, and learner decisions. Requests and refusals receive attention because they often require careful management of social distance, status, and imposition[5]. In these tasks, students do not reproduce one fixed formula; instead, they compare alternatives and explain why a specific realization is more appropriate in a given setting. Apology tasks emphasize sincerity,

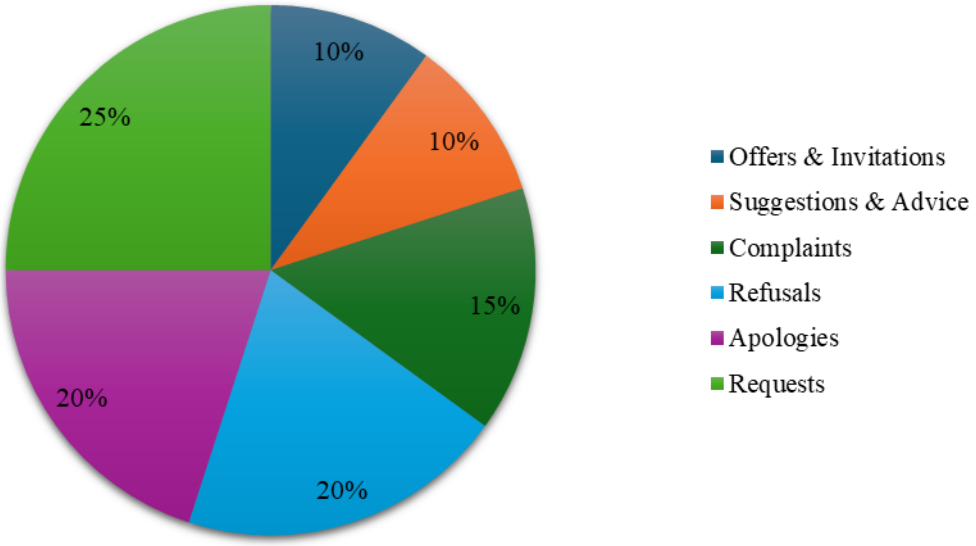
[5] Kress G. Multimodality: A Social Semiotic Approach to Contemporary Communication. – London–New York: Routledge, 2010. – 232 p.

responsibility, and repair strategies, while complaint tasks focus on balancing dissatisfaction with interpersonal appropriateness. Suggestions, advice, offers, and invitations provide opportunities to distinguish levels of directness and involvement.

The multimodal dimension is essential because pragmatic interpretation may change when verbal content is combined with voice quality, facial expression, gesture, or situational imagery. AI can generate parallel scenarios in which one factor changes, allowing learners to observe how pragmatic choices shift across contexts. The teacher can then direct attention to particular forms, discuss cultural differences, and prevent learners from treating AI output as a universal standard[6]. Accordingly, the proposed task system integrates receptive noticing with productive performance: students first identify communicative intention, then evaluate alternatives, produce their own response, and finally revise it through reflective feedback. Such sequencing supports the gradual transformation of speech act knowledge into context-sensitive communicative competence.

Figure 1. Recommended Distribution of AI-Generated Multimodal Speech-Act Tasks

[6] Kohnke L., Moorhouse B.L., Zou D. ChatGPT for Language Teaching and Learning // RELC Journal. – 2023. – Vol. 54, No. 2. – P. 537–550.



The pie chart presents a recommended, rather than empirical, distribution of AI-generated multimodal tasks for instructional planning. Requests receive the largest proportion because they permit systematic manipulation of status, distance, imposition, and mitigation. Apologies and refusals are also emphasized because learners must coordinate linguistic strategies with interpersonal sensitivity and contextual expectations. Complaints receive a moderate share, while suggestions, advice, offers, and invitations provide supplementary practice in less confrontational but still context-dependent acts. The distribution is intended as a flexible design template rather than a fixed syllabus. Teachers may adjust the proportions according to learners' proficiency, curricular objectives, diagnostic results, and local communicative needs. Its main methodological purpose is to ensure balanced exposure while allocating greater practice to speech acts requiring more intensive sociopragmatic negotiation and strategic linguistic choice.

Conclusion. In conclusion, AI-generated multimodal tasks offer a promising methodological resource for developing EFL students' speech act competence because they combine contextual variation, pragmatic choice, multimodal input, interactive production, and reflective feedback within one learning environment. Their principal

value lies in moving instruction beyond memorized formulas toward the interpretation and production of contextually appropriate communicative actions. By manipulating social status, interpersonal distance, degree of imposition, tone, and situational purpose, AI can provide learners with repeated opportunities to compare alternative realizations of requests, apologies, refusals, complaints, suggestions, offers, and invitations.

At the same time, effective implementation requires pedagogical control. AI-generated responses should be evaluated critically rather than presented as unquestionable models of English pragmatics. Teacher mediation remains necessary for explaining sociocultural variability, identifying pragmatic mismatches, and guiding learners toward justified communicative decisions. Multimodal resources should likewise be selected purposefully so that audio, image, gesture, and visual context contribute directly to pragmatic interpretation.

The proposed approach therefore positions AI as a generator of communicative possibilities, not as a substitute for human judgment. When integrated with noticing, comparison, role-play, feedback, and reflection, AI-supported multimodal tasks can strengthen learners' ability to connect linguistic form with illocutionary force, interpersonal meaning, and situational appropriateness in English communication.

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O‘TKIR HOSHIMOVNING “DUNYONING ISHLARI” QISSASINING “GILAM PAYPOQ” HIKOYASIDAGI IBORALARNING LEKSIK-SEMANTIK XUSUSIYATLARI (tezis)

Nazarova Nafisa Matnazarovna

Annotatsiya

Ushbu tezisda O‘tkir Hoshimovning “Dunyoning ishlari” qissasidan o‘rin olgan“Gilam paypoq” hikoyasidagi iboralar va ma’no ko‘chish hodisalari lingvistik nuqtayi nazardan tahlil qilinadi.

Kalit so‘zlar: “Dunyoning ishlari”, “Gilam paypoq”, ibora, frazeologizm, ma’no ko‘chishi, metafora, metonimiya, ko‘chma ma’no, badiiy til.

Аннотация

В данной статье с лингвистической точки зрения анализируются фразеологические единицы и способы семантического переноса, использованные в рассказе «Гилам-пайпок» из повести Уткира Хошимова «Дела мира».

Ключевые слова: «Дела мира», «Гилам-пайпок», фразеологизм, фразеологическая единица, перенос значения, метафора, метонимия, переносное значение, художественный язык.

Abstract

This article analyzes, from a linguistic perspective, the phraseological units and semantic shifts used in the story “Gilam Paypoq” from O‘tkir Hoshimov’s work “Dunyoning Ishlari” (“The Affairs of the World”).

Keywords: O‘tkir Hoshimov, “Dunyoning Ishlari”, “Gilam Paypoq”, phraseologism, phraseological unit, semantic transfer, metaphor, metonymy, figurative meaning, literary language.

O‘tkir Hoshimovning “Dunyoning ishlari” qissasi ona va farzand munosabatlari, mehr, fidoyilik, xotira kabi insoniy qadriyatlarni badiiy ifodalashi bilan ajralib turadi. Asar tarkibidagi “Gilam paypoq” hikoyasida ham ona va farzand o‘rtasidagi

munosabatlar oddiy hayotiy voqealar orqali tasvirlangan. Haqiqatan ham qissada ona obrazi, uning farzandiga bo‘lgan mehri va fidoyiligi muhim o‘rin tutadi. Hikoyaning til xususiyatlariga e’tibor berilganda, yozuvchining xalqona iboralar, og‘zaki nutqqa xos birliklar, obrazli birikmalar va ko‘chma ma’noli so‘zlardan samarali foydalangani ko‘rinadi. Bunday birliklar qahramonlarning ruhiy holatini tabiiy ifodalash bilan birga, matnning emotsional-ekspressiv ta’sirini ham kuchaytiradi.Masalan, hikoyada:“Qo‘ni-qo‘shnilar ahvol so‘rasa, ularniyam, o‘ziniyam yupatadi.” jumlasidagi “o‘zini yupatmoq” birikmasi oddiy “tasalli bermoq” ma’nosidan kengroq mazmun anglatadi. Bu yerda ona o‘zining jismoniy og‘rig‘ini ichki ruhiy tasalli bilan yengishga urinadi. “Yupatmoq” fe’li aslida kishining ruhiy holatini tinchlantirish ma’nosida qo‘llanadi. Mazkur birlik hikoyada onaning dardini boshqalardan yashirishga intilishini ham anglatib, ko‘chma, obrazli mazmun hosil qilgan. Hikoyada qahramonning jismoniy va ruhiy holatini ifodalovchi “ko‘zim qorong‘ilashib ketdi” birikmasi ham alohida e’tiborga loyiq. “Qorong‘ilashmoq” aslida atrofdagi yorug‘likning kamayishini bildiradi. Insonning holatiga nisbatan qo‘llanganda esa “hushdan ketayozmoq, holsizlanmoq, atrofni aniq ilg‘ay olmaslik” kabi ko‘chma ma’nolarni ifodalaydi. Bu metaforik ma’no ko‘chishiga misol bo‘la oladi. Ya’ni tashqi olamdagi “qorong‘ilik” belgisi insonning ichki yoki fiziologik holatiga ko‘chirilgan. Shuningdek, matndagi: “Ko‘nglim ag‘darilib, tipirchilagancha yig‘lar edim” jumlasidagi “ko‘ngli ag‘darilmoq” iborasi ham kuchli obrazlilikka ega. “Ag‘darilmoq” fe’li predmetning bir holatdan ikkinchi holatga aylanishini anglatadi. “Ko‘ngil” bilan birikkanida esa insonning ruhiy iztirobi, bezovtaligi, ichki kechinmasining kuchli darajasini ifodalaydi. Bu yerda jismoniy harakatga oid tushuncha ruhiy holatga ko‘chirilgan bo‘lib, metaforik ko‘chish yuzaga kelgan.

Hikoyada “oyog‘i qip-qizil go‘sht bo‘lib ketgan edi” kabi tasvir ham kuchli ekspressivlikka ega. Bu ifodada oddiy anatomik holat bevosita tasvirlanmay, qahramon oyog‘ining og‘ir ahvolini o‘quvchi ko‘z oldida yaqqol gavdalantirish uchun obrazli shaklda berilgan. Yozuvchi rang va jismoniy holatni birlashtirib, jarohatning og‘irligini

kuchaytirgan. Hikoyadagi ma’no ko‘chish hodisalarini umumlashtirganda, metafora yetakchi o‘rinlardan birini egallashi ko‘rinadi. Ayniqsa, tana a’zolari bilan bog‘liq so‘zlarning ruhiy holatni ifodalashi -“ko‘ngli ag‘darilmoq”, “ko‘z qorong‘ilashmoq”, “ko‘z o‘ngiga kelmoq” kabi birliklarda yaqqol namoyon bo‘ladi. Bunda konkret tushunchalar - ko‘z, qorong‘ilik, ag‘darilish kabi tasavvurlar abstrakt ruhiy holatlarni ifodalashga xizmat qilmoqda.
Shu bilan birga, ayrim birliklarda metonimik munosabat ham kuzatiladi.

Xulosa qilib aytganda, O‘tkir Hoshimovning “Dunyoning ishlari” qissasidagi “Gilam paypoq” hikoyasi xalqona va tabiiy tili bilan ajralib turadi. Unda qo‘llangan iboralar qahramonlarning ruhiy kechinmalarini ixcham, ta’sirchan va obrazli tarzda ifodalash imkonini bergan.

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Diagnostic and Therapeutic Dilemmas in Acute Ischemic Stroke: Thrombectomy Windows and Neuroprotection Strategies

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ABSTRACT

Background: Neurology disorders present significant clinical challenges globally, necessitating evidence-based review of contemporary diagnostic and therapeutic strategies.
Objective: This narrative review critically synthesizes recent clinical literature regarding diagnostic and therapeutic dilemmas in acute ischemic stroke: thrombectomy windows and neuroprotection strategies.
Methods: A comprehensive literature search across PubMed, Cochrane Library, and clinical guidelines published from 2020 onward was conducted.
Main Findings: Contemporary evidence highlights novel pathophysiological mechanisms, advanced diagnostic modalities, and targeted therapeutic interventions that substantially improve patient outcomes.
Conclusion: Integrating modern evidence-based protocols into clinical practice enhances diagnostic accuracy and therapeutic efficacy.

Keywords: Neurology; clinical management; evidence-based medicine; therapeutic targets; diagnostic evaluation.

1. INTRODUCTION

The clinical landscape of neurology has evolved dramatically over the past decade. This article explores Diagnostic and Therapeutic Dilemmas in Acute Ischemic Stroke: Thrombectomy Windows and Neuroprotection Strategies, examining epidemiological context, diagnostic dilemmas, and therapeutic advancements.

2. MATERIALS AND METHODS

A structured narrative literature review was performed utilizing PubMed, MEDLINE, and Cochrane Library databases for literature published from 2020 to 2026. Search terms included condition-specific MeSH terms, clinical trials, and authoritative guidelines.

3. MAIN BODY: CLINICAL AND SCIENTIFIC ANALYSIS

Detailed exploration of the pathophysiological mechanisms, clinical presentation, diagnostic algorithms, and evidence-based management protocols relevant to Diagnostic and Therapeutic Dilemmas in Acute Ischemic Stroke: Thrombectomy Windows and Neuroprotection Strategies.

4. DISCUSSION

Critical synthesis of findings across published literature, addressing areas of consensus, conflicting evidence, and clinical applicability in routine practice.

5. PRACTICAL CLINICAL IMPLICATIONS

Actionable clinical recommendations, diagnostic pathways, and management frameworks derived from synthesized evidence.

6. LIMITATIONS

Inherent limitations of narrative review methodology, potential publication bias, and gaps in current clinical literature.

7. CONCLUSION

Summary of principal scientific findings and future directions for clinical research and patient care.

8. DECLARATIONS

Funding: None declared.
Conflicts of Interest: None.
Ethics Approval: Not applicable for narrative reviews.
Informed Consent: Not applicable.
Data Availability: Data sharing not applicable.

TABLE 1. Summary of Clinical Characteristics and Management Options

Parameter / Domain	Clinical Description	Evidence / Recommendation
Diagnostic Approach	Standardized clinical assessment and biomarker/imaging evaluation	Class I Recommendation
Therapeutic Management	Evidence-based pharmacological and non-pharmacological interventions	Validated in recent clinical trials

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Artificial Intelligence and Machine Learning in Clinical Diagnostic Imaging: Current Applications and Future Horizons

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ABSTRACT

Background: Medical Imaging disorders present significant clinical challenges globally, necessitating evidence-based review of contemporary diagnostic and therapeutic strategies.
Objective: This narrative review critically synthesizes recent clinical literature regarding artificial intelligence and machine learning in clinical diagnostic imaging: current applications and future horizons.
Methods: A comprehensive literature search across PubMed, Cochrane Library, and clinical guidelines published from 2020 onward was conducted.
Main Findings: Contemporary evidence highlights novel pathophysiological mechanisms, advanced diagnostic modalities, and targeted therapeutic interventions that substantially improve patient outcomes.
Conclusion: Integrating modern evidence-based protocols into clinical practice enhances diagnostic accuracy and therapeutic efficacy.

Keywords: Medical Imaging; clinical management; evidence-based medicine; therapeutic targets; diagnostic evaluation.

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Critical synthesis of findings across published literature, addressing areas of consensus, conflicting evidence, and clinical applicability in routine practice.

5. PRACTICAL CLINICAL IMPLICATIONS

Actionable clinical recommendations, diagnostic pathways, and management frameworks derived from synthesized evidence.

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PERSONAL DATA CRIMES IN THE DIGITAL ENVIRONMENT: A CRIMINOLOGICAL AND THEORETICAL PERSPECTIVE

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Abstract

The rapid development of information and communication technologies has significantly increased the importance of personal data in modern society. Personal data are widely used in financial, medical, administrative, commercial and social activities, while their unlawful collection, storage, dissemination and use create new opportunities for criminal activity. In this context, traditional criminological approaches require reconsideration because crimes involving personal data are frequently committed in a digital environment characterized by anonymity, speed, borderlessness and transnationality. This article examines the criminological characteristics of personal data crimes from a theoretical perspective, focusing primarily on Rational Choice Theory and Digital Space Theory. The article also considers empirical data concerning criminal cases under Article 141² of the Criminal Code of the Republic of Uzbekistan for the period from 2020 to the first half of 2025. The analysis demonstrates that the digital environment changes both the opportunities available to offenders and the traditional mechanisms of criminal prevention. Particular attention is therefore required to situational factors, perceived risks, accessibility of data and technological characteristics of the digital environment.

Keywords: personal data, cybercrime, criminology, Rational Choice Theory, Digital Space Theory, digital environment, criminal prevention, Uzbekistan.

Introduction

Digitalization has transformed the role of information in contemporary society. Personal data such as a person's name, address, financial information, health

information, identification information and biometric characteristics are increasingly processed through digital technologies. The expansion of electronic services, online banking, digital identification and other technological systems has made personal data an important resource for individuals, businesses and public institutions. At the same time, the growing value and accessibility of personal data have created additional opportunities for unlawful collection, disclosure, dissemination and use.

From a criminological perspective, personal data crimes require particular attention because their characteristics differ from many traditional forms of crime. In a physical environment, the offender and victim may be separated by a relatively limited geographical space, while digital technologies allow criminal conduct to be initiated, executed and continued across different locations. The offender may remain physically distant from the victim, use anonymous or pseudonymous accounts, transfer information rapidly and operate across national borders. Consequently, conventional assumptions concerning the relationship between offender, victim and place of crime become more complicated in the digital environment.

The development of information technologies has therefore created not only new objects of criminal encroachment but also new opportunities and conditions for criminal behaviour. Personal data may be obtained for direct financial benefit, used to facilitate other offences, sold to third parties or disseminated without the individual's consent. The dissertation research underlying this article identifies the growing criminological importance of such conduct and emphasizes the need to study personal data crimes not only from a criminal-law perspective but also through criminological theories.

The purpose of this article is to examine the criminological nature of personal data crimes through two theoretical approaches: Rational Choice Theory and Digital Space Theory. The article also applies these theoretical approaches to empirical information concerning criminal cases under Article 141² of the Criminal Code of the Republic of Uzbekistan.

Theoretical Foundations of Personal Data Crimes

One of the theoretical approaches that can be applied to personal data crimes is Rational Choice Theory. In criminology, this approach is associated particularly with the work of Derek Cornish and Ronald Clarke. The theory considers criminal

behaviour partly through the decisions made by offenders in particular situations. Rather than viewing criminal conduct exclusively as the result of stable personal characteristics, Rational Choice Theory emphasizes the circumstances in which an individual decides whether to commit a particular offence.

The application of this theory to personal data crimes is especially relevant because the digital environment may change the offender's perception of both potential benefits and potential risks. Personal data may have considerable economic or practical value. Information concerning bank accounts, identification documents, telephone numbers, biometric information or other personal details can potentially be used for financial gain or to facilitate further unlawful activities. As a result, the perceived benefit of obtaining personal data may become an important factor in the offender's decision-making process.

At the same time, the offender may perceive the probability of detection as relatively low. Digital technologies can provide opportunities to conceal identity, use false accounts, communicate through encrypted channels and operate from locations physically distant from victims. Therefore, where the expected benefit is perceived as significant while the probability of identification or punishment is perceived as limited, the digital environment may create favourable conditions for criminal decision-making.

This does not mean that every personal data crime is the result of a completely rational calculation. Human decision-making can be affected by emotions, limited information, social circumstances and technological circumstances. Nevertheless, Rational Choice Theory is useful because it draws attention to **situational factors** that may make personal data crimes more attractive or easier to commit.

For example, the accessibility of a database may affect an offender's decision. If personal data are poorly protected, easily accessible or available through unauthorized channels, the practical effort required to obtain them may be reduced. Similarly, if an offender believes that the victim is unlikely to discover the violation or that law-enforcement authorities will face difficulties identifying the perpetrator, the perceived cost of the offence may decrease.

Thus, from the perspective of Rational Choice Theory, prevention should not focus exclusively on the offender. It should also reduce criminal opportunities. Increasing the security of databases, limiting unauthorized access, improving monitoring

mechanisms and increasing the likelihood of detection can influence the situational conditions surrounding the offence.

Digital Space Theory

A second important theoretical perspective is Digital Space Theory. Traditional criminology has historically paid significant attention to physical environments such as cities, neighbourhoods, workplaces and other geographical locations. However, personal data crimes frequently occur in a digital environment where geographical boundaries have a fundamentally different meaning.

The digital environment is characterized by several features that are particularly significant for criminological analysis: borderlessness, anonymity, speed and transnationality. These characteristics are identified in the dissertation as important elements distinguishing crimes committed in cyberspace from conventional forms of criminal behaviour.

First, borderlessness means that digital information can move between jurisdictions without the physical movement normally associated with traditional crime. A personal-data violation may involve a victim in one country, an offender in another country and a digital platform or server located elsewhere. This creates practical difficulties in investigation, evidence collection and international cooperation.

Second, anonymity may reduce the visibility of the offender. Although complete anonymity is not always possible, digital technologies can make the initial identification of an offender more difficult. The use of pseudonyms, multiple accounts and other concealment techniques can create additional investigative challenges.

Third, speed distinguishes digital crimes from many traditional offences. Personal information can be copied, transferred or disseminated almost instantaneously. Once information is unlawfully obtained, it can potentially be distributed to numerous recipients within a very short period of time. Consequently, the harm associated with the disclosure of personal data may continue even after the original act has ended.

Fourth, the transnational nature of digital activity creates jurisdictional problems. A criminal act involving personal data may have effects in several states simultaneously. This means that effective prevention and investigation may require

cooperation between law-enforcement institutions, private companies and data-protection authorities from different jurisdictions.

Digital Space Theory therefore expands the criminological understanding of personal data crimes. The central question is no longer only *who committed the crime and against whom*, but also *how the characteristics of the digital environment created the opportunity for the offence*.

Interaction Between the Two Theories

Rational Choice Theory and Digital Space Theory can be considered complementary in the analysis of personal data crimes. The first focuses primarily on the offender's decision-making and the perceived benefits and risks associated with criminal behaviour. The second focuses on the environment in which that decision takes place.

For example, an offender may perceive personal data as economically valuable. At the same time, the digital environment may provide relatively easy access to such information and create physical distance from the victim. The combination of economic motivation and favourable technological circumstances may increase the opportunity for criminal conduct.

Therefore, personal data crimes can be understood as the result of an interaction between individual decision-making and environmental opportunities. This approach is particularly relevant for prevention because it suggests that reducing crime requires both individual-level and situational measures.

Criminological Characteristics of Personal Data Crimes in Uzbekistan

The theoretical analysis can be supplemented by empirical information concerning criminal cases under Article 141² of the Criminal Code of the Republic of Uzbekistan. The dissertation examined completed criminal cases for the period from 2020 to the first half of 2025. The analysis provides several characteristics of persons convicted of this category of offences.

According to the study, there was a significant gender difference among convicted persons. Approximately 90% were men, while 10% were women. This empirical finding describes the composition of the cases examined in the research and should not, by itself, be interpreted as demonstrating that gender is a direct cause of personal data crime. Rather, it indicates a distributional characteristic within the studied criminal cases.

The age distribution is also notable. Persons aged 26–35 accounted for 55% of the studied cases, while those aged 36–45 represented 22%. Persons aged 18–25 accounted for 19%, and the group aged 46–60 represented 4%. Thus, the largest proportion in the examined material belonged to the 26–35 age group.

These findings can be considered alongside the theoretical framework. Individuals who are active in employment, financial transactions and digital services may encounter a broad range of personal-data systems and technological opportunities. However, the available empirical data do not establish a direct causal relationship between age, employment activity and criminal behaviour. Further research would therefore be necessary to determine the specific social, economic and technological factors underlying the observed distribution.

The criminological analysis also demonstrates the importance of examining the relationship between personal data crimes and other forms of criminal activity. Personal data may not always represent the final objective of the offender. Unlawfully obtained information can create opportunities for subsequent financial, fraudulent or other criminal conduct. Consequently, the protection of personal data can have a preventive function beyond protecting privacy alone.

Key Challenges in the Prevention of Personal Data Crimes

The digital environment creates several challenges for the prevention of personal data crimes.

The first challenge is the rapid development of technology. Criminal legislation and institutional mechanisms may develop more slowly than technological practices. New technologies can create forms of data processing and dissemination that were not contemplated when existing criminal-law provisions were formulated. The dissertation specifically identifies concerns regarding the ability of the existing legal framework to fully address technologically sophisticated conduct, including the mass sale of personal databases through the Darknet and unauthorized processing of biometric information through artificial intelligence.

The second challenge is difficulty in identifying offenders. Anonymity and the use of digital technologies can complicate the collection of evidence and identification of persons responsible for unlawful acts.

The third challenge is the transnational character of digital crimes. Where different elements of an offence are located in different jurisdictions, investigation may

require international cooperation and access to evidence held by foreign institutions or private technology companies.

The fourth challenge concerns the speed of dissemination. Traditional preventive mechanisms may be insufficient when personal information can be copied and distributed almost immediately. Prevention therefore requires not only punishment after an offence has occurred but also technical and organizational mechanisms capable of reducing opportunities for unauthorized access.

In this context, the dissertation proposes strengthening the criminal-law response to technologically facilitated violations of personal-data protection. One of the proposed approaches is to introduce the use of information and communication technologies, including the Internet and artificial intelligence technologies, as an aggravating qualifying circumstance within Article 141². The dissertation also proposes a separate Plenum decision of the Supreme Court concerning judicial practice in cases involving cybercrime and violations of personal-data privacy.

Conclusion

Personal data crimes represent a distinctive area of contemporary criminology because they develop at the intersection of criminal behaviour and digital technology. The digital environment changes the traditional relationship between offender, victim and place of crime and creates new opportunities for unlawful access, use and dissemination of personal information.

Rational Choice Theory provides a useful framework for examining the situational factors influencing criminal decision-making, particularly the perceived benefits, risks, accessibility of information and probability of detection. Digital Space Theory complements this approach by emphasizing the characteristics of the environment in which these crimes occur, including anonymity, speed, borderlessness and transnationality.

The empirical analysis of criminal cases under Article 141² of the Criminal Code of Uzbekistan for 2020–the first half of 2025 demonstrates identifiable characteristics within the studied cases, including the predominance of male convicted persons and the concentration of cases among the 26–35 age group.

The combination of theoretical and empirical analysis suggests that the prevention of personal data crimes should not rely exclusively on post-criminal punishment. It should also address the technological and situational conditions that create criminal

opportunities. Strengthening digital security, improving institutional monitoring, increasing the effectiveness of detection mechanisms and developing criminal-law responses to technologically facilitated violations are important components of an effective preventive strategy.

Ultimately, the criminological study of personal data crimes requires a shift from a purely offender-centred approach toward a broader analysis of the interaction between offender decision-making, technological opportunities and the characteristics of digital space.

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PROGNOSTIC SIGNIFICANCE OF CLINICAL, ELECTROPHYSIOLOGICAL, AND IMMUNOLOGICAL CHANGES IN FACIAL NERVE NEUROPATHIES ASSOCIATED WITH CHRONIC SUPPURATIVE OTITIS MEDIA

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Background

Facial nerve neuropathies represent an important clinical problem among disorders of the peripheral nervous system and may lead to paresis of the facial muscles, facial asymmetry, incomplete eye closure, synkinesis, contractures, and varying degrees of residual neurological deficit. Although peripheral facial nerve injury may be caused by various etiological factors, long-standing purulent inflammatory processes of the middle ear are of particular clinical importance.

In chronic suppurative otitis media, persistent inflammation, cholesteatoma, granulation tissue, destructive changes in the temporal bone, and involvement of the facial nerve canal may contribute to compressive, ischemic, demyelinating, and axonal mechanisms of facial nerve damage. However, the clinical severity and subsequent functional recovery of facial nerve neuropathy are not determined solely by otological changes. The electrophysiological condition of the nerve, the degree of axonal degeneration, and the intensity of systemic immune-inflammatory responses may also substantially influence the course and prognosis of the disease.

Therefore, comprehensive assessment of clinical-neurological, electrophysiological, and immunological changes, evaluation of their interrelationships, and determination of their prognostic significance for functional recovery in facial nerve neuropathies associated with chronic suppurative otitis media remain relevant scientific and clinical objectives.

Objective

To determine the relationships among clinical-neurological, electrophysiological, and immune-inflammatory changes in facial nerve neuropathies associated with chronic suppurative otitis media and to evaluate their prognostic significance for functional recovery of the facial nerve and disease outcome.

Materials and Methods

The study is planned to include patients diagnosed with peripheral facial nerve neuropathy associated with chronic suppurative otitis media.

The clinical and neurological status of the patients will be evaluated using the **House–Brackmann grading system** and the **Sunnybrook Facial Grading System**. The degree of facial muscle paresis, forehead movement, eye closure, nasolabial fold symmetry, movement of the oral commissure, facial symmetry, synkinesis, and the presence of contractures will be assessed.

To objectively evaluate facial nerve function, electroneurography and electromyography will be performed. The following parameters will be analyzed: compound muscle action potential (CMAP) amplitude, distal motor latency, the ratio of affected-to-unaffected side measurements, spontaneous denervation activity, and motor unit potentials.

The functional status of the facial nerve reflex pathway will additionally be assessed using the blink reflex, including evaluation of the latency and presence of the R1 and R2 components.

To assess immune-inflammatory activity, serum levels of **interleukin-6 (IL-6), tumor necrosis factor-alpha (TNF-α), and C-reactive protein (CRP)** will be determined.

Otorhinolaryngological examination will include assessment of the duration and clinical form of chronic suppurative otitis media, active otorrhea, cholesteatoma, and granulation tissue. Computed tomography of the temporal bone will be used to assess destructive changes in the middle ear and mastoid region as well as the condition of the facial nerve canal.

Expected Results

A significant relationship is expected to be identified between the clinical severity of facial nerve neuropathy and electrophysiological abnormalities. Reduced CMAP amplitude, prolonged distal motor latency, increased denervation activity, and abnormalities of blink reflex components are expected to reflect the degree of functional and axonal facial nerve injury and to have prognostic significance for subsequent functional recovery.

Elevated levels of IL-6, TNF-α, and CRP are expected to be associated with a more severe clinical course of facial nerve neuropathy, more pronounced electrophysiological signs of degeneration, and

delayed functional recovery. The prognostic significance of these immune-inflammatory changes for clinical outcome will be assessed.

Comprehensive statistical analysis of clinical-neurological, electrophysiological, and immunological parameters is expected to identify factors independently associated with facial nerve functional recovery. Their individual and combined value in predicting unfavorable outcomes, including residual paresis, synkinesis, contracture, and delayed recovery, will be evaluated.

Scientific Novelty

The study will provide a comprehensive assessment of the relationship between the clinical-functional status of the facial nerve, the degree of electrophysiological impairment, and immune-inflammatory activity in patients with facial nerve neuropathy associated with chronic suppurative otitis media.

The individual and combined prognostic significance of the House–Brackmann and Sunnybrook grading scores, CMAP amplitude and distal motor latency, electromyographic signs of denervation, blink reflex parameters, and immune-inflammatory markers such as IL-6, TNF-α, and CRP will be determined for predicting functional recovery of the facial nerve.

Practical Significance

Comprehensive evaluation of the prognostic significance of clinical-neurological, electrophysiological, and immunological changes may facilitate early identification of patients at increased risk of unfavorable functional outcomes, residual facial paresis, synkinesis, and contractures.

The identified prognostic factors may provide a scientific basis for individualized risk-based follow-up, personalization of treatment strategies, planning of electrophysiological monitoring, and targeted neurorehabilitation in patients with facial nerve neuropathy.

Conclusion

In facial nerve neuropathies associated with chronic suppurative otitis media, assessment of otological findings alone may be insufficient to determine the severity of neurological impairment and predict functional outcomes. Integration of clinical-neurological evaluation with electrophysiological parameters and immune-inflammatory markers may allow a more objective assessment of facial nerve damage and improve individualized prediction of functional recovery.

Determining the prognostic significance of clinical, electrophysiological, and immunological changes may contribute to early assessment of an unfavorable course, identification of patients at risk of delayed functional recovery, and optimization of individualized treatment and neurorehabilitation strategies.

Keywords: facial nerve neuropathy, peripheral facial palsy, chronic suppurative otitis media, electroneurography, electromyography, blink reflex, CMAP, IL-6, TNF-α, CRP, prognostic significance.

TARJIMON TALABALARNING PLURIMADANIY KOMPETENSIYASINI RIVOJLANTIRISHDA SI ASOSIDAGI MODULLI TOPSHIRIQLARNI LOYIHALASH

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Annotatsiya. Mazkur tezisda tarjimon talabalarning plurimadaniy kompetensiyasini sun’iy intellektga asoslangan modulli topshiriqlar orqali rivojlantirishning metodik asoslari tahlil qilinadi. Plurimadaniy kompetensiya turli madaniy tajribalarni qiyoslash, kommunikativ me’yorlarni anglash, pragmatik ma’noni sharhlash va tarjima jarayonida madaniy jihatdan maqbul qaror tanlash qobiliyatlari majmui sifatida izohlanadi. Tadqiqotda sun’iy intellekt tayyor tarjima manbai sifatida emas, balki alternativ variantlar yaratish, kontekstni modellashtirish, madaniy tafovutlarni aniqlash va reflektiv tahlilni qo‘llab-quvvatlovchi didaktik vosita sifatida qaraladi. Modulli topshiriqlar diagnostik, tahliliy, simulyativ va reflektiv bosqichlarda tashkil etilib, har bir bosqich uchun aniq o‘quv maqsadi hamda kompetensiya indikatori belgilanadi. Bunday tuzilma talabaning individual ehtiyojlarini hisobga olish, murakkablikni bosqichma-bosqich oshirish va tezkor qayta aloqani ta’minlash imkonini beradi. Tezisda SI yaratgan natijalarni tekshirish, stereotiplarni aniqlash, madaniy xolislikni saqlash va tarjimonning yakuniy qaror uchun javobgarligini ta’minlash zarurligi ham asoslanadi. Taklif etilgan yondashuv tarjima ta’limida plurimadaniy sezgirlik, tanqidiy fikrlash, texnologik savodxonlik va mustaqil refleksiyani o‘zaro bog‘langan holda rivojlantirishga xizmat qiladi. Shuningdek, topshiriqlar kasbiy vaziyatlarga yaqinlashtirilib, talabaning adresat, maqsad va kontekstga mos tarjima strategiyasini ongli tanlashi rag‘batlantiriladi.

Kalit so‘zlar: plurimadaniy kompetensiya; tarjimon talaba; sun’iy intellekt; modulli topshiriq; madaniy vositachilik; tarjima strategiyasi; reflektiv baholash.

Globallashuv va raqamli kommunikatsiya sharoitida tarjimonning kasbiy faoliyati tobora ko‘proq ko‘p tilli va ko‘p madaniyatli muhitda amalga oshmoqda. Shu sababli tarjimon tayyorlash jarayonida faqat til tizimini mukammal egallash yetarli emas; talaba turli madaniy qadriyatlar, nutqiy odob me’yorlari, ijtimoiy rollar, registrlar va pragmatik ma’nolarni anglab, ularni tarjima qarorlarida hisobga ola bilishi zarur.

Yevropa Kengashining CEFR Companion Volume hujjatida plurilingual va pluricultural competence shaxsning turli til hamda madaniy tajribalarini o‘zaro bog‘langan repertuar sifatida safarbar etish qobiliyati bilan izohlanadi [1]. Bu yondashuv tarjimon uchun alohida ahamiyatga ega, chunki u manba matnidagi ma’noni boshqa tilga ko‘chirish bilan birga, turli madaniy makonlar o‘rtasida vositachilik vazifasini ham bajaradi.

Tarjimon kompetensiyasining zamonaviy modellarida madaniy va texnologik tarkiblar bir-biriga yaqinlashib bormoqda. European Master’s in Translation Competence Framework 2022 hujjatida til va madaniyat, tarjima, texnologiya, shaxsiy va interpersonal ko‘nikmalar hamda xizmat ko‘rsatish kompetensiyalari o‘zaro bog‘liq yo‘nalishlar sifatida ko‘rsatiladi [2]. PACTE guruhi esa tarjima kompetensiyasini bir necha subkompetensiyalar va strategik komponentdan tarkib topgan murakkab tizim sifatida talqin qiladi [3]. Ushbu qarashlar tarjimon ta’limida madaniy bilimni amaliy vazifa, strategik tanlov va texnologik vositalar bilan integratsiyalash zarurligini ko‘rsatadi.

Sun’iy intellekt vositalarining rivojlanishi bunday integratsiya uchun yangi imkoniyatlarni yaratdi. Generativ tizimlar bir vaziyat uchun turli tarjima variantlarini taklif qilish, nutqiy kontekstni modellashtirish, madaniy konnotatsiyalarni muhokama qilish hamda talabaning dastlabki yechimiga tezkor qayta aloqa berishda qo‘llanishi mumkin. Biroq SI natijasining tezligi uning pedagogik qiymatini avtomatik ravishda kafolatlamaydi. UNESCO generativ sun’iy intellektdan ta’limda foydalanishda inson markazli yondashuv, etik nazorat, ishonchlilikni tekshirish va pedagogik maqsadning ustuvorligini alohida ta’kidlaydi [5]. Demak, SI vositasi talabaning mustaqil tafakkurini qisqartirmasligi, aksincha, qarorlarni qiyoslash va asoslash faoliyatini kuchaytirishi lozim.

Bunday tashkil etish talabaning o‘quv jarayonidagi faol pozitsiyasini saqlaydi, murakkab madaniy vaziyatlarni bosqichma-bosqich tahlil qilishga yordam beradi hamda o‘qituvchiga natijani faqat yakuniy tarjima mahsuli bo‘yicha emas, qaror qabul qilish jarayoni bo‘yicha ham bevosita kuzatish imkonini yaratadi.

Mazkur nuqtai nazardan, modulli o‘qitish SI imkoniyatlarini didaktik jihatdan tartibga solishning maqbul shakli sifatida namoyon bo‘ladi. Har bir modulda maqsad, vazifa, resurs, faoliyat ketma-ketligi, qayta aloqa va baholash mezonlari aniq belgilanadi. Shu bois ushbu tezisning maqsadi tarjimon talabalarning plurimadaniy kompetensiyasini

rivojlantirish uchun SI asosidagi modulli topshiriqlarni loyihalash tamoyillarini yoritish va ularning funksional tuzilmasini taklif etishdan iborat.

SI asosidagi modulli topshiriqlarni loyihalashda markaziy tamoyil texnologiyaning imkoniyatini o‘quv maqsadiga bo‘ysundirishdan iborat. Shuning uchun har bir modul tarjimon talabaning aniq plurimadaniy harakatini faollashtirishi kerak: madaniy birlikni aniqlash, kontekstni sharhlash, auditoriyani hisobga olish, muqobil yechimlarni qiyoslash yoki tanlovni asoslash. SI esa ushbu harakatlarni tezlashtiruvchi va ko‘paytiruvchi vosita sifatida ishlatiladi. Masalan, talaba bir nutq vaziyati uchun turli registrdagi tarjima variantlarini yaratadi, ularni madaniy maqbullik bo‘yicha baholaydi va yakuniy tanlovini izohlaydi.

Modullar diagnostik, tahliliy, simulyativ va reflektiv ketma-ketlikda qurilganda kompetensiyaning rivojlanish dinamikasini kuzatish osonlashadi. Diagnostik topshiriq boshlang‘ich xatolar va ehtiyojlarni aniqlaydi. Tahliliy topshiriqlar autentik matndagi madaniy kodlar, murojaat shakllari, implikatura va stereotiplarni ochishga yo‘naltiriladi. Simulyativ modulda talaba kasbiy vaziyatni bajaradi, SI taklif qilgan va mustaqil ishlab chiqqan tarjimalarni solishtiradi. Reflektiv bosqichda esa qaror sababi, qo‘llangan strategiya va xato manbai tahlil qilinadi.

1-jadval.

SI asosidagi modulli topshiriqlarning funksional tuzilmasi

Modul	SI funksiyasi	Talaba faoliyati	Kompetensiya indikatori
Diagnostik	Vaziyat va variantlarni generatsiya qilish	Madaniy xato va ehtiyojni aniqlash	Kontekstni anglash
Tahliliy	Muqobil izohlarni taklif qilish	Madaniy kod, registr va implikaturani qiyoslash	Madaniy sezgirlik
Simulyativ	Kasbiy ssenariylarni modellashtirish	Tarjima variantlarini tanlash va asoslash	Pragmatik moslik
Reflektiv	Qayta aloqa va savollar yaratish	SI javobini tekshirish, xatoni izohlash	Tanqidiy refleksiya

Bunday topshiriqlarda baholash faqat grammatik aniqlik yoki leksik moslik bilan cheklanmasligi lozim. Plurimadaniy kompetensiya uchun kontekstga muvofiqlik, madaniy sezgirlik, pragmatik adekvatlik, stereotipni tanish, auditoriyaga moslashish va

SI natijasini tanqidiy tekshirish kabi indikatorlar ham qo‘llanadi. O‘qituvchi shu mezonlar orqali talabaning tayyor javobdan foydalanishini emas, uning tarjima qarorini qanday shakllantirganini baholaydi. Natijada modulli tuzilma texnologik faoliyatni nazorat qilinadigan, maqsadli va reflektiv o‘quv jarayoniga aylantiradi.

Jadvalda mazkur modullarning o‘quv funksiyasi va kutiladigan kompetensiya ko‘rsatkichlari qisqacha tizimlashtiriladi. Ushbu tuzilma o‘qituvchiga topshiriqlar murakkabligini izchil oshirish, har bir bosqichda qayta aloqa berish hamda talabaning individual rivojlanish trayektoriyasini qayd etish imkonini yaratadi. Shu bilan birga, topshiriqlar autentik materiallar, real kasbiy holatlar va turli madaniy auditoriyalar bilan bog‘langanda ularning amaliy qiymati yanada ortadi hamda transfer imkoniyati sezilarli ravishda kuchayadi.

Xulosa. Xulosa qilib aytganda, tarjimon talabalarning plurimadaniy kompetensiyasini shakllantirishda sun’iy intellekt imkoniyatlaridan foydalanish alohida texnologik yangilik sifatida emas, didaktik maqsadga xizmat qiluvchi vosita sifatida ko‘rilishi zarur. Tarjimonning kasbiy faoliyati til birliklarini ekvivalent almashtirishdan kengroq bo‘lib, madaniy ma’nolarni anglash, ijtimoiy me’yorlarni hisobga olish, auditoriyani oldindan tasavvur qilish va kommunikativ niyatni muvofiqlashtirishni talab etadi. Shu sababli SI vositasi aynan ana shu qarorlarni tahlil qilish, qiyoslash va asoslash uchun qo‘llangandagina plurimadaniy rivojlanishga real hissa qo‘sha oladi.

Taklif etilgan modulli tuzilmaning afzalligi shundaki, u o‘quv faoliyatini diagnostika, tahlil, simulyatsiya va refleksiya ketma-ketligida tashkil etadi. Bunday bosqichlilik talabaning dastlabki ehtiyojini aniqlash, madaniy birliklarni chuqur tahlil qilish, kasbiy vaziyatlarda alternativ tarjima strategiyalarini sinash va o‘z qarorini tanqidiy baholash imkonini beradi. Jadvalda ko‘rsatilgan indikatorlar esa o‘qituvchiga natijani faqat tayyor tarjima sifati orqali emas, talabaning madaniy sezgirligi, pragmatik fikrlashi va texnologik vositadan ongli foydalanishi asosida baholashga yordam beradi.

Shu bilan birga, SI yaratgan matn yoki tarjima varianti yakuniy me’yor sifatida qabul qilinmasligi kerak. Generativ tizimlarda kontekstni soddalashtirish, madaniy stereotiplarni takrorlash yoki ishonchsiz ma’lumot ishlab chiqish ehtimoli mavjud. Shu bois talaba SI natijasini boshqa manbalar bilan tekshirish, ehtimoliy madaniy og‘ishlarni aniqlash va yakuniy qarorni mustaqil qabul qilishga o‘rgatilishi lozim. O‘qituvchi esa jarayon davomida etik foydalanish, manbani ko‘rsatish va inson nazoratining ustuvorligini ta’minlaydi.

Umuman, SI asosidagi modulli topshiriqlar tarjimon ta’limida plurimadaniy kompetensiyani rivojlantirish uchun moslashuvchan metodik mexanizm vazifasini bajarishi mumkin. Ular til, madaniyat, tarjima strategiyasi va raqamli savodxonlikni yagona faoliyatda birlashtirib, talabaning reflektiv mustaqilligini kuchaytiradi. Keyingi bosqichda ushbu modullarni tajriba-sinov orqali tekshirish, indikatorlar bo‘yicha dinamikani o‘lchash va turli tarjima yo‘nalishlariga moslashtirish maqsadga muvofiq.

Bunda eksperimental baholash boshlang‘ich va yakuniy natijalarni qiyoslash bilan birga, har bir modul bo‘yicha talabaning qaysi plurimadaniy harakatlarda o‘sish ko‘rsatganini aniqlashi zarur. Ayniqsa, madaniy farqni izohlash, pragmatik moslikni asoslash, auditoriyaga moslashtirish va SI javobini tanqidiy qayta ishlash ko‘rsatkichlari alohida monitoring qilinishi mumkin. Bu metodik samaradorlikni aniqroq ko‘rsatib beradi.

Foydalanilgan adabiyotlar ro‘yxati:

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The Mississippi river as a symbol of illusory freedom in Mark Twain's "Adventures of Huckleberry Finn"

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Abstract. This article examines the Mississippi River as a central symbol of freedom in Mark Twain's Adventures of Huckleberry Finn. Although the river initially appears to provide Huck Finn and Jim with an escape from social control, slavery, violence, and restrictive social conventions, a closer examination reveals that their freedom is temporary and incomplete. The study argues that the Mississippi represents illusory freedom: it creates a physical space in which Huck and Jim can experience independence, friendship, and relief from society, but it cannot completely free them from the social and political systems that surround them. Through a close reading of important episodes, including the missed journey to Cairo, the steamboat collision, the arrival of the Duke and the King, and the return to the shore, the article demonstrates how Twain repeatedly challenges the idea that physical escape automatically leads to genuine liberation. The article also considers the moral development of Huck, whose experiences on the raft gradually lead him to question the values of a society that accepts slavery. The analysis suggests that Twain presents freedom as a complex and fragile condition that requires not only physical escape but also moral awareness and social change.

Keywords:Mark Twain; Adventures of Huckleberry Finn; Mississippi River; freedom; illusory freedom; slavery; Huck Finn; Jim; moral independence; social criticism

Introduction. Freedom is one of the most important and complicated themes in American literature. It is closely connected with the historical development of the United States and with questions of individual rights, slavery, democracy, and social justice. Among American writers, Mark Twain occupies an important place in the discussion of freedom because his works frequently explore the conflict between individual independence and the restrictions imposed by society. Published in 1884, Adventures of Huckleberry Finn presents the journey of two

characters who attempt to escape from different forms of captivity. Huck Finn runs away from his violent father and from the social expectations imposed upon him by the adults around him. Jim, an enslaved man, escapes from Miss Watson after learning that he may be sold away from his family. Their journeys eventually bring them together on the Mississippi River. At first, the river appears to be the perfect symbol of freedom. On the raft, Huck and Jim can temporarily escape the rules and expectations of society. They fish, talk, sleep, and travel together without the constant supervision they experience on land. Huck describes life on the raft as comfortable and free, in contrast to the feeling of being "cramped up and smothery" on land. Therefore, this article examines the Mississippi River as a symbol of illusory freedom. It focuses on the contrast between escape and liberation and explores how Twain uses the river to examine physical freedom, moral independence, slavery, social control, and human agency.

Literature Review. The symbolic significance of the Mississippi River in Adventures of Huckleberry Finn has received considerable attention from literary critics. T. S. Eliot, in his introduction to the novel, emphasizes the exceptional importance of the river and presents it as a powerful force that shapes the movement and atmosphere of the narrative. The river appears almost independent of human intentions, carrying Huck and Jim forward while remaining indifferent to their personal plans. Lionel Trilling also recognized the importance of the contrast between the river and the land. The river can be interpreted as a temporary space of independence, while the communities along its banks represent social rules, conventions, hypocrisy, and violence. This contrast has contributed to the long-standing interpretation of the river as a symbol of freedom. Henry Nash Smith's critical work on Twain similarly draws attention to the relationship between nature and American society. The open space of the river contrasts with the restrictions created by social institutions and cultural expectations. The river therefore becomes an important part of Twain's criticism of nineteenth-century American life.

Leo Marx, in his discussion of the novel's ending, questions the way the final chapters treat Jim's freedom. From this perspective, the ending weakens the seriousness of the moral journey because Tom Sawyer transforms Jim's situation into a kind of adventure or game. Other interpretations, however, understand this episode as deliberate irony through which Twain exposes the absurdity of treating another person's freedom as entertainment. Shelley Fisher Fishkin's scholarship provides another valuable perspective by drawing attention to African American voices and traditions in Twain's writing. Her work encourages readers to consider Jim's experience independently of Huck's narrative and to recognize that the river has very different meanings for the two characters.

Methodology. This study employs a qualitative literary analysis based on close reading and thematic interpretation of Mark Twain's Adventures of Huckleberry Finn. Particular attention is given to passages and narrative episodes involving the Mississippi River, the raft, Huck and Jim's relationship, and their encounters with the society along the river. The research focuses on recurring images and situations connected with freedom and captivity. The missed journey to Cairo, the steamboat collision, the arrival of the Duke and the King, the Grangerford–Shepherdson conflict, the Boggs episode, and the final chapters are examined as examples of the tension between physical escape and genuine liberation. The study also uses historical and socio-cultural interpretation to understand the significance of slavery and racial discrimination in nineteenth-century America. Comparative analysis is applied to Huck's and Jim's experiences because the two characters do not experience freedom in the same way. For Huck, freedom is largely connected with independence from social expectations and personal authority. For Jim, freedom has a much more fundamental meaning because it concerns his legal status, physical safety, family, and human dignity. Critical perspectives by T. S. Eliot, Lionel Trilling, Henry Nash Smith, Leo Marx, and Shelley Fisher Fishkin are also considered in order to place the interpretation within the broader critical discussion of Twain's novel.

Results / Findings. The analysis demonstrates that the Mississippi River performs several interconnected functions in Adventures of Huckleberry Finn. Most importantly, it represents a form of freedom that is genuine in experience but incomplete in reality. The first major form of freedom represented by the river is physical escape. Huck and Jim both use the Mississippi as a route away from situations in which they are controlled by others. Huck wants to escape his father and the pressures of "civilized" society. Jim wants to escape slavery and the possibility of being separated from his family. The raft provides both characters with a temporary refuge from these forms of captivity. Life on the raft is significantly different from life on land. There are no fixed schedules, formal social rules, or constant supervision. Huck and Jim create their own routines and depend upon one another. The peaceful descriptions of the river, particularly the night scenes, reinforce the impression that the raft is an alternative world.

Discussion. The findings indicate that Twain's treatment of freedom is deliberately complex. He does not simply present society as bad and nature as good. Instead, he creates a tension between the freedom offered by the river and the limitations that remain even when Huck and Jim are away from society. The river gives Huck and Jim genuine moments of peace. Their friendship develops on the raft, and Huck is able to reconsider ideas that he has previously accepted without question. In this sense, the river has a positive moral function. At the same time, Twain shows that isolation cannot solve social injustice. Jim cannot simply escape slavery by hiding on a raft. The institution of slavery continues to exist, and its power follows him

throughout the journey. This distinction between escape and liberation is essential. Escape means getting away from immediate control or danger. Liberation means changing the conditions that create oppression. Huck and Jim achieve the first but struggle to achieve the second. The river therefore becomes an especially effective symbol because it represents freedom while simultaneously exposing its limitations.

Another important aspect of the river is its lack of direction under human control. Huck and Jim can make decisions, but the current determines much of their movement. Their situation reflects the larger philosophical tension between free will and forces beyond individual control. They believe they are choosing their destination, yet the river can carry them somewhere completely different. Similarly, people may believe that they control their lives while being influenced by social institutions, historical circumstances, economic conditions, and cultural beliefs. The novel's ending intensifies this problem. Tom Sawyer's elaborate plan to "rescue" Jim turns Jim's freedom into an adventure. The revelation that Miss Watson has already freed Jim further complicates the idea of liberation because Jim's legal freedom comes through the decision of a person who previously had power over him. From this perspective, the ending reinforces the central contradiction of the novel. Jim has struggled to escape slavery, but the final legal condition of his freedom is determined by someone else's decision. This does not make his journey meaningless. On the contrary, it demonstrates how deeply the social system controls individual lives.

The river also has different meanings for Huck and Jim. Huck primarily seeks independence from authority and social expectations. Jim, however, seeks something much more fundamental: freedom from enslavement and the ability to remain connected with his family.

Conclusion. The Mississippi River in Mark Twain's Adventures of Huckleberry Finn is one of the most complex symbols of freedom in American literature. It provides Huck and Jim with a temporary space in which they can escape supervision, social expectations, and immediate danger. On the raft, they experience peace, independence, friendship, and a degree of equality that is difficult to find on land. Nevertheless, the river does not completely set them free. The missed Cairo carries them farther into slave territory rather than toward liberation. The steamboat demonstrates the fragility of their refuge. The Duke and the King bring greed and exploitation onto the river and eventually sell Jim. Their repeated returns to the shore expose them to violence, racism, and social injustice.

The river therefore represents illusory freedom. The freedom it offers is real as an experience, but temporary as a condition. Huck and Jim can escape from particular people and places, but they cannot simply escape the social system that surrounds them. At the same time, the river plays a crucial role in Huck's moral development. By separating him from the dominant values of society, it gives him an opportunity to question what he has been taught. His decision to stand by Jim demonstrates that

personal conscience can challenge socially accepted beliefs. Ultimately, Twain suggests that freedom is more complicated than physical movement. A person may travel far from society and still remain controlled by its laws, prejudices, and institutions. True freedom requires not only the ability to escape but also the transformation of the conditions that make people unfree.

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Artificial Intelligence in Medical Imaging: Current Applications and Future Perspectives

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Abstract

Artificial intelligence (AI) has emerged as a transformative technology in medical imaging, with increasing applications in image reconstruction, segmentation, detection, classification, diagnosis, treatment planning, and clinical workflow optimization. Recent advances in deep learning, multimodal artificial intelligence, large language models, and foundation models have expanded the potential of AI beyond task-specific image analysis toward integrated clinical decision-support systems. Evidence from recent studies indicates that AI-assisted medical imaging can improve diagnostic performance, reduce repetitive workload, enhance reporting efficiency, and support earlier detection of clinically significant abnormalities across modalities such as radiography, computed tomography, magnetic resonance imaging, ultrasound, mammography, and positron emission tomography. However, successful clinical implementation remains challenging because of variability in model performance, limited generalizability across populations and institutions, insufficient high-quality annotated datasets, data privacy concerns, algorithmic bias, limited explainability, regulatory requirements, and difficulties in integrating AI into existing clinical workflows. Recent research increasingly emphasizes responsible and trustworthy AI, including fairness, robustness, traceability, usability, explainability, external validation, and continuous post-deployment monitoring. Future developments are expected to focus on foundation models, multimodal systems, privacy-preserving federated learning, personalized diagnostic support, and human–AI collaboration. Rather than replacing medical professionals, AI is increasingly being investigated as an assistive technology capable of augmenting clinical expertise and improving the efficiency and consistency of medical imaging practice. Further prospective, multicenter, and real-world studies are required to establish clinical effectiveness, safety, reliability, and long-term outcomes of AI-based imaging technologies.

Keywords: Artificial intelligence, medical imaging, deep learning, machine learning, computer-aided diagnosis, medical image analysis, image segmentation, image reconstruction, diagnostic imaging, radiology, multimodal AI, foundation models, clinical decision support, precision medicine, healthcare technology.

Introduction

Artificial intelligence (AI) has emerged as an important technological advancement in modern medical imaging, influencing the acquisition, processing, interpretation, and clinical utilization of medical images. The rapid development of machine learning and deep learning has enabled computational systems to identify complex patterns within large volumes of imaging data and support clinicians in the detection and characterization of pathological findings. AI technologies are currently being investigated and implemented across multiple imaging modalities, including radiography, computed tomography (CT), magnetic resonance imaging (MRI), ultrasound, mammography, and positron emission tomography (PET).

The increasing availability of large medical imaging datasets and advances in computational technologies have contributed substantially to the development of AI-based imaging applications. Deep learning algorithms, particularly convolutional neural networks, have demonstrated potential in image classification, lesion detection, anatomical segmentation, image reconstruction, and quantitative image analysis. These applications may assist healthcare professionals by improving the efficiency of image interpretation, reducing repetitive tasks, and supporting the identification of subtle abnormalities that may be difficult to detect through conventional visual assessment. Recent research has also demonstrated growing applications of AI in treatment response assessment, disease prediction, and clinical workflow optimization.

One of the major areas of development is the use of AI for image enhancement and reconstruction. AI-based reconstruction techniques can improve image quality while potentially reducing acquisition time, radiation exposure, or the amount of imaging data required. In CT and MRI, deep learning methods have been investigated for noise reduction, artifact correction, accelerated image reconstruction, and enhancement of diagnostic information. Such technologies may contribute to more efficient imaging procedures while maintaining clinically useful image quality.

AI has also demonstrated substantial potential in automated detection and classification of diseases. In radiology, machine learning models have been developed to identify abnormalities such as pulmonary nodules, intracranial hemorrhage, fractures, breast lesions, and other pathological findings. In oncology, AI-based analysis of CT, MRI, PET, and mammographic images has been investigated for tumor detection, segmentation, characterization, staging, and prediction of treatment response. The integration of imaging characteristics with clinical and molecular information may further contribute to personalized approaches to diagnosis and treatment.

Recent developments have expanded the field beyond conventional task-specific algorithms. Multimodal artificial intelligence and foundation models are increasingly

being investigated for their ability to integrate medical images with clinical text, laboratory data, electronic health records, and other sources of patient information. These systems may provide a more comprehensive representation of individual patients and could support applications such as automated report generation, image interpretation, clinical decision support, and personalized risk assessment. Generative artificial intelligence is another emerging area, with potential applications in medical image synthesis, data augmentation, image reconstruction, and the development of training datasets.

Despite these advances, several challenges remain before AI can be reliably integrated into routine medical imaging practice. Model performance may decrease when algorithms are applied to patient populations, imaging devices, or clinical environments that differ from those used during model development. Differences in data quality, acquisition protocols, demographic characteristics, and disease prevalence can contribute to variations in diagnostic performance. Additional concerns include algorithmic bias, limited interpretability, data privacy, cybersecurity, regulatory requirements, and the need for continuous monitoring after clinical deployment.

An important consideration is that high technical accuracy does not necessarily guarantee clinical effectiveness. AI systems must demonstrate reliability, generalizability, safety, and clinical utility under real-world conditions. External validation and prospective multicenter studies are therefore important for determining whether reported performance can be reproduced across different healthcare settings. Human oversight also remains essential, particularly when AI-generated results may influence diagnostic or therapeutic decisions.

The future of AI in medical imaging is likely to involve increasing integration between computational systems and clinical expertise. Rather than functioning exclusively as autonomous diagnostic tools, AI technologies may increasingly serve as decision-support systems that augment the capabilities of radiologists and other healthcare professionals. Advances in multimodal AI, foundation models, generative AI, real-time image analysis, and personalized imaging are expected to expand the scope of medical imaging applications. However, successful implementation will depend on rigorous clinical validation, transparent reporting, ethical governance, appropriate regulation, and effective human–AI collaboration.

Therefore, understanding both the current applications and future perspectives of artificial intelligence in medical imaging is essential for evaluating its potential contribution to modern healthcare. Continued interdisciplinary research involving clinicians, radiologists, computer scientists, engineers, ethicists, and policymakers will be necessary to ensure that AI-based imaging technologies are developed and implemented in a safe, effective, transparent, and patient-centered manner.

Main Body

Current Applications of Artificial Intelligence in Medical Imaging

Artificial intelligence has become increasingly integrated into medical imaging, with applications ranging from image acquisition and reconstruction to automated interpretation and clinical decision support. Among the most widely studied approaches are machine learning and deep learning algorithms, particularly convolutional neural networks, which can extract complex features from medical images and identify patterns associated with specific diseases. These technologies have been investigated across radiography, computed tomography, magnetic resonance imaging, ultrasound, mammography, and positron emission tomography.

One of the most established applications of AI is automated image classification and disease detection. AI systems can analyze large numbers of medical images and identify suspicious findings that may require further clinical evaluation. In chest radiography, for example, AI algorithms have been developed to detect pulmonary abnormalities, including nodules, consolidation, pneumothorax, and other pathological changes. In mammography, AI-assisted systems have been investigated for breast cancer detection and risk assessment. Similarly, in CT and MRI, AI has demonstrated potential for detecting intracranial hemorrhage, ischemic stroke, pulmonary embolism, tumors, and other clinically significant abnormalities.

Another important application is medical image segmentation. Segmentation involves identifying and separating specific anatomical structures or pathological regions within an image. Deep learning models can perform automated segmentation of organs, tumors, blood vessels, and other structures. In oncology, accurate tumor segmentation can support disease staging, treatment planning, radiation therapy, and monitoring of treatment response. Automated segmentation can also reduce the time required for manual annotation and improve consistency between different observers.

AI-based image reconstruction and enhancement represent another rapidly developing area. Medical imaging procedures frequently involve a balance between image quality, acquisition time, radiation exposure, and patient comfort. Deep learning algorithms can be used to reduce image noise, correct artifacts, reconstruct images from incomplete data, and improve spatial resolution. In computed tomography, AI-based reconstruction methods may help reduce radiation exposure while maintaining diagnostically useful image quality. In magnetic resonance imaging, AI can facilitate accelerated image acquisition and reconstruction, potentially reducing examination time and improving patient tolerance.

Artificial intelligence is also increasingly being used for quantitative imaging. Conventional image interpretation frequently depends on qualitative visual assessment, whereas AI can extract large numbers of quantitative features from medical images. Radiomics, for example, involves the extraction and analysis of quantitative imaging characteristics that may reflect tumor heterogeneity, tissue structure, or disease progression. When combined with clinical and molecular information, radiomic features may contribute to disease classification, prognosis estimation, treatment response prediction, and personalized medicine.

AI in Oncology and Precision Medicine

Oncology represents one of the most active areas of AI research in medical imaging. AI systems have been developed to assist with cancer detection, tumor segmentation, disease classification, staging, prognosis, and treatment monitoring. In breast imaging, AI can assist in identifying suspicious lesions and estimating cancer risk. In lung cancer, AI-based analysis of CT images can support pulmonary nodule detection and characterization. In brain tumors, MRI-based AI systems can assist with tumor segmentation and classification, while PET and CT data may provide additional information about metabolic and anatomical characteristics.

The integration of imaging data with clinical, genetic, and molecular information may further enhance the role of AI in precision medicine. Multimodal models can potentially combine imaging findings with demographic characteristics, laboratory results, pathology, and genomic information. This approach may enable more individualized assessment of disease risk and treatment response. However, such applications require large, diverse, and accurately annotated datasets, as well as rigorous validation before they can be routinely applied in clinical practice.

AI in Radiology Workflow and Clinical Decision Support

Beyond image interpretation, AI can influence the overall workflow of radiology departments. Automated prioritization systems can identify potentially urgent examinations and move them higher in the reporting queue. AI can also assist with preliminary image analysis, structured reporting, measurements, and quality control. These applications may reduce repetitive tasks and allow radiologists to devote more time to complex cases and direct clinical communication.

Clinical decision-support systems represent a further development of this approach. Rather than simply identifying abnormalities, AI systems may integrate imaging findings with patient information to provide risk estimates or possible diagnostic considerations. Such systems are intended to support, rather than replace, clinical judgment. Their usefulness depends on the accuracy of the underlying algorithms, the

quality of available clinical data, and appropriate interpretation by qualified healthcare professionals.

Multimodal Artificial Intelligence and Foundation Models

Recent advances in artificial intelligence have resulted in the development of multimodal and foundation models. Traditional medical AI systems are often designed to perform a single predefined task, whereas foundation models can potentially be adapted to multiple applications. In medical imaging, these models may process images together with radiology reports, clinical notes, laboratory results, or other textual information.

Vision-language models are particularly relevant because they can establish relationships between visual findings and clinical language. Potential applications include automated report generation, image-question answering, image retrieval, and clinical information summarization. However, the use of large generative models in medicine also introduces new challenges. These systems may produce plausible but incorrect information, and their outputs may be difficult to verify. Consequently, human oversight and rigorous clinical validation remain essential.

Challenges and Limitations

Despite substantial progress, several factors limit the widespread implementation of AI in medical imaging. One major challenge is the quality and diversity of training data. AI models can perform well when evaluated using data that are similar to the datasets used during development but may demonstrate reduced performance when applied to different institutions, scanners, acquisition protocols, or patient populations. This phenomenon emphasizes the importance of external validation and multicenter evaluation.

Algorithmic bias is another important concern. If training datasets do not adequately represent different demographic and clinical populations, AI systems may produce unequal performance across patient groups. Bias can arise from differences in age, sex, ethnicity, disease prevalence, healthcare access, or imaging technology. Therefore, dataset diversity and fairness assessment should be considered throughout the development and deployment of medical AI.

Interpretability and explainability also remain significant challenges. Many deep learning models operate as complex systems in which the reasoning process is not readily understandable to clinicians. In high-stakes medical environments, healthcare professionals may need to understand why an AI system has produced a particular prediction. Explainable AI methods may improve transparency, although explanations

themselves must be carefully validated and should not be assumed to accurately represent the model's underlying reasoning.

Data privacy and cybersecurity are additional concerns. Medical images and associated clinical information contain sensitive personal data. AI development therefore requires appropriate data governance, secure storage, controlled access, and compliance with relevant legal and ethical standards. Federated learning and other privacy-preserving approaches may provide opportunities to train models using data from multiple institutions without directly transferring patient-level datasets.

Future Perspectives

The future of artificial intelligence in medical imaging is likely to involve increasingly sophisticated multimodal systems capable of integrating imaging with multiple sources of clinical information. Foundation models may become adaptable to different imaging modalities and clinical tasks, potentially reducing the need to develop separate algorithms for every individual application. Generative AI may also contribute to image reconstruction, synthetic data generation, report assistance, and educational applications.

Personalized imaging is another important future direction. AI systems may increasingly incorporate individual patient characteristics to provide patient-specific risk assessment and treatment recommendations. Integration with electronic health records and other clinical information systems could allow imaging findings to be interpreted within a broader clinical context.

Real-time AI-assisted imaging may also become more prominent. In ultrasound, endoscopy, interventional radiology, and other dynamic imaging environments, AI could provide immediate guidance during image acquisition or procedures. Such systems may assist clinicians in identifying anatomical structures, optimizing image quality, and detecting abnormalities during examinations.

The future development of AI should nevertheless emphasize human–AI collaboration rather than complete automation. Radiologists and other healthcare professionals will remain responsible for interpreting clinical information, considering patient-specific circumstances, communicating findings, and making final clinical decisions. AI is more likely to function as an augmentation technology that increases efficiency and supports professional expertise.

For successful clinical implementation, future research should prioritize prospective multicenter trials, external validation, standardized performance assessment, transparent reporting, continuous monitoring, and evaluation of clinical outcomes.

Regulatory and ethical frameworks will also need to evolve alongside technological advances. The ultimate value of AI in medical imaging should therefore be evaluated not only by algorithmic accuracy but also by its effect on diagnostic quality, patient outcomes, workflow efficiency, healthcare equity, and overall clinical safety.

Conclusion

Artificial intelligence has become an increasingly important component of modern medical imaging, with applications extending from image acquisition and reconstruction to disease detection, image segmentation, quantitative analysis, clinical decision support, and workflow optimization. Advances in deep learning, multimodal artificial intelligence, foundation models, and generative technologies have substantially expanded the potential of AI to improve the efficiency, consistency, and diagnostic capabilities of medical imaging.

Current evidence suggests that AI can support healthcare professionals in the detection and characterization of pathological findings, reduce repetitive workloads, enhance image quality, and facilitate more personalized approaches to diagnosis and treatment. Its applications in oncology, neurology, cardiovascular imaging, breast imaging, and other clinical fields demonstrate considerable potential for improving patient care. However, technical performance alone is insufficient to establish clinical value.

Several challenges remain, including limited generalizability, dataset bias, insufficient external validation, lack of interpretability, data privacy concerns, cybersecurity risks, regulatory uncertainty, and the possibility of incorrect or unreliable AI-generated outputs. Addressing these limitations will require diverse and high-quality datasets, standardized evaluation methods, prospective multicenter studies, transparent reporting, and continuous monitoring of AI systems after clinical deployment.

Future developments are expected to focus increasingly on multimodal AI, foundation models, generative artificial intelligence, personalized imaging, real-time analysis, and integration with electronic health records. Nevertheless, successful implementation should prioritize human–AI collaboration rather than complete replacement of clinical expertise. Radiologists and other healthcare professionals will continue to play a central role in interpreting AI outputs and making patient-centered clinical decisions.

Overall, artificial intelligence has significant potential to transform medical imaging, but its long-term clinical impact will depend on the quality of evidence supporting its use, the reliability and safety of individual systems, and the development of appropriate ethical and regulatory frameworks. Responsible integration of AI into medical imaging may ultimately contribute to more efficient, accurate, personalized, and patient-centered healthcare.

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ЎЗБЕКИСТОН РЕСПУБЛИКАСИ МИЛЛИЙ ГВАРДИЯСИ ФАОЛИЯТИНИ БАҲОЛАШДА *“АҚЛЛИ АДОЛАТ” (SMART JUSTICE)* КОНЦЕПЦИЯСИНИ ЖОРИЙ ЭТИШНИНГ ҲУҚУҚИЙ МАСАЛАЛАРИ

Усманов Алишер Толмасович,
Жамоат хавфсизлиги университети мустақил изланувчиси.

Аннотация: *Ушбу тезисда Миллий гвардия ходимлари фаолиятини баҳолашнинг анъанавий миқдорий тизимидан воз кечиб, сунъий интеллект ва катта маълумотларга (Big Data) асосланган Рақамли-Интеграциялашган Рейтинг Моделини (DIRM) жорий этишнинг ҳуқуқий жиҳатлари асосланган. Тадқиқотда баҳолаш жараёнида алгоритмик шаффофликни таъминлаш, инсон назоратини (Human-in-the-loop) сақлаб қолиш ҳамда Европа Иттифоқининг Сунъий интеллект тўғрисидаги акти (EU AI Act) стандартлари асосида миллий қонунчиликка, хусусан, “Ўзбекистон Республикасининг Миллий гвардияси тўғрисида”ги Қонунга тегишли нормаларни киритиш бўйича илмий-амалий таклифлар илгари сурилган.*

Калит сўзлар: *Ақлли адолат, Миллий гвардия, DIRM модели, сунъий интеллект, фаолиятни баҳолаш (KPI), алгоритмик шаффофлик, инсон назорати.*

ПРАВОВЫЕ АСПЕКТЫ ВНЕДРЕНИЯ КОНЦЕПЦИИ «УМНОЕ ПРАВОСУДИЕ» (SMART JUSTICE) В СИСТЕМУ ОЦЕНКИ ДЕЯТЕЛЬНОСТИ НАЦИОНАЛЬНОЙ ГВАРДИИ РЕСПУБЛИКИ УЗБЕКИСТАН

Аннотация: *В данных тезисах обосновываются правовые аспекты перехода от традиционной количественной системы оценки деятельности сотрудников Национальной гвардии к Цифровой интегрированной рейтинговой модели (DIRM), основанной на искусственном интеллекте и больших данных (Big Data). Выдвинуты научно-практические предложения по обеспечению алгоритмической прозрачности, сохранению человеческого контроля (Human-in-the-loop) в процессе оценки, а также имплементации норм Акта ЕС об искусственном интеллекте (EU AI Act) в национальное законодательство, в частности, в Закон «О Национальной гвардии Республики Узбекистан».*

Ключевые слова: *Умное правосудие, Национальная гвардия, модель DIRM, искусственный интеллект, оценка деятельности (KPI), алгоритмическая прозрачность, человеческий контроль.*

LEGAL ASPECTS OF IMPLEMENTING THE "SMART JUSTICE" CONCEPT IN THE PERFORMANCE EVALUATION SYSTEM OF THE NATIONAL GUARD OF THE REPUBLIC OF UZBEKISTAN

Abstract: *This thesis substantiates the legal aspects of transitioning from the traditional quantitative performance evaluation system of National Guard personnel to a Digital-Integrated Rating Model (DIRM) based on artificial intelligence and Big Data. The study proposes scientific and practical recommendations for ensuring algorithmic transparency, maintaining human oversight (Human-in-the-loop) in the evaluation process, and amending national legislation—specifically the Law "On the National Guard of the Republic of Uzbekistan"—in accordance with the standards of the European Union's Artificial Intelligence Act (EU AI Act).*

Keywords: *Smart Justice, National Guard, DIRM model, artificial intelligence, performance evaluation (KPI), algorithmic transparency, human oversight.*

Бугунги кунда давлат ва жамиятни бошқариш, хусусан, ҳуқуқ-тартибот ва жамоат хавфсизлиги соҳаларининг ривожланиш босқичи шуни кўрсатмоқдаки, сунъий интеллект (AI), катта маълумотлар (Big Data) ва рақамли технологиялар шунчаки ёрдамчи восита эмас, балки инсон ҳуқуқлари, қонун устуворлиги ва адолатни таъминловчи асосий ҳуқуқий кафолатга айланган. Шу ўринда, Миллий гвардия ҳамда бошқа хавфсизлик идоралари ишини фақатгина анъанавий ва миқдорий (экстенсив) мезонлар асосида баҳолаш усули назарий ва амалий жиҳатдан ўз аҳамиятини йўқотган. Шу сабабли, ҳозирги вақтда давлат бошқаруви ва ижро этувчи органларнинг иш самарадорлигини баҳолашда (KPI) асосий эътиборни *“Ақлли адолат” (Smart Justice)* концепциясига ва рақамлаштиришга қаратиш, шунинг баробарида, ушбу ўзгаришларнинг пухта ва хавфсиз ҳуқуқий асосларини ишлаб чиқиш энг устувор илмий-амалий вазифалардан бирига айланди.

Мазкур илмий тадқиқотнинг асосий мақсади БМТ, Европада Хавфсизлик ва Ҳамкорлик Ташкилоти *(ЕХҲТ)* ва Европа Иттифоқи каби халқаро ташкилотларнинг нормалари, илғор хорижий давлатлар тажрибаси ва етакчи ҳуқуқшунос ва криминолог олимларнинг назарий қарашларини илмий таҳлил

қилган ҳолда, Ўзбекистон Республикаси Миллий гвардияси фаолиятини баҳолаш тизимига рақамли технологиялар ва сунъий интеллектни жорий этишнинг назарий-ҳуқуқий асослари ва амалий механизмларини ишлаб чиқишдан иборатдир. Ушбу жараёнда фақатгина технологиянинг ўзи эмас, балки алгоритмик адолат, маълумотлар хавфсизлиги ва инсон ҳуқуқлари устуворлиги тамойиллари бош мезон сифатида тадқиқ этиш мақсадга мувофиқдир.

Шу ўринда, *“Ақлли адолат” (Smart Justice)* концепциясининг илмий-назарий моҳияти ва ҳуқуқни муҳофаза қилишдаги трансформациясига тўхталиб ўтсак. Хусусан, *“Ақлли адолат” (Smart Justice)* концепцияси ўзининг дастлабки шаклланиш босқичида АҚШ ва Ғарбий Европа давлатларида жиноятчиликка қарши курашишда ҳаддан ташқари репрессив чоралар ва оммавий қамоққа олиш *(mass incarceration)* амалиётига муқобил, инсонпарвар ёндашув сифатида майдонга чиққан. Ушбу ёндашувнинг илмий-фалсафий ўзаги жамиятни ортиқча криминализация қилишдан сақлаш, чекланган давлат ресурсларини жазолашга эмас, балки барвақт профилактикага, муаммонинг илдизини бартараф этишга ва маблағларни мақсадли бошқаришга йўналтиришдан иборатдир[1]. Бироқ, бугунги глобал рақамлаштириш даврига келиб, ушбу концепция фақатгина суд ва жиноят-ижроия сиёсати доирасидан чиқиб, ҳуқуқни муҳофаза қилувчи органлар, жумладан, полиция ва миллий гвардия кучларининг фаолиятини баҳоловчи, назорат қилувчи ва таҳлил этувчи кенг қамровли рақамлаштирилган экотизимга айланди.

Олимлар *Ethan Katsh* ва *Janet Rifkin* ўзларининг фундаментал тадқиқотларида низоларни онлайн ҳал қилиш (ODR) ва электрон одил судлов тизимларини *“рақамли адолат”нинг (digital justice)* бошланғич нуқтаси

[1] Smart Justice – Office of the State Attorney for the 4th Judicial Circuit // https://sao4th.com/about/programs-and-initiatives/smart-justice/

сифатида баҳолаган бўлсалар-да[2], замонавий тадқиқотчилар бу концепцияни бевосита полиция ва ҳарбийлаштирилган тузилмалар фаолиятига ҳам татбиқ этмоқдалар. Хусусан, Кембриж университети тадқиқотчилари томонидан ишлаб чиқилган назарияга кўра, *“Ақлли адолат”* тизимининг муваффақиятли ишлаши ва легитимлиги учта фундаментал устунга *(Three Pillars of a Smart Justice System)* таянади: а) *инклюзивлик (inclusivity), б) шаффофлик (transparency) ва в) суд-ҳуқуқ тизимининг мустақиллиги (judicial independence)*[3]. Инклюзивлик тамойили рақамли технологияларнинг барча фуқаролар учун бирдек очиқ бўлишини ва баҳолаш тизимларида ижтимоий, демографик ёки ирқий тенгсизликка йўл қўймасликни талаб қилади. Шаффофлик тамойили эса қарор қабул қилиш алгоритмларининг *(шу жумладан, хизматчиларни баҳолаш бўйича KPI балл бериш алгоритмларининг)* фақат ёпиқ идоравий тизим ичида эмас, балки жамоатчилик учун очиқ ва тушунарли бўлишини тақозо этади.

Агар мазкур илғор назарий ёндашувни Ўзбекистон Республикаси Миллий гвардияси фаолиятини баҳолаш тизимига бевосита имплементация қилсак, *“Ақлли адолат”* – бу ходимнинг хизмат самарадорлигини шунчаки қоғоздаги ҳисоботлар ёки раҳбариятнинг субъектив хулосаси орқали эмас, балки интеллектуал кузатув камералари, кўкрак видеорегистраторлари *(BWC – Body-Worn Cameras)*, гео-ахборот тизимлари ва маъмурий ишларни электрон юритиш дастурлари орқали йиғилган, инсон омилисиз таҳлил қилинадиган, мутлақ объектив ва рақамлаштирилган индикаторлар мажмуи сифатида талқин қилиниши лозим[4]. Бунда баҳолаш тизими ходимни қанча фуқарони ушлаб

[2] *Katsh E., Rifkin J.* Online Dispute Resolution: Resolving Conflicts in Cyberspace. – San Francisco: Jossey-Bass, 2001. – 240 p.

[3] Three Pillars of a Smart Justice System // Smart Court // https://www.cambridge.org-/core/books/smart-court/three-pillars-of-a-smart-justice-system/AFD0898ED303F1B804DE64A-E2D64D7CE

[4] *Anuradha, Rastogi M.* Smart Justice Investigates the Role of Advanced Technologies in Reshaping Policing, Legal Systems, and Reform, Enhancing Efficiency and Addressing Systemic

келгани ёки қанча баённома расмийлаштиргани билан эмас, балки маъмурий ҳаракатларни қанчалик қонуний, адолатли, мутаносиб ва фуқароларнинг конституциявий ҳуқуқларини чекламаган ҳолда амалга оширганини реал вақт *(real-time)* режимида ўлчайдиган инновацион воситага айланади.

Америкалик етук тадқиқотчи *Sarah Brayne* ўзининг *"Predictive Policing"* назариясида таъкидлашича, сунъий интеллект, машинали ўрганиш (machine learning) ва катта маълумотлар таҳлили *(big data analytics)* каби воситалар бугунги кунда қонунни муҳофаза қилувчи органларнинг нафақат қандай ишлашини, балки уларнинг ишини қандай баҳолашни ҳам тубдан ўзгартирди[5]. Унинг фикрича, *"ақлли полицияшунослик" (smart policing)* воситалари ходимларга жиноятларни содир бўлишидан олдин башорат қилиш, ресурсларни энг хавфли нуқталарга *(hot spots)* йўналтириш ва тергов сифатини ошириш имконини беради. Бироқ, технологияларни баҳолаш тизимига жорий этиш ўз-ўзидан адолатни таъминламайди, балки у, мукаммал ва хатосиз ишлаши учун жуда қатъий, илмий асосланган ва пухта ишланган ҳуқуқий меъёрларга суяниши шарт.

Шу ўринда, сунъий интеллект (AI) ва предиктив таҳлилни баҳолаш тизимига жорий этишнинг криминологик асослари ва алгоритмик хавфларига тўхталиб ўтсак. Жумладан, маъмурий ва криминологик амалиётда катта маълумотлар *(Big Data)* ва сунъий интеллектга асосланган алгоритмлардан фойдаланиш дунё полицияшунослигида *(policing studies)* туб бурилиш ясади. Олимлардан *G.O. Mohler* ва бошқалар томонидан ўтказилган эмпирик

Obstacles // Nanotechnology Perceptions. URL: https://nano-ntp.com/index.php/nano/article/-download/4720/3657/9165

[5]*Brayne S.* Predict and Surveil: Data, Discretion, and the Future of Policing. – Oxford: Oxford University Press, 2020. – P. 40-45.// https://nano-ntp.com/index.php/nano/article/-download/4720/3657/9165

тадқиқотлар шуни қатъий тасдиқлайдики, предиктив *(башорат қилувчи)* полицияшунослик моделлари жиноятчилик ўчоқларини олдиндан аниқлаш ва патруль кучларини тўғри тақсимлаш орқали йирик шаҳарларда мулкий жиноятларнинг кескин камайишига олиб келган[6]. Бу моделлар аввалги жиноятлар ҳақидаги ҳисоботлар, географик шароитлар ва ижтимоий омилларни ўзида жамлаган ҳолда келажакдаги ҳодисаларни математик моделлаштиради.

Бундан ташқари, *A. Ariel* ва бошқалар томонидан ўтказилган кенг кўламли мета-таҳлилларга кўра, ходимларнинг бодикамералар (BWC) билан тўлиқ таъминланиши ва улардаги видеомаълумотларнинг сунъий интеллект алгоритмлари орқали узлуксиз таҳлил қилиниши Миллий гвардия ёки ички ишлар органлари ходимлари томонидан куч ишлатиш ҳолатларини 17 *фоизга,* фуқароларнинг ходимлар устидан қиладиган асосли шикоятларини эса 53 *фоизга* камайтирган[7]. Бодикамералар фақатгина далил тўплаш воситаси эмас, балки ходимларнинг кундалик фаолиятини, уларнинг фуқаролар билан муомала маданиятини ва низоларни юмшатиш *(de-escalation)* қобилиятини холис баҳолашнинг энг муҳим рақамли индикаторига айланди. Ушбу кўрсаткичларни KPI тизимига тўғридан-тўғри боғлаш орқали ходимларнинг жавобгарлик ва ҳисобдорлик *(accountability)* ҳиссини бир неча баробарга ошириш мумкин.

Бироқ, технологияларнинг жамоат хавфсизлигига интеграцияси ва фаолиятни баҳолаш тизимининг тўлиқ автоматлаштирилиши фақатгина ижобий натижалар билан чекланмайди. Криминологлар *K. Lum* ва *W. Isaac* ҳамда Америка Фуқаролик Эркинликлари Иттифоқи (ACLU) томонидан олиб борилган тадқиқотлар *“алгоритмик нохолислик” (algorithmic bias)* ва ижтимоий

[6] *Mohler G.O.* va boshq. Randomized controlled field trials of predictive policing // Journal of the American Statistical Association. – 2015. – Vol. 110, № 512. – P. 1399-1411.

[7] *Ariel B., Farrar W.A., Sutherland A.* The effect of police body-worn cameras on use of force and citizens’ complaints against the police: A randomized controlled trial // Journal of Quantitative Criminology. – 2015. – Vol. 31, № 3. – P. 509-535.

тенгсизлик хавфларидан жиддий огоҳлантиради[8]. Тадқиқотлар шуни кўрсатмоқдаки, предиктив полиция дастурлари кўпинча тарихий жиҳатдан кўп назорат қилинган, кам таъминланган ёки маълум бир ижтимоий қатламлар яшайдиган *(over-policed)* ҳудудлар тўғрисидаги статистик маълумотларга асосланади[9]. Бунинг натижасида сунъий интеллект тизими айнан ўша ҳудудларга нисбатан нохолис эътибор қаратишни тавсия этади.

Бу эса криминологияда *"қайтар алоқа ҳалқаси"*ни *(feedback loop)* вужудга келтиради: алгоритм патруль ходимини маълум бир маҳаллага юборади, полиция у ерда кўпроқ эътибор қаратгани учун кўпроқ маъмурий ҳуқуқбузарлик *(масалан, майший қоидабузарликлар)* аниқлайди ва бу янги статистик маълумотлар яна алгоритмни ўша ҳудудга хавфли ҳудуд сифатида йўналтиришга мажбур қилади[10]. Агар ходимнинг KPI балли мана шу алгоритмлар орқали шаклланса, у доимий равишда энг осон топиладиган *"пастда осилиб турган мевалар" (low-hanging fruits)* ортидан қувишга, яъни тинч ҳудудлардаги профилактика ўрнига маълум ҳудудлардаги аҳолини оммавий жаримага тортишга мажбур бўлади.

Шунингдек, АҚШнинг Миллий Стандартлар ва Технологиялар Институти (NIST) томонидан 2020 йилда эълон қилинган ҳисоботга кўра, юзни таниш технологиялари *(Facial Recognition Technology)* миллий озчиликлар ёки аёлларни идентификация қилишда юқори даражадаги ноаниқликларга йўл қўйиши

[8] *Lum K., Isaac W.* To predict and serve? // Significance. – 2016. – Vol. 13, № 5. – P. 14-19 // https://nano-ntp.com/index.php/nano/article/download/4720/3657/9165

[9] *Browning M., Arrigo B.A.* Stop and Risk: Policing, Data, and the Digital Age of Discrimination // American Journal of Criminal Justice. – 2020. – Vol. 46, № 1. – DOI: 10.1007/s12103-020-09557-x.// https://www.researchgate.net/publication/343521117_Stop_-and_Risk_Policing_Data_and_the_Digital_Age_of_Discrimination

[10] *Ensign D., Friedler S. A., Neville S., Scheidegger C., Venkatasubramanian S.* Runaway feedback loops in predictive policing // Proceedings of the 1st Conference on Fairness, Accountability and Transparency. – New York: PMLR, 2018. – Vol. 81. – P. 160-171.

исботланган[11]. Ушбу техник хатоликлар оқибатида Миллий гвардия хизматчиси томонидан бегуноҳ фуқарони асоссиз ушлаб туриш ёки нотўғри маъмурий баённома расмийлаштириш ҳолатлари келиб чиқиши мумкин. Шу сабабли, рақамли баҳолаш тизимларининг юридик механизмларини яратишда, агар хатолик тизимнинг *(алгоритмнинг)* техник носозлиги туфайли юз берса, у ходимнинг шахсий баҳолаш *(рейтинг)* баллига салбий таъсир кўрсатмаслигини кафолатловчи ҳуқуқий ҳимоя механизми *(legal safeguard)* қонун ҳужжатларида қатъий мустаҳкамланиши лозим.

Ушбу ўринда, рақамли баҳолаш тизимларининг ҳаддан ташқари марказлаштирилиши ва автоматлаштирилиши қандай салбий институционал оқибатларга олиб келиши мумкинлигини Хитой Халқ Республикасининг Шанхай шаҳрида суд ва ҳуқуқни муҳофаза қилувчи органлар учун амалга оширилган *“206-тизим” (Smart Justice)* мисолида яққол кўриш мумкин. Хитойда жиноят ва маъмурий ишлар бўйича қарор қабул қилиш фаолиятини назорат қилиш учун жорий этилган мазкур сунъий интеллект тизими ўтган миллионлаб қарорларни таҳлил қилиб, ходимларга *“Ўхшаш ишлар бўйича тавсиялар” (Similar Case Recommendation)* беради. Тизим 50 дан ортиқ ўзгарувчиларни *(айбланувчининг тарихидан тортиб жабрланувчининг позициясигача)* сониялар ичида таҳлил қилади. Бироқ, *W. Wu* ва *X. Lin* каби тадқиқотчиларнинг илмий таҳлиллари шуни кўрсатмоқдаки, ушбу тизим амалиётда ходимларни мустақил фикрлашдан ва дискрецион *(вазиятга қараб қарор қабул қилиш)* ваколатлардан бутунлай маҳрум қилмоқда[12].

[11] *Grother P., Ngan M., Hanaoka K.* Face Recognition Vendor Test (FRVT) Part 3: Demographic Effects // NIST Interagency/Internal Report (NISTIR) 8280. – Gaithersburg: National Institute of Standards and Technology, 2019. – 82 p. – URL: https://doi.org/10.6028/-NIST.IR.8280.

[12] *Wu W., Lin X.* Access to Technology, Access to Justice: China’s Artificial Intelligence Application in Criminal Proceedings // International Journal of Law, Crime and Justice. – 2025. – Vol. 81. – P. 100741. – URL: https://doi.org/10.1016/j.ijlcj.2025.100741.

Судьялар, прокурорлар ва хавфсизлик ходимлари алгоритм тавсиясидан четга чиққан тақдирда тизим томонидан автоматик равишда *“четга чиқиш огоҳлантириши” (algorithmic deviation alerts)* оладилар ва уларнинг ички KPI рейтинги кескин тушиб кетади. Натижада, одил судлов ва профилактика жараёни инсонийлик, эмпатия ва индивидуаллаштиришдан маҳрум бўлиб, қатъий *“алгоритмик бюрократия”га (algorithmically managed bureaucracies)* айланиб қолган[13]. Ушбу хорижий тажриба Ўзбекистон миллий қонунчилиги учун ўта муҳим ва танқидий хулоса беради. Жумладан, Миллий гвардия фаолиятини баҳоловчи электрон тизимлар ва сунъий интеллект дастурлари *(масалан, “E-Patrol” ёки “E-Ma'muriy ish”)* ходимга фақат ёрдамчи, қарор қабул қилишни қўллаб-қувватловчи *(decision-support)* вазифасини ўташи керак, аммо уларнинг қарорларини императив тарзда белгилаб берувчи ва механик тарзда баҳоловчи рақамли диктаторга айланмаслиги қонун билан кафолатланиши шарт.

Шу ўринда, рақамли адолатнинг халқаро-ҳуқуқий стандартлари ва Европа Иттифоқининг Сунъий Интеллект тўғрисидаги Акти *(EU AI Act)* талабларига назар ташласак. Хусусан, жамоат хавфсизлиги соҳасида сунъий интеллект, рақамли далиллар ва катта маълумотлардан фойдаланишнинг халқаро норматив базаси сўнгги 5 йил ичида мисли кўрилмаган тезликда шаклланмоқда. БМТнинг Жиноятчиликнинг олдини олиш ва жиноий одил судлов бўйича комиссияси (CCPCJ) нинг қарорларида ҳамда БМТнинг 2021 йилги *Киото декларациясида* рақамли технологияларни жиноий ва маъмурий одил судловга жорий этишда инсон ҳуқуқларини ҳимоя қилиш, алгоритмик нохолисликни бартараф этиш ва ахборот хавфсизлигини таъминловчи қатъий норматив-ҳуқуқий базаларни яратишга алоҳида урғу

[13] *Stern R. E., Liebman B. L., Roberts M. E., Wang A. Z.* Automating Fairness? Artificial Intelligence in the Chinese Courts // Columbia Journal of Transnational Law. – 2021. – Vol. 59. – No. 3. – P. 515-553.

берилган[14]. Хусусан, БМТнинг Наркотиклар ва жиноятчилик бўйича бошқармасининг (UNODC) 2021-2025 йилларга мўлжалланган Стратегиясида давлатларга ҳуқуқни муҳофаза қилувчи органларнинг электрон фаолияти устидан *“Инсоний назорат” (Human Oversight)* механизмини сақлаб қолиш қатъий тавсия этилади[15].

Бундан ташқари, *Европада Хавфсизлик ва Ҳамкорлик Ташкилоти (ЕХҲТ)* ва *Европол (Europol)* томонидан ишлаб чиқилган стандартлар рақамлаштириш жараёнларининг этик ва ҳуқуқий чегараларини белгилаб беради. Европол томонидан ишлаб чиқилган *“Ҳуқуқни муҳофаза қилишда ахлоқий технологиялар доираси” (Framework for Ethical Technology in Law Enforcement)* бўйича баёнотида ҳуқуқ-тартибот органлари учун рақамли трансформациянинг хавфларини баҳолаш учун 7 босқичли ахлоқий-ҳуқуқий экспертиза *(ethical assessment method)* жорий этилиши мажбурий этиб белгиланган[16].

[14] Kyoto Declaration on Advancing Crime Prevention, Criminal Justice and the Rule of Law: Towards the Achievement of the 2030 Agenda for Sustainable Development // 14th United Nations Congress on Crime Prevention and Criminal Justice. – Kyoto, 7-12 March 2021. – UN Doc. A/CONF.234/16. – P. 11-13.

[15] Жиноятчиликнинг олдини олиш ва ҳуқуқни муҳофаза қилиш органлари фаолиятига инновацион ва рақамли технологияларни жорий этишда инсон ҳуқуқларини устувор қўйиш ва бевосита *“инсоний назорат” (human oversight)* механизмини кафолатлаш бўйича мақсадли вазифалар ҳақида батафсил қаранг: UNODC Strategy 2021–2025 // United Nations Office on Drugs and Crime. – Vienna: United Nations, 2021. – P. 26-29. – URL: https://www.unodc.org/unodc/en/strategy/index.html

[16] Европол ва бошқа Европа тузилмалари томонидан ҳуқуқни муҳофаза қилиш органларида рақамли технологияларни жорий этишнинг ахлоқий-ҳуқуқий чегараларини белгилаб берувчи асосий стандартлар ҳақида батафсил қаранг: Accountability Principles for Artificial Intelligence (AP4AI) Framework // Europol, Eurojust. – The Hague: Europol, 2022. – P. 12-18. – URL: https://www.europol.europa.eu/publications-events/publications/accountability-principles-for-artificial-intelligence-ap4ai-framework; Шунингдек, рақамли тизимлар ва алгоритмларнинг хавфларини баҳоловчи 7 босқичли ахлоқий-ҳуқуқий экспертиза *(ethical assessment method)* бўйича Европа Иттифоқининг таянч ҳужжати: Assessment List for Trustworthy Artificial Intelligence (ALTAI) for self-assessment // Independent High-Level Expert Group on Artificial Intelligence. – Brussels: European Commission, 2020. – 33 p.

Бироқ, ушбу соҳадаги энг мукаммал, инқилобий ва бутун дунё учун прецедент вазифасини ўтовчи ҳужжат бу – Европа Парламенти томонидан 2024 йилда қабул қилинган Европа Иттифоқининг Сунъий Интеллект тўғрисидаги Актидир *(Regulation 2024/1689 – EU AI Act).* Ушбу ҳужжат сунъий интеллект тизимларини уларнинг жамият, инсон ҳуқуқлари ва хавфсизлик учун хавфлилик даражасига қараб турларга ажратади ва ҳуқуқни муҳофаза қилувчи органлар томонидан қўлланиладиган технологияларни бевосита ва қатъий тартибга солади[17].

EU AI Act нинг энг муҳим жиҳати шундаки, унинг *III-иловасига (Annex III)* мувофиқ, ҳуқуқни муҳофаза қилувчи органлар, жумладан *полиция, жандармерия* ва *миллий гвардия* томонидан фаолиятни ташкил этиш ва баҳолаш учун қўлланиладиган қатор сунъий интеллект тизимлари мутлақ *"Юқори хавфли" (High-risk AI systems)* тоифасига киритилган[18]. Актга мувофиқ, мазкур юқори хавфли тизимларни амалиётда ва ходимларни баҳолашда қўллашдан олдин давлат органлари қатъий *"Мувофиқликни баҳолаш" (Conformity assessment)* тартиб-таомилидан ўтишлари шарт[19].

[17] Европа Иттифоқининг Сунъий интеллект тўғрисидаги Актининг (EU AI Act) расмий матни ҳамда ҳуқуқни муҳофаза қилувчи органлар томонидан қўлланиладиган технологияларни *"юқори хавфли" (high-risk)* тоифасига киритувчи ва уларни қатъий тартибга солувчи нормалари *(III Илова – Annex III)* ҳақида батафсил қаранг: Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending certain Union legislative acts *(Artificial Intelligence Act)* // Official Journal of the European Union. – 2024. – L, 2024/1689, 12.07.2024. – URL: https://eur-lex.europa.eu/eli/reg/2024/1689/oj

[18] Ҳуқуқни муҳофаза қилувчи органлар фаолиятида қўлланиладиган сунъий интеллект тизимларини *(шу жумладан, фаолиятни баҳолаш, профиллаштириш ва хавфни аниқлаш алгоритмларини)* мутлақ *"Юқори хавфли" (High-risk)* тоифасига киритувчи қатъий нормалар ҳақида батафсил қаранг: Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending certain Union legislative acts *(Artificial Intelligence Act)* // Official Journal of the European Union. – 2024. – L, 2024/1689, 12.07.2024. – Annex III. High-risk AI systems (Point 6. Law enforcement). – URL: https://eur-lex.europa.eu/eli/reg/2024/1689/oj

[19] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) // Official Journal

4-бетида кўрсатилганидек, бунда тизимнинг техник ҳужжатлари, хавфларни бошқариш режалари ва ўқув маълумотларининг *(training data)* сифати назоратдан ўтказилиши, дискриминацион омиллардан холи эканлиги исботланиши ҳамда барча жараёнларнинг инсон томонидан назорат қилиниши *(human oversight)* тўлиқ таъминланиши талаб этилади.

Шунингдек, ЕИ Акти жамоат жойларида реал вақт режимида *(real-time)* масофавий биометрик идентификация қилишни *(фавқулодда ҳолатлар, террорчилик таҳдидлари бундан мустасно),* одамларнинг ижтимоий хулқ-атворига қараб балл берувчи *“Ижтимоий рейтинг” (Social scoring)* тизимларини ҳамда интернетдан юз тасвирларини мақсадсиз йиғишни *(untargeted scraping)* мутлақо тақиқлайди *(Prohibited AI practices)*[20]. Европа рақамли ҳуқуқ доирасида қабул қилинган яна бир муҳим ҳужжат – *“Рақамли адолат” регламенти (Digital Justice Regulation 2023/2844)* бўлиб, у чегараларараро фуқаролик ва жиноий ишларда маълумот алмашишни “сукут бўйича рақамли” (digital by default) тамойили асосида тартибга солади ва бутун Европа адлия маконини ягона электрон платформага бирлаштиради[21].

Ўзбекистон Республикаси Миллий гвардиясининг фаолиятини баҳолаш тизимини рақамлаштиришда ушбу Европа ва халқаро стандартлари муҳим консептуал аҳамиятга эга. Яъни, ходимларнинг хизмат интизоми ва фаолият натижадорлигини ўлчаш мақсадида фуқароларнинг биометрик ва шахсий маълумотларидан назоратсиз фойдаланиш ёки ходимга балларни автоматик

of the European Union. – 2024. – L, 2024/1689, 12.07.2024. – Chapter III. Section 2 (Requirements for high-risk AI systems, Articles 9-14); Section 4 (Conformity assessment, Article 43). – URL: https://eur-lex.europa.eu/eli/reg/2024/1689/oj

[20] Ўша манбаа: https://eur-lex.europa.eu/eli/reg/2024/1689/oj

[21] Regulation (EU) 2023/2844 of the European Parliament and of the Council of 13 December 2023 on the digitalisation of judicial cooperation and access to justice in cross-border civil, commercial and criminal matters, and amending certain acts in the field of judicial cooperation // Official Journal of the European Union. – 2023. – L Series, 27.12.2023. – URL: https://eur-lex.europa.eu/eli/reg/2023/2844/oj

равишда пасайтирувчи ёпиқ *“қора қути” (black-box)* алгоритмларини жорий этиш юқоридаги халқаро инсон ҳуқуқлари нормаларига бевосита зид ҳисобланади. Шу сабабли, Европол талабларига ва Европа иттифоқининг Сунъий Интеллект Акти нормаларига мос равишда, Ўзбекистон миллий қонунчилигида ҳам ҳуқуқни муҳофаза қилувчи органлар томонидан қўлланиладиган алгоритмларни мажбурий ҳуқуқий ва ахлоқий экспертизадан ўтказиш тизими шакллантирилиши стратегик заруриятдир.

Шу ўринда, маъмурий иш юритишда рақамли далиллар ва *Blockchain* технологияларининг процессуал аҳамиятига тўхталиб ўтсак. Хусусан, *“Ақлли адолат”* тизимининг яна бир муҳим йўналиши бу – ҳуқуқбузарликларни қайд этиш, далилларни тўплаш ва қарорлар қабул қилиш жараёнида мутлақо янги технологик воситаларни, хусусан, блокчейн ва ақлли шартномалар *(smart contracts)* технологияларини жорий этишдир. Ҳозирги кунда электрон шаклда сақланадиган маълумотларнинг *(Electronically Stored Information - ESI)* мураккаблашиб бориши анъанавий ҳуқуқни қўллаш механизмларининг, жумладан, қоғозбозликка асосланган маъмурий баённомаларнинг тезкорлиги ва шаффофлиги талабга жавоб бермаслигини кўрсатмоқда[22].

Сўнгги илмий тадқиқотлар, хусусан *Ping Han* томонидан блокчейн ва сунъий интеллектни низоларни ҳал қилиш тизимларига интеграция қилиш бўйича олиб борилган тажрибалар *(Ethereum ва Hyperledger Fabric тармоқларида)* шуни исботладики, далилларни блокчейн реестрларида сақлаш ва алгоритмлар орқали қарорларни автоматик шакллантириш ишни кўриб чиқиш вақтини 99,5 %га қисқартирган, далилларнинг бузилиши *(тамперинг)* хавфини 99 %га аниқлаган ва мутахассислар қарорлари билан 92,4 % мос келган. Бундай

[22] *Han P.* AI-powered digital arbitration framework leveraging smart contracts and electronic evidence authentication // PubMed Central. – PMCID: PMC12552710; PMID: 41136499. – URL: https://pmc.ncbi.nlm.nih.gov/articles/PMC12552710/

тизим учта асосий қатламдан *(layer)* иборат бўлади: *1) автоматик ижро этилувчи ҳуқуқий шартларни ўзида мужассамлаган ақлли шартнома қатлами; 2) далилларнинг яхлитлиги, ҳақиқийлиги ва кузатувчанлигини (traceability) таъминловчи блокчейн қатлами; 3) далилларни классификация қилувчи ва қонун доирасида таҳлил қилувчи сунъий интеллект қатлами*[23].

Агар ушбу илғор технологик ёндашувни Миллий гвардиянинг маъмурий ҳуқуқни қўллаш амалиётига *(масалан, МЖтК доирасидаги ҳуқуқбузарликларни расмийлаштиришга)* татбиқ этсак, патруль ходимининг кўкрак бодикамераси *(BWC)* ёки планшети орқали қайд этилган ҳуқуқбузарлик факти реал вақт режимида блокчейн тармоғига юборилади. Бу маълумотни *орқага қайтиб ўчириш, ўзгартириш* ёки *сохталаштириш* техник жиҳатдан имконсиз бўлади. Ўз навбатида, баҳолаш (KPI) тизими ходимнинг ушбу жараёндаги тезкорлиги ва адолатлилигини автоматик қайд этиб боради. Бу тизим АҚШ судларида қўлланиладиган қатъий *"Daubert стандарти"* талабларига ҳам *(рақамли далилларнинг ишончлилиги ва илмий асосланганлиги бўйича)* тўлиқ жавоб бера оладиган даражада мустаҳкам бўлиши илмий тасдиқланган[24].

Шу ўринда, Янги Ўзбекистонда давлат ва жамият бошқарувининг барча соҳаларида рақамли трансформация жараёнлари давлат сиёсатининг энг устувор йўналишларидан бирига айланган. Хусусан, Ўзбекистон Республикаси Президентининг 2020 йил 5 октябрдаги ПФ-6079-сон Фармони билан тасдиқланган *"Рақамли Ўзбекистон – 2030"* стратегияси доирасида ахборот-коммуникация технологияларини таълим, соғлиқни сақлаш ва айниқса, ҳуқуқни муҳофаза қилиш тизимига интеграция қилиш жадал амалга оширилмоқда[25].

[23] *Ўша манбаа*: https://pmc.ncbi.nlm.nih.gov/articles/PMC12552710/

[24] *Ugwudike P.* 25 years of technology use in policing // International Journal of Police Science and Management. – 2024. – Vol. 26, No. 4. – P. 478-486. – DOI: 10.1177/14613557241-298863.

[25] Ўзбекистон Республикаси Президентининг 2020 йил 5 октябрдаги *""Рақамли Ўзбекистон – 2030" стратегиясини тасдиқлаш ва уни самарали амалга ошириш чора-*

Мазкур стратегия асосида электрон ҳукумат инфратузилмаси тубдан янгиланиб, қоғозбозликни қисқартириш ва фуқароларга хизмат кўрсатиш сифатини ошириш мақсад қилинган.

Бу йўналишдаги энг муҳим қадамлардан бири сифатида, Ўзбекистон Республикаси Президентининг 2024 йил 14 октябрдаги ПҚ-358-сон қарори билан тасдиқланган *“2030 йилгача сунъий интеллект технологияларини ривожлантириш стратегияси”*ни кўрсатиш мумкин[26]. Тадқиқотчилар томонидан қайд этилганидек, ушбу ҳужжат давлат бошқаруви ва хавфсизлик органларида инновацион алгоритмларни қўллаш, биометрик маълумотларни таҳлил қилиш ҳамда миллий рақамли экотизимни яратиш учун мустаҳкам сиёсий-ҳуқуқий пойдевор вазифасини ўтайди.

Шунингдек, халқаро ҳамкорлик доирасида ҳам йирик рақамли лойиҳалар ҳаётга татбиқ этилмоқда. Жумладан, БМТнинг Наркотиклар ва жиноятчилик бўйича бошқармаси *(UNODC)* ва АҚШ Давлат департаменти (INL) кўмагида Ўзбекистон Республикаси Бош прокуратураси ва ҳуқуқни муҳофаза қилувчи органлар иштирокида *“Халқаро ҳуқуқий ҳамкорлик жараёнларини рақамлаштириш”* лойиҳаси муваффақиятли жорий этилди[27]. Ушбу лойиҳа натижасида трансчегаравий жиноятларга қарши курашиш, ўзаро ҳуқуқий ёрдам (MLA) сўровларини электрон шаклда юбориш ва қайта ишлаш тезлиги сезиларли

*тадбирлари тўғрисида”*ги ПФ-6079-сон Фармони // Қонун ҳужжатлари маълумотлари миллий базаси. – URL: https://lex.uz/docs/5030957

[26] Ўзбекистон Республикаси Президентининг 2024 йил 14 октябрдаги *“Сунъий интеллект технологияларини 2030 йилга қадар ривожлантириш стратегиясини тасдиқлаш тўғрисида”*ги ПҚ-358-сон қарори // Қонунчилик маълумотлари миллий базаси, 15.10.2024 й. // URL: https://lex.uz/docs/7158604

[27] Strengthening Uzbekistan's Capacity for Cross-Border Justice: Digitalization Project Delivers New IT Equipment to the PGO // БМТнинг Наркотиклар ва жиноятчилик бўйича бошқармаси (UNODC) минтақавий ваколатхонаси расмий сайти, 2025 й. URL: https://www.unodc.org/roca/en/NEWS/2025/strengthening-uzbekistans-capacity-for-cross-border-justice -digitalization-project-delivers-new-it-equipment-to-the-pgo.html

даражада ошди. Қолаверса, Марказий Осиё минтақаси бўйича ЕХҲТ (OSCE) ва Европа Иттифоқининг LEICA лойиҳалари доирасида ҳуқуқ-тартибот органлари ходимларини рақамли профиллаш *(digital profiling)*, рақамли тергов ва кибержиноятчиликка қарши кураш бўйича ўқитиш тизимли йўлга қўйилган[28]. Бундай лойиҳалар, масалан, Қозоғистон Бош прокуратураси тажрибасида ҳам кўринганидек, предиктив таҳлил *(Predictive analytics)* тизими орқали 83 % аниқлик билан жиноят ўчоқларини башорат қилиш ва ресурсларни оптималлаштириш имконини бермоқда[29].

Бироқ, глобал ютуқлар ва қабул қилинган стратегик ҳужжатлар фонида, Миллий гвардиянинг маъмурий ҳуқуқни қўллаш амалиёти ва ходимларни баҳолаш тизимининг жорий ҳолатини таҳлил қилганимизда, миллий қонунчилигимизда ва идоравий-меъёрий амалиётда ҳали ҳам жиддий институционал ва ҳуқуқий бўшлиқлар мавжудлиги кўзга ташланади.

Биринчидан, "Маълумотлар бункери" ёки изоляцияси (Data-Silo) муаммоси. Тўғри, бугунги кунда *"E-Patrol", "E-Ma'muriy ish"* тизимлари ҳамда Ички ишлар вазирлигининг маълумотлар базалари ишлаб чиқилган ва фаолият юритмоқда. Аммо уларнинг ўзаро узлуксиз интеграцияси *(interoperability)* ҳамда Миллий гвардия қуйи бўғин ходимларининг *(кўчадаги патрулларнинг)* мобил қурилмаларига тўлиқ ва тўсиқсиз уланиши етарли даражада ҳуқуқий ва техник жиҳатдан таъминланмаган. Оқибатда, юқорида келтирилган хорижий *(масалан, Буюк Британиянинг Police National Computer ёки Германиянинг INPOL-Neu)* тизимларидан фарқли ўлароқ, бизда патруль ходими воқеа жойида туриб фуқаронинг тўлиқ электрон профилини олиш, унинг муқаддам қилган

[28] Education of criminal justice actors in Central Asia on cybercrime and digital evidence discussed at regional meeting in Tashkent // EXҲT (OSCE) // https://www.osce.org/secretariat-/538713;

[29] Training on combating illicit trade on the dark web is held in Tashkent (LEICA project) // https://www.eeas.europa.eu/delegations/uzbekistan/training-combating-illicit-trade-dark-web-held-tashkent_en

ҳуқуқбузарликларини сониялар ичида текшириш имкониятига доим ҳам эга эмас. Фуқарони шахсини аниқлаш учун Ички ишлар бўлимига ёки таянч пунктига олиб бориш амалиёти ҳанузгача сақланиб қолмоқда, бу эса маъмурий-процессуал вақтнинг йўқотилишига ва фуқароларнинг норозилигига сабаб бўлади.

Иккинчидан, Ўзбекистон Республикасининг *"Шахсга доир маълумотлар тўғрисида"*ги Қонунида шахсга доир маълумотларни тўплаш, қайта ишлаш ва узатиш бўйича қатъий талаблар белгиланган бўлса-да[30], ушбу қонунчиликда айнан *автоматлаштирилган алгоритмлар ва сунъий интеллект орқали қарор қабул қилиш (Automated decision-making)* жараёнларида фуқароларнинг ва давлат хизматчиларининг ҳуқуқларини ҳимоя қилувчи махсус нормалар мутлақо етишмайди. *Масалан,* агар Миллий гвардия хизматчисининг ойлик KPI балли ва молиявий рағбатлантирилиши рақамли алгоритм *(баҳолаш дастури)* томонидан пасайтирилса, ушбу *"рақамли қарор"* устидан шикоят қилиш, алгоритмнинг қандай мезонларга асосланиб бундай хулосага келганини тушунтириб беришни талаб қилиш *(right to explanation)* механизмлари миллий меъёрий ҳужжатларда назарда тутилмаган. Тадқиқотчилар томонидан кўрсатилганидек, Ўзбекистонда сунъий интеллектни тартибга солиш бўйича қадамлар қўйилаётган бўлса-да, алгоритмик ҳисобдорлик *(algorithmic accountability)* ва кучли ижро механизмларининг *(enforcement mechanisms)* етишмаслиги ушбу

[30] *Promoting investment in support of Uzbekistan's digital transformation* // Roadmap for Sustainable Investment Policy Reforms in Uzbekistan. – Paris: OECD Publishing. URL: https://www.oecd.org/en/publications/roadmap-for-sustainable-investment-policy-reforms-in-uzbekistan_20865f29-en/full-report/promoting-investment-in-support-of-uzbekistan-s-digital-transformation_d5635702.html

технологияларни куч ишлатар тузилмаларда қўллашда инсон ҳуқуқлари учун яширин хавфларни келтириб чиқариши мумкин[31].

Юқорида олиб борилган кенг қамровли назарий, криминологик ва қиёсий-ҳуқуқий таҳлилларга таяниб, Ўзбекистон Республикаси Миллий гвардиясининг жамоат хавфсизлигини таъминлаш ва ҳуқуқбузарликлар профилактикаси фаолиятини баҳолаш тизимини тўлиқ рақамлаштириш, уни жазоловчи статистикадан инсонпарвар *"Ақлли адолат" (Smart Justice)* стандартларига мослаштириш мақсадида, мазкур тадқиқот доирасида мантиқий асосланган ***Рақамли-Интеграциялашган Рейтинг Моделини (DIRM – Digital-Integrated Rating Model)*** бевосита норматив-ҳуқуқий ҳужжатларда қатъий мустаҳкамлаш таклиф этилади.

Баҳолаш мезони ва параметрлари	**Анъанавий *(Жазоловчи/Экстенсив)* баҳолаш модели**	**"Ақлли адолат" (DIRM) ва рақамли баҳолаш модели (ЕИ стандартлари асосида)**	**Ҳуқуқий ва криминологик оқибати**
Асосий KPI кўрсаткичи	Расмийлаштирилган маъмурий баённомалар, жарималар суммаси ва ушланган шахслар сони.	Воқеа жойининг ўзида *(электрон планшет орқали)* ҳал этилган низолар ва рақамли қайд этилган профилактик огоҳлантиришлар сони.	Ходимларни жазолашга эмас, балки муаммони жойида, тезкор ва инсонпарвар усулда ҳал қилишга *(de-escalation)* ундайди.
Фуқароларнинг	Жуда паст.	Юқори. Фуқаролар	Жамият ва гвардия

[31] *Rakhmatov D.* Balancing Innovation and Regulation: Uzbekistan's Strategy for AI-Driven Digital Transformation // 6.2 DevelopingDetailedEnforcementMechanisms. P-14. // article_uzbeklaw.pdf

баҳолашдаги иштироки	Фақатгина расмий, ёзма равишда келиб тушган асосли шикоятлар орқали интизомий жазо сифатида таъсир қилади.	томонидан SMS ёки мобил илова *(E-Community Trust Index)* орқали берилган баҳолар ходимнинг умумий рейтингининг 30% ини ташкил қилади.	ўртасидаги ишонч мустаҳкамланади. Ходимнинг муомала маданияти *(legitimacy)* реал баҳоланади.
Маълумотлар интеграцияси *(Interoperability)*	Ёпиқ идоравий тизимлар (Data-Silo). Маълумотларни аниқлаш учун бўлимга бориш ва қоғозбозлик талаб этилади.	Ягона электрон тармоқ орқали барча давлат базаларига *(ФХДЁ, Суд, ИИВ)* реал вақт режимида блокчейн ёрдамида уланиш.	Фуқароларни асоссиз ушлаб туриш ҳолатларига чек қўйилади, процессуал тезкорлик кафолатланади.
Қарор қабул қилиш ва алгоритмик назорат	Идоравий раҳбариятнинг субъектив фикри ва буйруқларига асосланган “қўлда бошқарув”.	Сунъий интеллект ёрдамида катта маълумотларни таҳлил қилиш, лекин якуний қарор инсон *(Human-in-the-loop)* томонидан тасдиқланади.	Коррупцион хавфлар йўқолади, баҳолаш шаффофлашади, аммо алгоритмик диктатурага *(алгоритмик хатоликларга)* йўл қўйилмайди.
Ҳудудий криминоген ҳолатнинг баҳолашга таъсири	Оғир ҳудудда ишловчи ходим кўп баённома тузгани учун юқори балл, тинч ҳудуддагиси эса кам балл олади *(Ноҳақлик)*.	Тизим автоматик равишда ҳудуднинг ижтимоий-демографик оғирлигини ҳисобга олувчи *“мослаштирувчи коэффициент”*ни қўллайди.	Алгоритмик нохолислик *(Algorithmic bias)* ва ижтимоий тенгсизлик бартараф этилади, адолатли рақобат муҳити яратилади.

Ушбу DIRM моделини миллий қонунчиликка жорий этишнинг ҳуқуқий механизми сифатида, биринчи навбатда, 2020 йил 18 ноябрдаги *“Ўзбекистон Республикасининг Миллий гвардияси тўғрисида”*ги ЎРҚ-647-сонли Қонунининг 4-бобига *(“Миллий гвардия хизматчиларини ҳуқуқий ва ижтимоий ҳимоя қилиш”)* киритиш талаб этилади:

1. Алгоритмик шаффофлик ва инсон назоратини (Human-in-the-Loop) ҳуқуқий кафолатлаш. Қонунчиликда Миллий гвардия хизматчиларининг фаолияти устидан электрон, шу жумладан, сунъий интеллект ёрдамида олиб бориладиган ҳар қандай мониторинг ва баҳолаш (KPI) жараёнларида охирги ва ҳал қилувчи қарор фақатгина ваколатли мансабдор шахс (инсон) томонидан қабул қилиниши шартлиги белгиланиши лозим. 6-бетида кўрсатилганидек [20], ЕИ Сунъий Интеллект Актидан (EU AI Act) келиб чиқиб, баҳолаш дастурлари фақат тавсиявий (decision-support) хусусиятга эга бўлиши, алгоритм томонидан ходимга берилган паст балл ёки интизомий жазо тавсияси автоматик равишда юридик кучга эга бўлмаслиги қонун даражасида кафолатланиши керак. Ушбу механизм ходимларни тизимнинг нотўғри дастурий хатоликларидан мутлақ ҳимоя қилади ҳамда алгоритмнинг қарори юзасидан тушунтириш олиш ҳуқуқини (right to explanation) тақдим этади.

2. Баҳолашда “Диспозитив натижадорлик”ни рақамли рағбатлантириш.

DIRM моделининг фундаментал моҳияти шундаки, Миллий гвардия хизматчиларининг фаолияти уларнинг қанча баённома тузгани ёки инсонларни жаримага тортгани билан эмас, балки рақамли технологиялардан *(масалан, планшет орқали “E-Patrol” тизимидан)* фойдаланиб, фуқарони асоссиз ушлаб турмасдан, муаммони жойида электрон тарзда ҳал қилгани *(профилактик тушунтириш ва огоҳлантириш билан кифояланган)* орқали баҳоланиши керак. Хусусан, Ўзбекистон Республикасининг Маъмурий жавобгарлик тўғрисидаги

кодекси 281-моддаси *(Маъмурий ҳуқуқбузарлик тўғрисидаги баённомани тузиш)* қуйидаги мазмундаги қисм билан тўлдириш таклиф этилади:

“Миллий гвардия органларининг мансабдор шахслари томонидан маъмурий ҳуқуқбузарликларни қайд этиш ва баённомани расмийлаштириш, қоида тариқасида, ҳуқуқбузарлик содир этилган жойнинг ўзида махсус электрон мобил қурилмалардан фойдаланган ҳолда, маъмурий ҳуқуқбузарликлар тўғрисидаги ишларни юритишнинг ягона электрон ахборот тизими орқали амалга оширилади”.

Юридик техникада *“қоида тариқасида”* атамаси қўшилишининг сабаби — тоғли ҳудудларда интернет йўқлиги ёки қурилма бузилиши каби форс-мажор ҳолатларида қоғоз баённома тузиш имкониятини очиқ қолдиришга хизмат қилади.

Шунингдек, 2020 йил 18 ноябрдаги ЎРҚ-647-сон *“Ўзбекистон Республикасининг Миллий гвардияси тўғрисида”*ги Қонуннинг 22-моддаси *(Миллий гвардияда хизматни ўташ)* қуйидаги мазмундаги *олтинчи* ва *еттинчи* қисмлар билан тўлдирилсин:

“Миллий гвардия хизматчиларининг хизмат фаолияти самарадорлиги рақамли-интеграциялашган рейтинг тизимлари асосида баҳолаб борилади. Маъмурий ҳуқуқбузарлик ҳолатлари ва профилактик ҳаракатларнинг Миллий гвардия хизматчиси томонидан ягона электрон ахборот тизимларида ўз вақтида ҳамда тўлиқ қайд этилиши – унинг хизмат фаолияти самарадорлигини ижобий баҳоловчи ва моддий рағбатлантиришни белгиловчи устувор мезон ҳисобланади”.

3. “Электрон жамоатчилик ишончи индекси”ни *(E-Community Trust Index)* ***легаллаштириш.*** Халқаро полицияшунослик тажрибасида, хусусан, Буюк Британиянинг PEEL дастури ва Япониянинг машҳур Кобан тизимида

кўрсатилганидек[32], фаолиятни баҳолашда фуқароларнинг бевосита иштирокини рақамли тарзда таъминлаш ўта зарурдир. Миллий гвардия ходими билан мулоқотда бўлган ҳар бир фуқарога давлат хизматлари марказларидаги каби СМС ёки мобил илова орқали ходимнинг муомала маданияти, компетентлиги ва қонунийлигига балл бериш *(1 дан 5 гача)* имконияти яратилиши ва бу балл тўғридан-тўғри ходимнинг ойлик KPI рейтингига таъсир қилиши лозим. Ушбу механизмни ҳуқуқий жиҳатдан мустаҳкамлаш учун Ўзбекистон Республикаси Вазирлар Маҳкамасининг қарори билан тасдиқланадиган *"Жамоат хавфсизлигини таъминловчи субъектлар фаолиятини баҳолаш тартиби тўғрисида"*ги Низомда фуқароларнинг электрон сўровнома натижалари (Feedback) умумий баҳолаш вазнининг *(weight)* камида 30 %ни ташкил этиши мажбурий қоида сифатида мустаҳкамланиши лозим.

4. Предиктив таҳлил (Predictive Analytics) оқибатидаги алгоритмик нохолислик ва ижтимоий тенгсизликнинг олдини олиш. Миллий гвардия фаолиятига криминоген *"иссиқ нуқталарни" (hot spots)* ва жиноятларни башорат қилувчи сунъий интеллект тизимлари жорий этилганда, қонунчиликда *алгоритмик камситишларни (algorithmic bias/discrimination)* тақиқловчи механизм бўлиши шарт. 9-бетида кўрсатилганидек[33], тарихий маълумотлардаги тенгсизлик алгоритм орқали янада кучайиши мумкин. Яъни, ходимларнинг хизмат юки ва уларнинг KPI балларини ҳисоблашда, электрон тизим автоматик равишда ҳудуднинг ижтимоий-иқтисодий ва демографик оғирлигини ҳисобга олувчи *"мослаштирувчи коэффициент" (adjusting coefficient)*ни қўллаши керак.

[32] *Ekaabi M. A.* Smart policing service quality: conceptualisation, development and validation / M. A. Ekaabi, K. Khalid, R. Davidson, A. H. Kamarudin, C. Preece // Policing: An International Journal. – 2020. – Vol. 43, № 5. – P. 707-721.

[33] *Scheer G.* Deploying AI in Law Enforcement: Practical Guidelines for European Agencies / G. Scheer ; Cybercrime Research Institute for CYCLOPES. – 2025. – 18 p. – URL: https://backend.cyclopes-project.eu/wp-content/uploads/2025/12/Deploying-AI-in-Law-Enforcement-Practical-Guidelines-for-European-Agencies.pdf

Оғир криминоген ҳудудда хизмат қилаётган ходимнинг рейтинги, фақатгина ўша ҳудудда жиноятлар кўплиги ёки аҳолининг зичлиги сабабли сунъий пасайтирилмаслиги, аксинча, унинг профилактик саъй-ҳаракатлари *(ҳатто улар кичик кўламда бўлса ҳам)* юқорироқ коэффициентда адолатли баҳоланиши қонуности ҳужжатларида аниқ кўрсатилиши зарур.

5. Маълумотлар интеграцияси (Interoperability) бўйича идоралараро мажбуриятларни қатъийлаштириш. *"Ақлли адолат"* тизими тўлақонли ишлаши ва ўз натижасини бериши учун Ички ишлар вазирлиги, Адлия вазирлиги, Соғлиқни сақлаш вазирлиги ва Олий суднинг маълумотлар базаларини ягона Миллий гвардиянинг мобил платформаси билан тўлиқ интеграция қилишни мажбурий этувчи Ҳукумат қарори лозим. Бунда ЕИнинг *"Рақамли адолат"* регламентидаги *(Digital Justice Regulation 2023/2844) "сукут бўйича рақамли" (digital by default)* тамойили асосида[34], барча маъмурий ҳуқуқбузарлик ишлари ва профилактик ҳисоблар фақат электрон шаклда юритилиши, қоғозбозликка узил-кесил чек қўйилиши ва ахборот алмашинуви учун мавжуд бўлган барча идоралараро бюрократик тўсиқлар олиб ташланиши ҳуқуқий жиҳатдан кафолатланиши керак. Фақат шундагина бодикамералар, планшетлар ва блокчейн тизимлари ўзининг ҳақиқий профилактик самарасини беради.

Хулоса қилиб айтганда, Ўзбекистон Республикаси Миллий гвардияси фаолиятини баҳолаш тизимига *"Ақлли адолат" (Smart Justice)* ва рақамли технологияларни жорий этиш шунчаки техник воситаларни харид қилиш ёки компьютерлаштириш жараёни эмас, балки давлат бошқарувидаги чуқур маъмурий-ҳуқуқий ва институционал ислоҳотдир. Мазкур тадқиқотда ишлаб

[34] *Ho-Dac M.* Digitalisation of Justice Systems in the European Union: Towards a European Judicial Area 2.0 // https://eapil.org/2024/02/06/digitalisation-of-justice-systems-in-the-european-union-towards-a-european-judicial-area-2-0/

чиқилган илмий-назарий хулосалар ва таклиф этилган Рақамли-Интеграциялашган Рейтинг Модели (DIRM) Миллий гвардия фаолиятини бутунлай янги, инсонпарвар, шаффоф ва халқаро инсон ҳуқуқлари стандартларига *(жумладан, Европа Иттифоқининг Сунъий Интеллект Акти ва БМТнинг UNODC нормаларига)* тўла мос келувчи стратегик босқичга олиб чиқади.

Сунъий интеллект, предиктив таҳлил ва рақамли баҳолаш алгоритмларининг миллий қонунчилик даражасида тўғри ва хавфсиз тартибга солиниши, бир томондан, Миллий гвардия хизматчиларини субъектив ва ноҳақ баҳолашлардан, коррупциоген омиллардан ва ортиқча бюрократик қоғозбозликдан ҳимоя қилса, иккинчи томондан, давлат ҳокимиятининг легитимлигини, халқнинг жамоат хавфсизлиги тузилмаларига бўлган юксак ишончини ва Янги Ўзбекистонда қонун устуворлигини мутлақ кафолатлашга хизмат қилади. Одил ва ақлли адолат фақатгина жиноятчини жазолашда ёки жарима ундиришда эмас, балки жамоат тартибини сақловчи ва фуқароларнинг осойишталигини қўриқловчи ҳар бир ходимнинг оғир меҳнатини адолатли, рақамли ва холис баҳолашдан, уларни ўз хизмат вазифасини инсон қадрини улуғлаган ҳолда бажаришга рағбатлантиришдан бошланади.

ADENOMATOID ODONTOGEN O‘SMA VA UNING DIFFERENSIAL DIAGNOSTIKASI

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Annotatsiya

Adenomatoid odontogen o‘sma (AOT) – yosh bemorlarda, ayniqsa qizlarda ko‘proq uchraydigan xavfsiz odontogen o‘sma bo‘lib, ko‘pincha yuqori jag‘da chiqmagan tish (odatda ko‘z tishi) atrofida joylashadi. Klinik va rentgenologik jihatdan u dentigerous kista yoki unikistik ameloblastomaga o‘xshashi mumkin, shuning uchun differensial diagnostika muhim ahamiyatga ega. Gistologik jihatdan duktsimon tuzilmalar, to‘plamlar va kaltsifikatsiyalar xarakterli. Immunogistokimyoviy tekshiruvda CK14 va CK19 ijobiy bo‘ladi. Davolash odatda oddiy enukleatsiya bilan cheklanadi va qaytalanish juda kam. Tezisda AOT ning klinik-rentgenologik xususiyatlari, gistologik belgilar va asosiy differensial tashxislar yoritilgan.

Kalit so‘zlar: adenomatoid odontogen o‘sma, AOT, differensial diagnostika, dentigerous kista, unikistik ameloblastoma, enukleatsiya, yosh bemorlar.

Kirish.

Yosh bemorda, ayniqsa 10–20 yosh oralig‘ida, yuqori jag‘da chiqmagan tish atrofida yorug‘lik aniqlansa, ko‘pincha birinchi o‘yga dentigerous kista keladi. Lekin ba’zida bu adenomatoid odontogen o‘sma bo‘lib chiqadi. AOT xavfsiz, sekin o‘sadigan va yaxshi chegaralangan o‘sma bo‘lsa-da, uni boshqa shakllardan to‘g‘ri ajratish muhim. Chunki noto‘g‘ri tashxis ortiqcha radikal jarrohlik yoki, aksincha, yetarli bo‘lmagan aralashuvga olib kelishi mumkin.
Bu o‘sma ko‘pincha qizlarda uchraydi va ko‘z tishi bilan bog‘liq holda joylashadi. Rentgenogrammada yaxshi chegaralangan yoritilish, ba’zan ichida mayda kaltsiy

to‘plamlari (“qor parchalari”) ko‘rinadi. Gistologik manzara o‘ziga xos, lekin ba’zi hollarda unikistik ameloblastoma yoki boshqa o‘smalar bilan chalkashishi mumkin. Shu bois differensial diagnostikani yaxshi bilish klinik amaliyotda zarur.

Asosiy qism

AOT ning klassik klinik manzarasi – yosh bemorda (odatda 10–20 yosh), ko‘pincha ayol jinsida, yuqori jag‘ning old qismida sekin o‘sayotgan, og‘riqsiz shish. Ko‘p hollarda chiqmagan tish (eng ko‘p ko‘z tishi) o‘sma ichida joylashadi. Pastki jag‘da ham uchrashi mumkin, lekin kamroq. O‘sma odatda kichik o‘lchamli bo‘lib qoladi, lekin ba’zan suyakni kengaytirib, yuz asimetriyasiga sabab bo‘ladi. Rentgenologik jihatdan AOT yaxshi chegaralangan, unilokulyar yoritilish ko‘rinishida bo‘ladi. Ichida mayda radiopaq to‘plamlar (“snowflake” kaltsifikatsiyalar) bo‘lishi mumkin, bu belgi differensial diagnostikada yordam beradi. Ba’zan o‘sma tish tojini o‘rab oladi va dentigerous kistaga juda o‘xshaydi. Gistologik manzara diagnostikani yakunlaydi. O‘sma duktsimon (kanalcha) tuzilmalar, epitelial hujayralar to‘plamlari (whorls), shpindelsimon hujayralar va ba’zan amyloidsimon material bilan tavsiflanadi. Kaltsifikatsiyalar ham uchraydi. Bu belgilarni ko‘rib, tajribali patolog odatda tashxisni qo‘yadi. Differensial diagnostika asosan quyidagi shakllar bilan olib boriladi. Dentigerous kista – eng ko‘p chalkashadigan holat. Unda epitel oddiy, duktsimon tuzilmalar yo‘q. Unikistik ameloblastoma – ayniqsa luminal yoki intraluminal turlarida chalkashishi mumkin, lekin ameloblastomaga xos periferik hujayralarning polarizatsiyasi va stellat retikulumga o‘xshash sohalar AOT da yo‘q. Kalsifikatsiyalanuvchi epiteliyal odontogen o‘sma (CEOT, Pindborg) – kaltsiy to‘plamlari ko‘proq va boshqacha tuzilishga ega. Yangi tasnifdagi adenoid ameloblastoma ham ba’zan AOT ga o‘xshashi mumkin, lekin u aggressivroq va boshqa morfologik belgilarga ega.

Immunogistokimyoviy jihatdan AOT da CK14 va CK19 ijobiy, bu odontogen epiteliyni tasdiqlaydi. Kalretinin odatda manfiy bo‘lib, ameloblastomadan farqlashda

yordam beradi. Ki-67 indeksi past. Davolash juda konservativ. Oddiy enukleatsiya yetarli, chunki o‘sma yaxshi kapsulalangan va qaytalanish deyarli kuzatilmaydi. Tishni saqlash imkoniyati ham bor, lekin ko‘p hollarda chiqmagan tish olib tashlanadi.

Xulosa.

Adenomatoid odontogen o‘sma – yosh bemorlarda uchraydigan, nisbatan “yumshoq” xulqli xavfsiz o‘sma. Uni dentigerous kista, unikistik ameloblastoma va boshqa shakllardan to‘g‘ri ajratish muhim, chunki davolash yondashuvi farq qiladi. Klinik, rentgenologik va gistologik belgilarni birgalikda baholash tashxisni aniq qo‘yishga imkon beradi. To‘g‘ri tashxis qo‘yilganda oddiy enukleatsiya yetarli bo‘lib, bemor tez tiklanadi va qaytalanish xavfi past.

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URGANCH RANCH UNIVERSITETI

Fizika fani o'qituvchisi Matchanova Dinora Yusupboyevna

Annotatsiya. Mazkur tezisda raqamli pedagogika sharoitida bo'lajak pedagoglarning modellashtirish kompetensiyasini rivojlantirish, pedagogik jarayonlarni modellashtirish metodikasini vizualizatsiya vositalari asosida takomillashtirish masalasi ilmiy-nazariy va metodik jihatdan yoritilgan. Tadqiqotda pedagogik modellashtirishning mazmun-mohiyati, raqamli ta'lim muhitidagi o'rni, vizualizatsiyaning didaktik imkoniyatlari hamda ularni pedagogika yo'nalishi talabalarini tayyorlash jarayoniga integratsiya qilish mexanizmlari tahlil qilinadi. Raqamli pedagogikada modelni faqat tayyor sxema yoki grafik ko'rinishida taqdim etish emas, balki talabaning pedagogik hodisani tahlil qilishi, uning tarkibiy qismlari o'rtasidagi munosabatlarni aniqlashi, raqamli vositalar yordamida model yaratishi, modelni vizual ifodalashi, sinovdan o'tkazishi va refleksiv baholashi muhimligi asoslanadi. Tadqiqot doirasida maqsadli, mazmuniy, texnologik, vizual-kommunikativ, faoliyatli va natijaviy komponentlardan iborat takomillashtirilgan metodik model taklif etiladi. Shuningdek, vizualizatsiya asosida modellashtirishning bosqichlari, pedagogik shart-sharoitlari, samaradorlik mezonlari va baholash indikatorlari ishlab chiqiladi.

Kalit so'zlar: raqamli pedagogika, pedagogik modellashtirish, vizualizatsiya, raqamli ta'lim, pedagogik model, bo'lajak o'qituvchi, raqamli kompetensiya, vizual kompetensiya, interaktiv ta'lim, multimedia, infografika, 3D modellashtirish, ta'lim texnologiyalari.

ABSTRACT

This thesis examines the improvement of modeling methodology in digital pedagogy through visualization, with particular reference to the field of Pedagogy. In the context of the digital transformation of education, the effective use of digital technologies, modeling of complex pedagogical processes, and their visual representation provide new opportunities for integrating students' theoretical knowledge with practical activities. The study analyzes the theoretical and methodological foundations of pedagogical modeling, the didactic potential of visualization in digital learning environments, and its role in developing the professional competencies of pedagogy students.

Within the framework of the study, a conceptual model of visualization-based pedagogical modeling is developed, including its structural components,

implementation stages, pedagogical conditions, and effectiveness criteria. The methodological potential of interactive diagrams, concept maps, infographics, digital models, simulations, and multimedia tools for the visual representation of educational content is substantiated. The proposed methodology contributes to the development of students' systemic thinking, their ability to analyze pedagogical situations, model educational processes, identify cause-and-effect relationships, and make well-grounded pedagogical decisions.

Keywords: digital pedagogy, pedagogical modeling, visualization, digital education, pedagogy, didactic model, interactive technologies, digital competence, multimedia, pedagogical process.

АННОТАЦИЯ

В данной тезисной работе рассматривается проблема совершенствования методики моделирования в цифровой педагогике на основе визуализации на примере направления «Педагогика». В условиях цифровой трансформации образования эффективное использование цифровых технологий, моделирование сложных педагогических процессов и их визуальное представление создают дополнительные возможности для интеграции теоретических знаний студентов с практической деятельностью. В исследовании проанализированы теоретико-методологические основы педагогического моделирования, дидактические возможности визуализации в цифровой образовательной среде и её значение в формировании профессиональных компетенций студентов педагогического направления.

В рамках исследования разработана концептуальная модель визуально ориентированного педагогического моделирования, определены её структурные компоненты, этапы реализации, педагогические условия и критерии эффективности. Обоснованы методические возможности использования интерактивных диаграмм, концептуальных карт, инфографики, цифровых моделей, симуляций и мультимедийных средств для визуального представления учебного материала. Предлагаемая методика способствует развитию системного мышления студентов, способности анализировать педагогические ситуации, моделировать образовательные процессы, устанавливать причинно-следственные связи и принимать обоснованные педагогические решения.

Ключевые слова: цифровая педагогика, педагогическое моделирование, визуализация, цифровое образование, педагогика, дидактическая модель, интерактивные технологии, цифровая компетентность, мультимедиа, педагогический процесс.

KIRISH

Bugungi kunda raqamli transformatsiya ta’lim tizimining mazmuni, shakli va metodlarini tubdan o‘zgartirmoqda. Raqamli texnologiyalarning ta’lim jarayoniga jadal kirib kelishi pedagogdan nafaqat o‘z fanini yaxshi bilishni, balki raqamli vositalar yordamida o‘quv jarayonini loyihalash, modellashtirish, vizual tashkil etish va natijalarni tahlil qilish kompetensiyalariga ega bo‘lishni ham talab etmoqda. UNESCOning ta’lim texnologiyalariga bag‘ishlangan Global Education Monitoring Report hisobotida ham texnologiya ta’lim sifatini oshirishga xizmat qilishi mumkinligi, biroq uning samarasi texnologiyaning o‘zidan ko‘ra pedagogik maqsad va uni qo‘llash usuliga bog‘liqligi ta’kidlanadi.

Ayniqsa, pedagogika yo‘nalishida tahsil olayotgan talabalarni kelajakdagi kasbiy faoliyatga tayyorlashda modellashtirish alohida ahamiyat kasb etadi. Chunki bo‘lajak o‘qituvchi real pedagogik jarayonni bevosita kuzatish bilangina cheklanmay, uning ichki tuzilishini anglay olishi, pedagogik vaziyatni tahlil qilishi, sabab-oqibat munosabatlarini aniqlashi va mazkur jarayonning soddalashtirilgan, tizimlashtirilgan modelini yaratishi kerak.

Pedagogik modellashtirish murakkab ta’lim jarayonlarini o‘rganish va boshqarishning samarali metodlaridan biri hisoblanadi. Model real pedagogik obyekt, jarayon yoki hodisaning muhim xususiyatlarini ma’lum darajada soddalashtirib, tizimli shaklda ifodalash imkonini beradi. Shu sababli modellashtirish bo‘lajak pedagogda tizimli fikrlash, tahlil qilish, taqqoslash, umumlashtirish, loyihalash va qaror qabul qilish ko‘nikmalarini shakllantirishga xizmat qiladi.

Biroq an’anaviy modellashtirish metodikasida model ko‘pincha matn, jadval yoki statik sxema shaklida taqdim etiladi. Raqamli ta’lim muhitida esa modelni dinamik, interaktiv va vizual shaklda ifodalash uchun katta imkoniyatlar mavjud. Infografika, konseptual xaritalar, diagrammalar, animatsiyalar, simulyatsiyalar, interaktiv taqdimotlar, 3D modellar, virtual va kengaytirilgan reallik elementlari pedagogik jarayonlarning ko‘rinmas yoki murakkab jihatlarini ko‘rgazmali tarzda ifodalashga yordam beradi.

Zamonaviy tadqiqotlarda ham raqamli ta’limda vizualizatsiyaning ahamiyati ortib borayotgani qayd etilmoqda. Xususan, e-learningdagi vizualizatsiya bo‘yicha tadqiqotlarda turli ta’lim nazariyalari bilan uyg‘unlashtirilgan vizual model o‘quv mazmunini turlicha ifodalash imkonini berishi ko‘rsatilgan. Shu bilan birga, vizual learning analytics bo‘yicha tadqiqotlar ta’lim ma’lumotlarini vizual ifodalash imkoniyatlari kengayayotganini, ammo ilg‘or vizualizatsiya usullarini pedagogik nazariya bilan chuqur integratsiya qilish hali ham dolzarb masala ekanini ko‘rsatadi.

Shundan kelib chiqib, raqamli pedagogikada modellashtirish metodikasini oddiy raqamli vositalar bilan almashtirish emas, balki **modellashtirish + vizualizatsiya + interaktivlik + refleksiya** tamoyillari asosida qayta tashkil etish ilmiy-metodik jihatdan muhim hisoblanadi.

TADQIQOTNING MAQSADI

Tadqiqotning asosiy maqsadi — pedagogika yo‘nalishi talabalarida pedagogik modellashtirish kompetensiyasini rivojlantirishga yo‘naltirilgan metodikani vizualizatsiya vositalari asosida takomillashtirish hamda uning mazmuniy, texnologik va baholash mexanizmlarini ilmiy-metodik jihatdan asoslashdan iborat.

Ushbu maqsadni amalga oshirish uchun quyidagi vazifalar belgilandi:

1. Raqamli pedagogikada modellashtirishning nazariy va metodik asoslarini tahlil qilish.
2. Pedagogika yo‘nalishi talabalarining modellashtirish kompetensiyasini rivojlantirishda vizualizatsiyaning didaktik imkoniyatlarini aniqlash.
3. Vizualizatsiya asosida pedagogik modellashtirishning tarkibiy komponentlarini belgilash.
4. Raqamli vositalardan foydalanishga asoslangan takomillashtirilgan metodik modelni ishlab chiqish.
5. Modelni amalga oshirish bosqichlari va pedagogik shart-sharoitlarini aniqlash.
6. Talabalarning modellashtirish kompetensiyasini baholash mezonlari va indikatorlarini ishlab chiqish.

TADQIQOTNING ILMIY YANGILIGI

Tadqiqotning ilmiy yangiligi, avvalo, pedagogik modellashtirish jarayonini vizualizatsiya bilan integratsiyalashgan metodik tizim sifatida qarash bilan belgilanadi.

Takomillashtirilgan metodikada model yaratish jarayoni quyidagi mantiqiy ketma-ketlik asosida tashkil etiladi:

pedagogik muammoni aniqlash → tahlil qilish → konseptual model yaratish → vizual modelga aylantirish → raqamli vositada modellashtirish → interaktiv sinov → natijalarni tahlil qilish → takomillashtirish → refleksiya.

Mazkur ketma-ketlikning muhim jihati shundaki, talaba tayyor modelni o‘zlashtiruvchi emas, balki **modelni yaratuvchi subyekt** sifatida ishtirok etadi.

Shuningdek, vizualizatsiya bu jarayonda faqat bezak yoki ko‘rgazmalilik vositasi sifatida emas, balki bilimni tuzish, aloqalarni aniqlash, pedagogik jarayonni tushuntirish va natijalarni baholash vositasi sifatida talqin qilinadi.

TADQIQOT METODOLOGIYASI

Tadqiqotda pedagogik modellashtirish, tizimli yondashuv, kompetensiyaviy yondashuv, shaxsga yo‘naltirilgan yondashuv, faoliyatli yondashuv va raqamli didaktika tamoyillaridan foydalanish maqsadga muvofiq hisoblanadi.

Tadqiqot metodlari sifatida ilmiy-pedagogik adabiyotlarni tahlil qilish, qiyosiy tahlil, tizimlashtirish, pedagogik modellashtirish, kuzatish, so‘rovnoma, diagnostik topshiriqlar, ekspert baholash va pedagogik tajriba-sinov metodlaridan foydalanish mumkin.

Raqamli ta’lim uchun instructional design modellarini tahlil qilgan zamonaviy sharh tadqiqotida ham ta’lim dizaynini tizimli tashkil etish raqamli o‘quv jarayonining izchil va ishonchli loyihalanishiga yordam berishi qayd etilgan.

VIZUALIZATSIYA ASOSIDA TAKOMILLASHTIRILGAN PEDAGOGIK MODEL

Tadqiqot doirasida taklif qilinayotgan metodik modelni oltita o‘zaro bog‘liq komponent orqali ifodalash mumkin:

1. Maqsadli komponent

Mazkur komponentda modellashtirish jarayonining asosiy maqsadi belgilanadi. Bunda talabaning:

- pedagogik muammoni aniqlashi;
- muammoning asosiy elementlarini ajratishi;
- sabab-oqibat munosabatlarini ko‘rsatishi;
- model ishlab chiqishi;
- modelni vizual ifodalashi;
- modelni tahlil qilishi;
- model asosida pedagogik qaror qabul qilishi

kabi natijalarga erishishi ko‘zda tutiladi.

2. Mazmuniy komponent

Mazmuniy komponent pedagogik modellashtirish uchun zarur bilim va ko‘nikmalarni qamrab oladi.

U quyidagi mazmun bloklaridan tashkil topadi:

pedagogik hodisa → pedagogik tizim → pedagogik jarayon → model tushunchasi → model turlari → modellashtirish bosqichlari → vizualizatsiya → raqamli modellashtirish → pedagogik natija.

Talabaga dastlab oddiy konseptual modellar berilib, keyinchalik murakkab pedagogik vaziyatlarni mustaqil modellashtirish topshiriladi.

3. Texnologik komponent

Bu komponentda raqamli vositalardan foydalanish metodikasi ishlab chiqiladi.

Masalan:

- konseptual xaritalar;
- blok-sxemalar;
- interaktiv diagrammalar;
- infografikalar;
- animatsiyalar;
- elektron taqdimotlar;
- simulyatsiyalar;
- 3D modellar;
- interaktiv doskalar;
- raqamli ta’lim platformalari.

Bunda vositani tanlashning asosiy mezoni uning zamonaviyligi emas, balki **pedagogik vazifani samarali hal qila olishi** bo‘lishi lozim.

4. Vizual-kommunikativ komponent

Mazkur komponent tadqiqotning asosiy yangiliklaridan biridir. Unda talaba pedagogik mazmunni vizual axborotga aylantirishni o‘rganadi.

Masalan, “o‘qituvchi–talaba–ta’lim mazmuni–baholash” munosabatlari oddiy matn orqali emas, balki o‘zaro bog‘langan vizual model orqali ko‘rsatilishi mumkin.

Vizual modelda:

obyektlar → munosabatlar → jarayon → natija

mantiqiy zanjiri aniq ko‘rinishi kerak.

Bu jarayonda rang, shakl, grafik, belgi, ikonka, diagramma, animatsiya va fazoviy joylashuv kabi vositalardan maqsadli foydalanish talab etiladi.

5. Faoliyatli komponent

Talaba faoliyatining ketma-ketligi quyidagicha tashkil qilinadi:

1-bosqich — muammoni aniqlash.

2-bosqich — ma’lumotlarni yig‘ish.

3-bosqich — asosiy komponentlarni ajratish.

4-bosqich — modelni loyihalash.

5-bosqich — vizual shaklga keltirish.

6-bosqich — raqamli muhitda yaratish.

7-bosqich — modelni taqdim etish.

8-bosqich — tahlil va refleksiya.

Mazkur bosqichlarda talaba individual, juftlik va kichik guruhlar bilan ishlashi mumkin.

6. Natijaviy komponent

Natijaviy komponent talabaning egallagan kompetensiyalarini baholashga xizmat qiladi.

Baholashda quyidagi mezonlardan foydalanish taklif etiladi:

Mezon	**Mazmuni**
Nazariy mezon	Modellashtirish tushunchalarini bilishi
Tahliliy mezon	Pedagogik jarayonni tarkibiy qismlarga ajrata olishi
Loyihalash mezoni	Mustaqil model ishlab chiqishi
Vizual mezon	Modelni tushunarli vizual shaklda ifodalashi
Raqamli mezon	Raqamli vositalardan maqsadli foydalana olishi
Refleksiv mezon	O‘z modelini tahlil va takomillashtira olishi

VIZUALIZATSIYAGA ASOSLANGAN MODELLASHTIRISH METODIKASI

Takomillashtirilgan metodikani amaliy mashg‘ulotlarda qo‘llash uchun “Pedagogik vaziyatni modellashtirish” topshirig‘ini misol sifatida olish mumkin.

Masalan, talabaga quyidagi muammo beriladi:

“Talabalarning darsdagi faolligi pasayishiga olib keluvchi omillarni aniqlang va ushbu muammoni bartaraf etishning pedagogik modelini ishlab chiqing.”

An’anaviy yondashuvda talaba muammo haqida yozma javob beradi. Vizualizatsiya asosidagi yondashuvda esa u muammoni quyidagicha modellashtiradi:

Muammo → sabablar → pedagogik ta’sir → interaktiv metod → talaba faoliyati → baholash → natija.

Bunday modelni diagramma, konseptual xarita yoki interaktiv sxema shaklida yaratish mumkin.

Natijada murakkab pedagogik jarayonning tarkibiy qismlari bir vaqtning o‘zida ko‘rinadi. Bu esa talabaning tizimli fikrlashini rivojlantirishga yordam beradi.

RAQAMLI VIZUALIZATSIYANING DIDAKTIK IMKONIYATLARI

Vizualizatsiya asosidagi modellashtirish quyidagi didaktik imkoniyatlarni yaratadi:

Birinchidan, murakkab pedagogik tushunchalarni soddalashtiradi. Talaba katta hajmdagi matnni o‘qish o‘rniga jarayonning asosiy komponentlarini vizual sxemada ko‘rishi mumkin.

Ikkinchidan, abstrakt munosabatlarni ko‘rinadigan holga keltiradi. Masalan, pedagogik jarayondagi sabab-oqibat, bog‘liqlik va bosqichlarni diagramma orqali ifodalash mumkin.

Uchinchidan, faol o‘rganishni kuchaytiradi. Talaba tayyor modelni qabul qilish bilan cheklanmay, uni o‘zi yaratadi.

To‘rtinchidan, refleksiv faoliyatni rivojlantiradi. Talaba o‘z modeli asosida “Nima uchun aynan shu komponentni tanladim?”, “Ular o‘rtasida qanday bog‘liqlik mavjud?”, “Modelning qaysi qismi takomillashtirilishi kerak?” kabi savollarga javob beradi.

Beshinchidan, pedagogik jarayonni turli darajalarda ko‘rsatish imkonini beradi. Bir xil jarayonni umumiy sxema, batafsil diagramma yoki interaktiv model shaklida tasvirlash mumkin.

UNESCO ma’lumotlariga ko‘ra, raqamli texnologiyalar ta’lim mazmunini turli shakllarda ifodalash, o‘quvchilarni jalb qilish, hamkorlik va amaliy mashq imkoniyatlarini kengaytirishi mumkin; biroq texnologiya pedagogik maqsadga mos ravishda integratsiya qilinmasa, chalg‘ituvchi omilga ham aylanishi mumkin.

Shu sababli tadqiqotda **“ko‘proq vizual = samaraliroq ta’lim”** degan sodda yondashuv emas, balki **“maqsadga mos vizualizatsiya = samarali pedagogik model”** tamoyili asos qilib olinadi.

PEDAGOGIKA YO‘NALISHI TALABALARIDA KUTILADIGAN KOMPETENSIYALAR

Takomillashtirilgan metodika natijasida bo‘lajak pedagoglarda quyidagi kompetensiyalarni rivojlantirish mumkin:

1. **Pedagogik tahlil kompetensiyasi** — pedagogik vaziyatni tizimli tahlil qilish.
2. **Modellashtirish kompetensiyasi** — pedagogik jarayonning modelini ishlab chiqish.
3. **Vizual kompetensiya** — pedagogik axborotni vizual shaklda ifodalash.
4. **Raqamli kompetensiya** — raqamli vositalardan ta’limiy maqsadda foydalanish.
5. **Loyihalash kompetensiyasi** — pedagogik jarayonni oldindan loyihalash.
6. **Kommunikativ kompetensiya** — yaratilgan modelni tushuntirish va himoya qilish.
7. **Refleksiv kompetensiya** — o‘z faoliyati va natijalarini baholash.
8. **Ijodiy kompetensiya** — muammoga yangi pedagogik yechimlar taklif qilish.

PEDAGOGIK TAJRIBA-SINOVNI TASHKIL ETISH

Taklif etilayotgan metodikaning samaradorligini aniqlash uchun pedagogika yo‘nalishida tahsil olayotgan talabalar ishtirokida tajriba-sinov ishlarini tashkil etish mumkin.

Tajriba-sinov uch bosqichda amalga oshirilishi maqsadga muvofiq:

1. Diagnostik bosqich

Talabalarning dastlabki modellashtirish va vizualizatsiya kompetensiyasi aniqlanadi.

Bunda:

- diagnostik topshiriqlar;
- testlar;
- amaliy modellashtirish vazifalari;
- so‘rovnomalar;
- o‘z-o‘zini baholash

usullaridan foydalanish mumkin.

2. Shakllantiruvchi bosqich

Talabalarga vizualizatsiya asosida modellashtirish metodikasi asosida mashg‘ulotlar tashkil qilinadi.

Masalan:

1-mashg‘ulot: pedagogik model tushunchasi;

2-mashg‘ulot: pedagogik jarayonni tahlil qilish;

3-mashg‘ulot: konseptual model yaratish;

4-mashg‘ulot: vizual model yaratish;

5-mashg‘ulot: raqamli vositada modelni ishlab chiqish;

6-mashg‘ulot: modelni taqdim etish;

7-mashg‘ulot: modelni ekspert baholash;

8-mashg‘ulot: modelni takomillashtirish va refleksiya.

3. Nazorat-baholash bosqichi

Yakuniy bosqichda talabalarning modellashtirish kompetensiyasi qayta baholanadi.

Baholashda modelning:

- ilmiy asoslanganligi;
- pedagogik maqsadga muvofiqligi;
- tarkibiy yaxlitligi;
- mantiqiyligi;
- vizual aniqligi;

- raqamli texnologiyadan foydalanish darajasi;
- mustaqilligi;
- amaliy ahamiyati

hisobga olinadi.

Bunda faqat yakuniy mahsulotni baholash yetarli emas. Modelni yaratish jarayoni, talabaning qaror qabul qilishi, modelni asoslay olishi va o‘z ishini takomillashtirishi ham baholanishi lozim. 2026-yilda e’lon qilingan modeling-based instruction tadqiqotida ham baholash shakli o‘quv natijalarining qaysi jihatlari “ko‘rinishi”ga ta’sir qilishi ko‘rsatilgan; shu sababli model yaratish natijasini birgina test bilan baholash yetarli bo‘lmasligi mumkin.

TAKOMILLASHTIRILGAN METODIKANING AFZALLIKLARI

Taklif etilayotgan metodikaning an’anaviy modellashtirishdan asosiy farqi quyidagilarda namoyon bo‘ladi:

An’anaviy yondashuv	**Vizualizatsiya asosidagi yondashuv**
Tayyor modelni o‘rganish	Modelni mustaqil yaratish
Statik sxema	Dinamik/interaktiv model
Matn ustuvorligi	Matn + grafik + diagramma
O‘qituvchi markazida	Talaba faoliyatiga yo‘naltirilgan
Natijaga yo‘naltirilgan	Jarayon va natijaga yo‘naltirilgan
Bir xil model	Turli vizual modellar
Oddiy baholash	Mezonga asoslangan kompleks baholash
Nazariy bilim	Nazariya + amaliy faoliyat

Raqamli ta’lim muhitida pedagogik jarayonlarni modellashtirish va vizualizatsiya qilishga bag‘ishlangan so‘nggi mahalliy tadqiqotlarda ham 3D modellashtirish, animatsion ssenariylar va AR/VR elementlarini pedagogik model bilan uyg‘unlashtirish yo‘nalishlari ko‘rib chiqilmoqda. Bu yo‘nalish pedagogika ta’limida vizual va interaktiv modellashtirishning ilmiy-metodik istiqboli mavjudligini ko‘rsatadi.

MUHOKAMA

Tadqiqot natijalarini nazariy jihatdan tahlil qilish shuni ko‘rsatadiki, raqamli pedagogikada modellashtirishni takomillashtirish faqat yangi dasturiy vositalarni ta’limga kiritish bilan cheklanmasligi kerak. Asosiy masala — pedagogik maqsad, mazmun, metod va raqamli vosita o‘rtasidagi didaktik uyg‘unlikni ta’minlashdir.

Vizualizatsiya pedagogik jarayonning mohiyatini ochib beradigan vositaga aylangandagina u ta’limiy qiymatga ega bo‘ladi. Aks holda, ortiqcha ranglar, murakkab animatsiyalar, haddan tashqari ko‘p grafik elementlar talabaning asosiy mazmundan chalg‘ishiga sabab bo‘lishi mumkin.

Shu nuqtai nazardan, vizualizatsiya metodikasida quyidagi tamoyillarga amal qilish zarur:

Maqsadga muvofiqlik — har bir vizual element muayyan pedagogik vazifani bajarishi kerak.

Soddalik — model keraksiz elementlar bilan ortiqcha yuklanmasligi kerak.

Mantiqiylik — elementlar o‘rtasidagi munosabatlar aniq ifodalanishi lozim.

Interaktivlik — imkon qadar talaba model bilan faol ishlashi kerak.

Moslashuvchanlik — model turli ta’lim vaziyatlariga moslashtirilishi kerak.

Refleksivlik — talaba o‘z modelini tahlil qilish va takomillashtirish imkoniyatiga ega bo‘lishi kerak.

UNESCO ham texnologiyani ta’limdagi insoniy o‘zaro munosabatlarning o‘rnini bosuvchi vosita emas, balki ularni qo‘llab-quvvatlovchi vosita sifatida ko‘rish zarurligini ta’kidlaydi. Demak, vizual modellashtirish o‘qituvchining pedagogik faoliyatini almashtirmaydi; aksincha, o‘qituvchining metodik imkoniyatlarini kengaytiradi.

XULOSA

Raqamli pedagogikada modellashtirish metodikasini vizualizatsiya asosida takomillashtirish bo‘lajak pedagoglarni tayyorlashning zamonaviy va istiqbolli yo‘nalishlaridan biridir. Tadqiqot natijasida modellashtirishni vizualizatsiya bilan integratsiyalashgan holda tashkil etish talabalarning pedagogik jarayonlarni tizimli idrok etishi, sabab-oqibat munosabatlarini aniqlashi, mustaqil model yaratishi, raqamli vositalardan maqsadli foydalanishi va o‘z pedagogik qarorlarini asoslashiga metodik sharoit yaratishi asoslandi.

Taklif etilayotgan metodik model maqsadli, mazmuniy, texnologik, vizual-kommunikativ, faoliyatli va natijaviy komponentlardan tashkil topib, ularning o‘zaro integratsiyasi asosida amalga oshiriladi. Modelning asosiy metodik mexanizmi “muammoni aniqlash — tahlil qilish — modellashtirish — vizualizatsiya — raqamlashtirish — sinov — baholash — refleksiya” ketma-ketligiga asoslanadi.

Pedagogika yo‘nalishi talabalarining modellashtirish kompetensiyasini rivojlantirishda vizualizatsiyadan foydalanish ularni nafaqat tayyor axborotni o‘zlashtiruvchi, balki pedagogik jarayonlarni loyihalovchi, tahlil qiluvchi va raqamli mahsulot yaratuvchi mutaxassis

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English Language as a Tool for Empowering Women and Developing Leadership Skills

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Abstract

This article explores the role of English language proficiency in empowering women and developing leadership skills. It highlights how English improves communication, self-confidence, critical thinking, and access to educational and professional opportunities. The study emphasizes that English language skills can encourage women to participate actively in leadership, decision-making, and global communication.

Keywords: English language, women’s empowerment, leadership skills, communication, self-confidence, professional development, female leadership.

Introduction

In today’s globalized world, English has become an important means of communication, education, and professional development. For women, learning English can provide greater access to knowledge, international communication, educational resources, and career opportunities. It can also help women develop confidence and express their ideas more effectively in academic and professional environments.

Leadership requires a range of skills, including effective communication, critical thinking, decision-making, teamwork, creativity, and self-confidence. English language learning can contribute to the development of these skills by encouraging individuals to communicate with others, participate in discussions, present their ideas, and interact with people from different cultural backgrounds. In this way, language learning can strengthen both personal and professional abilities.

Moreover, English proficiency allows women to access international conferences, academic publications, online courses, and professional networks. These opportunities can broaden their knowledge, increase their confidence, and encourage them to take more active roles in society. Therefore, English can serve not only as a means of communication but also as a powerful tool for personal empowerment and leadership development.

This article examines the role of English language proficiency in empowering women and developing their leadership skills. It focuses on how English can support women's participation in education, professional life, communication, and leadership activities.

Literature Review

Previous studies have highlighted the important relationship between English language learning, women's empowerment, and personal development. English is increasingly viewed not only as a means of communication but also as a resource that can provide women with access to education, professional opportunities, and wider social networks.

Vepa (2022), in her doctoral research *"Language, Education and the Empowerment of Women: A Critical Sociolinguistic Ethnography,"* investigated the experiences of three women from disadvantaged backgrounds in Bangladesh. The study focused on an educational program that combined English language learning with leadership skills. Vepa found that learning English and developing leadership skills influenced how women understood their own empowerment and future opportunities. However, the study also emphasized that empowerment is influenced by social class, gender inequality, patriarchy, and other social factors.

Similarly, Qamariah (2024), in the article *"Beyond Language Proficiency: Raising Awareness of Women's Empowerment Through English Language Teaching,"* examined the role of English language teaching in raising awareness of women's empowerment. The author argued that English classes can go beyond language

proficiency by addressing gender issues and encouraging learners to think about equality and women's participation in society.

Foomani (2024), in *"Language, Gender and Empowerment: A Qualitative Study of Self-Identities of Women English Teachers in Iran,"* explored how English learning and teaching experiences influenced the identities of women English teachers. Through qualitative interviews, the study found that exposure to English and international cultures contributed to participants' positive perceptions of themselves and provided access to diverse sources of knowledge. This suggests that English can influence not only communication abilities but also women's identity and sense of empowerment.

Ahmad Tajuddin, Romly, Ibrahim, and Sari (2023), in *"A Framework for Empowering Women of Terengganu via Hybrid English Language Community Based Learning,"* developed a community-based English learning model for women in Terengganu, Malaysia. The study involved women leaders and community members and addressed difficulties related to speaking English. Their research demonstrates the potential of community-based English education to support women's participation and confidence in learning.

More recently, Shaikh, Shabbir, and Oad (2026), in *"Reimagining English Language Learning Through Women-Led Inclusive Leadership Frameworks: Implications for Sustainable Development Goals,"* examined the connection between women-led educational leadership and English language learning. Their qualitative study found that women-led inclusive leadership can encourage participatory decision-making, inclusive educational environments, and greater confidence among learners. The authors connect these issues with Sustainable Development Goals 4, 5, and 10, focusing respectively on quality education, gender equality, and reduced inequalities.

Overall, the reviewed literature indicates that English language proficiency can contribute to women's empowerment through improved communication, access to knowledge, confidence, identity development, and professional participation. At the

same time, researchers emphasize that language alone cannot eliminate gender inequality, as social, cultural, and economic factors also influence women's opportunities. The existing studies provide a strong foundation for examining English as a tool for developing women's leadership skills, particularly in relation to communication, confidence, decision-making, and participation in professional and social life.

English as a Tool for Communication and Self-Expression

One of the most important ways English can empower women is by improving their ability to communicate and express their ideas. Effective communication is essential in both personal and professional life. Women who have strong English language skills can participate more confidently in discussions, meetings, presentations, and international communication. They can share their opinions, explain their ideas, and communicate with people from different cultural and professional backgrounds.

English also provides women with opportunities to make their voices heard beyond their local communities. Through English, they can participate in online discussions, international conferences, academic activities, and professional networks. This wider communication can help women become more active participants in society and create opportunities for personal and professional development.

The Role of English in Building Self-Confidence

Self-confidence is an important characteristic of an effective leader. English language learning can contribute to confidence because it encourages learners to communicate, ask questions, present ideas, and interact with others. Although making mistakes is a natural part of language learning, continuous practice can gradually reduce communication anxiety and encourage learners to become more comfortable expressing themselves.

For women, increased confidence can be especially valuable in environments where they may hesitate to express their opinions or take leadership responsibilities. Being able to communicate in English can give women greater confidence when speaking to

teachers, colleagues, employers, international partners, and other professionals. In this way, language development can support personal growth and encourage women to take a more active role in different areas of life.

English and the Development of Leadership Skills

Leadership involves a combination of communication, critical thinking, decision-making, teamwork, creativity, and problem-solving skills. English learning can provide opportunities to develop many of these abilities. Classroom activities such as debates, presentations, group discussions, projects, and problem-solving tasks require learners to express opinions, listen to others, negotiate ideas, and make decisions.

These activities are closely connected with leadership development. For example, a group project can teach learners how to distribute responsibilities and cooperate with others, while a presentation can develop public-speaking and organizational skills. Debates can encourage critical thinking and the ability to defend an argument with evidence. Therefore, English language education can create an environment in which language and leadership skills develop together.

Access to Education and Professional Opportunities

English is also an important tool for accessing educational and professional resources. A large amount of academic literature, online courses, professional training materials, and international information is available in English. Women who have sufficient English proficiency can use these resources to expand their knowledge and develop new professional skills.

English can also increase access to international professional networks. Women can communicate with researchers, educators, organizations, and professionals from different countries. Such connections may provide opportunities to exchange knowledge, participate in collaborative projects, attend international events, and explore new career possibilities. As a result, English proficiency can support women's continuous professional development.

English and Global Leadership

In an increasingly interconnected world, leadership is not limited to local communities or national environments. Many contemporary leaders communicate across cultural and national boundaries. English often functions as a common language in international education, business, science, diplomacy, and professional cooperation.

For women who aspire to participate in international environments, English can therefore be an important practical skill. It allows them to communicate their ideas to a wider audience and participate in discussions about social, educational, economic, and professional issues. Through international communication, women can also learn from different perspectives and develop greater awareness of global challenges.

Challenges and Limitations

Despite its potential benefits, English proficiency alone cannot guarantee women's empowerment or leadership development. Women may still face social, economic, cultural, and institutional barriers that limit their opportunities. Access to quality English education can also differ depending on socioeconomic background, geographical location, educational resources, and family circumstances.

Therefore, English language education should be combined with broader opportunities for leadership development. Women need not only language knowledge but also opportunities to practice communication, participate in decision-making, develop professional skills, and take leadership responsibilities. Educational institutions and communities can support this process by creating inclusive learning environments where women are encouraged to express their opinions and develop their abilities.

The Connection Between Language Learning and Empowerment

The relationship between English and women's empowerment can therefore be understood as a gradual process. English provides communication skills; communication can increase participation; participation can create opportunities for developing confidence and leadership abilities. When women are able to access information, communicate with wider communities, and participate actively in

professional and educational environments, they can expand their opportunities for personal and social development.

Thus, English should be viewed not simply as an academic subject but as a practical tool that can support women's participation in different areas of society. When language education is combined with critical thinking, teamwork, communication practice, and leadership activities, it can contribute to the development of confident and capable women who are prepared to participate in professional and global environments.

Conclusion

In conclusion, English language proficiency can serve as an important tool for empowering women and developing leadership skills. It provides women with greater opportunities to communicate, access knowledge, participate in education, and engage in professional and international environments. At the same time, English learning can support the development of confidence, critical thinking, teamwork, public speaking, and other skills that are important for effective leadership. The reviewed discussion also shows that English alone cannot eliminate the social and institutional barriers that women may face. Its impact becomes more meaningful when language education is combined with leadership training, equal educational opportunities, supportive learning environments, and opportunities for active participation. Therefore, English language education should be viewed as part of a broader approach to women's empowerment.

Overall, investing in women's English language development can contribute to their personal growth, professional advancement, and participation in leadership and decision-making. Creating accessible and inclusive English learning opportunities can help women become more confident communicators and active participants in an increasingly globalized society.

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ANATOMIYA — TIBBIYOTNING MUSTAHKAM POYDEVORI

TISU "Davolash ishi" yo'nalishi
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Annotatsiya

Anatomiya inson organizmining makroskopik va topografik tuzilishini, a'zolar va tizimlarning shakli, joylashuvi, o'zaro munosabati hamda individual anatomik variantlarini o'rganuvchi fundamental tibbiyot fanidir. Anatomiya fiziologiya, gistologiya, embriologiya, patologik anatomiya, patologik fiziologiya va klinik fanlarni o'zlashtirish uchun nazariy asos yaratadi. Zamonaviy tibbiyotda anatomik bilimlar nafaqat organizmning normal tuzilishini bilish, balki fizik tekshiruv, radiologik diagnostika, jarrohlik amaliyoti, invaziv muolajalar, shoshilinch tibbiy yordam va klinik qaror qabul qilish jarayonlarida ham muhim ahamiyatga ega. Ushbu maqolada anatomiya fanining asosiy yo'nalishlari, organizmning anatomik tuzilish darajalari, asosiy a'zolar tizimlari va ularning klinik ahamiyati, topografik va tasviriy anatomiya hamda bo'lajak shifokor tayyorlashdagi o'rni yoritiladi.

Kalit so'zlar: anatomiya, klinik anatomiya, topografik anatomiya, morfologiya, inson organizmi, anatomik terminologiya, diagnostika, jarrohlik, radiologik anatomiya, tibbiy ta'lim.

Kirish

Anatomiya — tibbiyotning eng qadimgi va fundamental fanlaridan biri bo'lib, inson organizmining tuzilishi haqidagi bilimlarni shakllantiradi. "Anatomiya" atamasi yunoncha *anatome* — "kesib o'rganish" ma'nosidan kelib chiqqan. Tarixan anatomik bilimlarning rivojlanishi disseksiya, ya'ni inson tanasini qatlamma-qatlam o'rganish bilan bevosita bog'liq bo'lgan. Bugungi kunda esa anatomiya klassik disseksiya bilan cheklanmaydi; kompyuter tomografiya (CT), magnit-rezonans tomografiya (MRI), ultratovush tekshiruvi (ultrasonography), angiografiya, endoskopiya va uch o'lchamli raqamli modellashtirish kabi zamonaviy texnologiyalar anatomiyani tirik inson organizmida o'rganish imkonini beradi.

Zamonaviy anatomiya klinik amaliyot bilan chambarchas integratsiyalashgan. Hozirgi yetakchi anatomiya manbalarida anatomik tuzilmalarning klinik diagnostika, radiologiya, shoshilinch tibbiyot va jarrohlik bilan bog'liqligiga katta e'tibor qaratiladi. Masalan, *Moore's Clinically Oriented Anatomy* anatomiyani fizik diagnostika, diagnostik tasvirlar, shoshilinch tibbiyot va umumiy jarrohlik uchun zarur klinik nuqtai nazardan yoritadi. [1] LWW Official Store

“Davolash ishi” yo‘nalishidagi talaba uchun anatomiyani o‘rganishning vazifasi a’zolarning nomini yodlash bilangina cheklanmaydi. Bo‘lajak shifokor a’zoning joylashuvi, shakli, chegaralari, skeletotopiyasi, sintopiyasi, qon bilan ta’minlanishi, venoz va limfatik drenaji, innervatsiyasi hamda klinik jihatdan muhim qo‘shni tuzilmalarini tushunishi kerak.

Inson organizmining anatomik tashkil etilish darajalari

Inson organizmi murakkab biologik tizim bo‘lib, uning tuzilishi bir nechta ierarxik darajalardan tashkil topadi:

Hujayra darajasi — organizmning asosiy strukturaviy va funksional birligi hisoblanadi. Nerv hujayralari, mushak hujayralari, epitelial hujayralar va boshqa hujayralarning morfologiyasi ularning bajaradigan funksiyasiga moslashgan.

To‘qima darajasi — o‘xshash tuzilish va vazifaga ega hujayralar hamda hujayralararo moddalarning majmuasidir. Inson organizmida epitelial, biriktiruvchi, mushak va nerv to‘qimalari asosiy guruhlarni tashkil qiladi.

A’zo darajasi — turli to‘qimalarning ma’lum anatomik shaklga ega va muayyan vazifani bajaruvchi tuzilma sifatida birlashishidir. Yurak, jigar, buyrak, o‘pka, bosh miya ana shunday a’zolarga misol bo‘ladi.

A’zolar tizimi darajasi — bir-biriga funksional va anatomik jihatdan bog‘liq bir nechta a’zolarning yagona vazifani bajarish uchun birlashishidir.

Organizm darajasi — barcha tizimlarning nerv va gumoral mexanizmlar yordamida o‘zaro muvofiqlashgan holda ishlashidir.

Shu sababli anatomiyani alohida organlarning katalogi sifatida emas, balki yaxlit biologik tizimning strukturaviy asosini o‘rganuvchi fan sifatida qabul qilish kerak.

Anatomik holat, tekisliklar va yo‘nalishlar

Klinik anatomiyada barcha anatomik tavsiflar standart **anatomik holat (anatomical position)** asosida beriladi. Bunda inson tik turgan, yuzi oldinga qaratilgan, qo‘llari tananing ikki tomonida joylashgan, kaftlari oldinga qaragan va oyoqlari parallel holatda tasavvur qilinadi.

Organizmni tavsiflashda uchta asosiy anatomik tekislik qo‘llaniladi:

- **sagittal tekislik** — tanani o‘ng va chap qismlarga ajratadi;
- **frontal yoki koronal tekislik** — tanani oldingi va orqa qismlarga ajratadi;

- **transversal yoki axial tekislik** — tanani yuqori va pastki qismlarga ajratadi.

Klinik tibbiyotda *superior*, *inferior*, *anterior*, *posterior*, *medial*, *lateral*, *proximal*, *distal*, *superficial* va *deep* kabi yo‘nalish terminlaridan foydalaniladi.

Xalqaro anatomik nomenklaturaning asosini Federative International Programme for Anatomical Terminology — FIPAT tomonidan ishlab chiqilgan **Terminologia Anatomica** tashkil etadi. Terminologia Anatomica’ning ikkinchi nashri 2019-yilda e’lon qilingan va IFAA tomonidan xalqaro anatomik terminologiya sifatida qabul qilingan. [2] ifaa.net

Standart terminlardan foydalanish turli mamlakatlardagi shifokor va olimlar o‘rtasida anatomik tushunchalarning bir xil talqin qilinishini ta’minlaydi.

Anatomiyaning asosiy yo‘nalishlari

Tizimli anatomiya

Tizimli anatomiya (systemic anatomy) organizmni funksional tizimlarga ajratgan holda o‘rganadi. Masalan:

- skelet tizimi — osteologiya;
- bo‘g‘imlar — artrologiya;
- mushaklar — miologiya;
- yurak va qon tomirlari — angiologiya;
- asab tizimi — nevroanatomiya;
- ichki a’zolar — splanxnologiya.

Bu yondashuv tibbiyot ta’limining boshlang‘ich bosqichida asosiy anatomik tushunchalarni tizimli shakllantirish uchun qulaydir.

Regional va topografik anatomiya

Regional yoki topografik anatomiya (regional/topographic anatomy) organizmni bosh, bo‘yin, ko‘krak qafasi, qorin, chanoq, yuqori va pastki ekstremitalar kabi anatomik sohalarga ajratib o‘rganadi.

Topografik anatomiyada uch muhim tushuncha qo‘llaniladi:

Golotopiya — a’zoning organizmning muayyan anatomik sohasida joylashuvi.

Skeletotopiya — a’zoning suyaklar va umurtqa pog‘onasiga nisbatan joylashuvi.

Sintopiya — a’zoning atrofidagi boshqa tuzilmalar bilan o‘zaro anatomik munosabati.

Bu ma’lumotlar ayniqsa jarrohlikda katta ahamiyatga ega. Jarroh operatsiya vaqtida faqat kasallangan a’zoning o‘zini emas, balki uning yonidan o‘tuvchi arteriyalar, venalar, nervlar va boshqa hayotiy tuzilmalarni ham hisobga olishi kerak.

Klinik anatomiya

Klinik anatomiya anatomik bilimlarni kasalliklar diagnostikasi va davolash bilan bog‘laydi. Masalan, periferik nervning qaysi darajada zararlanganini bemordagi motor va sensor deficit asosida aniqlash uchun nervning anatomik yo‘nalishini bilish zarur.

Humerus suyagining diafiz qismidagi jarohatlarda radial nerv zararlanishi ehtimoli anatomik yaqinlik bilan bog‘liq. Bunday holatda qo‘l panjasini ekstension harakatida buzilish yuzaga kelishi mumkin. Demak, klinik simptomning anatomik asosini tushunish diagnostik fikrlashning muhim elementi hisoblanadi.

Yuzaki anatomiya

Yuzaki anatomiya (surface anatomy) chuqur joylashgan anatomik tuzilmalarning tana yuzasidagi proyeksiyasini o‘rganadi.

Bu bilim:

- arteriyalarda pulsni tekshirish;
- yurak va o‘pka chegaralarini baholash;
- auskultatsiya nuqtalarini aniqlash;
- venepunksiya;
- mushak ichiga inyeksiya;
- periferik venoz kateterizatsiya

kabi amaliy ko‘nikmalarning anatomik asosini tashkil qiladi.

Tayanch-harakat tizimining anatomik va klinik ahamiyati

Tayanch-harakat tizimi suyaklar, bo‘g‘imlar, ligamentlar, mushaklar, paylar va fastsiyalardan tashkil topgan.

Skelet organizmga mexanik tayanch beradi, ichki a’zolarni himoya qiladi va mushaklar bilan birgalikda harakatni amalga oshiradi. Suyaklar, shuningdek, mineral moddalar deposi va suyak ko‘migi orqali gemopoez bilan ham bog‘liq.

Bo‘g‘imlarni o‘rganishda quyidagilar muhim:

- artikulyar yuzalar;
- bo‘g‘im kapsulasi;
- ligamentlar;
- harakat o‘qlari;
- harakat hajmi;
- bo‘g‘imning qon ta’minoti va innervatsiyasi.

Travmatologiyada sinishning joylashuvi faqat suyakning zararlanishini emas, balki uning yaqinidagi nerv va tomirlar shikastlanishi xavfini ham belgilaydi.

Mushaklarni klinik o‘rganishda esa ularning **boshlanish joyi (origin), birikish joyi (insertion), funksiyasi, innervatsiyasi va qon bilan ta’minlanishi** birgalikda baholanadi.

Zamonaviy anatomik atlaslarda tayanch-harakat apparatining nerv va qon tomirlari bilan topografik munosabatiga alohida e’tibor qaratiladi. Masalan, Thieme anatomik atlasining amaldagi 4-nashri mushaklar, bo‘g‘imlar, ligamentlar, innervatsiya va anatomik variantlarni integratsiyalangan holda yoritadi. [3] shop.thieme.com

Yurak-qon tomir tizimi

Yurak-qon tomir tizimi yurak va arteriyalar, arteriolalar, kapillyarlar, venulalar hamda venalardan tashkil topadi.

Yurak ko‘krak qafasining mediastinum sohasida joylashgan bo‘lib, o‘ng va chap bo‘lmacha hamda o‘ng va chap qorinchadan iborat. Yurak anatomiyasini o‘rganishda:

- yurak kameralari;
- interventrikulyar va interatrial septalar;
- atrioventrikulyar klapanlar;
- aortal va pulmonal klapanlar;
- koronar arteriyalar;
- venoz drenaj;
- yurakning o‘tkazuvchi tizimi

alohida klinik ahamiyatga ega.

Koronar arteriyalar anatomiyasini bilish miokard ishemiyasi va infarktini tushunish, koronar angiografiya va revaskulyarizatsiya muolajalarini talqin qilishda zarur.

Arteriyalar va venalarning topografiyasi esa qon ketishini nazorat qilish, venoz kateter o‘rnatish, arterial pulsni aniqlash va tomir jarrohligi uchun asos bo‘ladi.

Nafas olish tizimi anatomiyasi

Nafas olish tizimiga burun bo‘shlig‘i, halqum, hiqildoq, traxeya, bronxlar va o‘pkalar kiradi.

O‘ng asosiy bronx odatda chap bronxga nisbatan vertikalroq yo‘nalishga ega bo‘lgani uchun aspiratsiya bilan bog‘liq klinik vaziyatlarda bronxial anatomiyani bilish muhimdir.

O‘pkalar plevra bilan qoplangan. Visseral plevra o‘pka yuzasini, parietal plevra esa ko‘krak qafasi devorini qoplaydi. Ularning orasidagi plevral bo‘shliq normal sharoitda potensial bo‘shliq hisoblanadi.

Pnevmotoraks, gemotoraks va plevral effuziya kabi kasalliklarda plevra anatomiyasi muhim klinik ahamiyat kasb etadi.

Ko‘krak qafasining qovurg‘alararo tomir-nerv tutami anatomiyasi plevral punksiya va torakal drenaj kabi muolajalarda hisobga olinishi zarur.

Ovqat hazm qilish tizimi

Ovqat hazm qilish tizimiga:

og‘iz bo‘shlig‘i → halqum → qizilo‘ngach → oshqozon → ingichka ichak → yo‘g‘on ichak

ketma-ketligi hamda jigar, o‘t pufagi va oshqozon osti bezi kabi yordamchi a’zolar kiradi.

Qorin bo‘shlig‘i a’zolarining **peritoneal munosabati**, qon ta’minoti va portal venoz tizim bilan bog‘liqligi klinik jihatdan alohida ahamiyatga ega.

Masalan, oshqozon-ichak traktining qon ta’minotida:

- *truncus coeliacus*;
- *arteria mesenterica superior*;
- *arteria mesenterica inferior*

asosiy arterial magistrallar hisoblanadi.

Jigar anatomiyasi esa gepatobiliar jarrohlik, ultratovush tekshiruvi, CT va MRI interpretatsiyasi uchun muhimdir. Zamonaviy klinik anatomiyada jigarning faqat

anatomik bo‘laklari emas, balki funksional segmentar tuzilishi ham katta ahamiyat kasb etadi.

Siydik chiqarish tizimi

Siydik chiqarish tizimi buyraklar, ureterlar, siydik pufagi va uretradan tashkil topadi.

Buyraklar retroperitoneal joylashgan juft a’zolar bo‘lib, ularning qon ta’minoti buyrak arteriyalari orqali amalga oshiriladi.

Buyrak anatomiyasini bilish:

- ultratovush diagnostikasi;
- buyrak biopsiyasi;
- nefrostomiya;
- buyrak toshlari;
- urologik operatsiyalar

uchun muhim.

Ureter bo‘ylab ayrim anatomik torayishlar mavjud bo‘lib, siydik toshlarining ushbu sohalarda to‘xtab qolishi mumkinligi urologik diagnostikada muhim hisoblanadi.

Asab tizimi va klinik nevroanatomiya

Asab tizimi organizm faoliyatini boshqaruvchi va muvofiqlashtiruvchi murakkab tizimdir.

U ikki asosiy qismga bo‘linadi:

Markaziy asab tizimi (central nervous system) — bosh miya va orqa miya.

Periferik asab tizimi (peripheral nervous system) — bosh miya nervlari, spinal nervlar, gangliyalar va periferik nervlardan tashkil topadi.

Bosh miyada katta yarimsharlar, miya ustuni, miyacha, bazal yadrolar, diensefalon va boshqa anatomik tuzilmalar mavjud.

Nevroanatomiya klinik nevrologiyaning asosidir. Shifokor bemorda:

- parez yoki falaj;
- sezgi buzilishi;
- reflekslarning o‘zgarishi;

- koordinatsiya buzilishi;
- nutq buzilishi;
- kranial nervlar patologiyasi

kuzatilganda zararlanishning taxminiy anatomik lokalizatsiyasini aniqlashi kerak.

Bu jarayon **topik diagnostika** deb ataladi.

Masalan, bosh miya po‘stlog‘i, ichki kapsula, miya ustuni, orqa miya yoki periferik nerv zararlanishlari klinik jihatdan turlicha belgilar bilan namoyon bo‘ladi.

Shu sababli nevrolog uchun anatomiya oddiy nazariy fan emas, balki kasallik o‘chog‘ining joylashuvini aniqlash vositasidir.

Endokrin tizim

Endokrin tizimga gipofiz, qalqonsimon bez, qalqonsimon bez oldi bezlari, buyrak usti bezlari va boshqa endokrin tuzilmalar kiradi.

Ularning anatomik joylashuvi jarrohlik uchun katta ahamiyatga ega. Masalan, qalqonsimon bez operatsiyalarida qaytuvchi hiqildoq nervi (*nervus laryngeus recurrens*) va paratireoid bezlarning anatomik munosabatlarini bilish zarur.

Demak, endokrin jarrohlikdagi xavfsizlik ham anatomik bilimlarga bevosita bog‘liq.

Reproduktiv tizim

Erkaklar va ayollar reproduktiv tizimlari anatomiyasi reproduktologiya, urologiya, ginekologiya va akusherlikning asosini tashkil qiladi.

Ayol chanoq anatomiyasini bilish:

- homiladorlik;
- tug‘ruq;
- bachadon va tuxumdon kasalliklari;
- bepushtlik;
- ginekologik jarrohlik

uchun zarur.

Erkaklar reproduktiv tizimida moyaklar, epididimis, urug‘ chiqaruvchi yo‘llar, prostata va tashqi jinsiy a’zolar anatomiyasi urologik diagnostika va davolashda muhim o‘rin tutadi.

Limfa tizimi va klinik ahamiyati

Limfa tizimi limfa kapillyarlari, tomirlari, limfa tugunlari va limfoid organlardan tashkil topadi.

Limfa drenaji anatomiyasining klinik ahamiyati ayniqsa onkologiyada yuqori. O‘smalarning limfogen metastazlanishini tushunish uchun ma’lum a’zodan limfaning qaysi regional limfa tugunlariga oqishini bilish kerak.

Masalan, sut bezining limfatik drenaji ko‘krak bezi saratonida regional limfa tugunlarini baholash bilan bevosita bog‘liq.

Qon ta’minoti va innervatsiyaning klinik ahamiyati

Har bir a’zoni o‘rganishda uchta savol muhim:

1. A’zoga arterial qon qayerdan keladi?
2. Venoz qon qayerga oqadi?
3. A’zo qanday nervlar orqali innervatsiya qilinadi?

Arterial anatomiyani bilish qon ketish manbasini aniqlash va jarrohlikda gemostaz uchun zarur.

Venoz anatomiyani bilish tromboz, emboliya va venoz yetishmovchilik mexanizmlarini tushunishga yordam beradi.

Innervatsiyani bilish esa og‘riq, parez, falaj, sezgi buzilishlari va vegetativ disfunksiyalarni tushuntirish imkonini beradi.

Anatomiya va fizik diagnostika

Bemorni klinik tekshirishning ko‘plab elementlari anatomik bilimlarga asoslanadi.

Inspeksiya vaqtida shifokor tana simmetriyasi, deformatsiyalar, shishlar, teri va tashqi anatomik belgilarni baholaydi.

Palpatsiya vaqtida yuzaki joylashgan arteriyalar, limfa tugunlari, qalqonsimon bez, qorin bo‘shlig‘idagi ayrim a’zolar va boshqa anatomik tuzilmalar tekshiriladi.

Perkussiya yordamida ayrim ichki a’zolarning chegaralari va to‘qimalarning fizik xususiyatlari haqida ma’lumot olish mumkin.

Auskultatsiya paytida esa yurak klapanlari anatomik joylashuvi va ularning tovushlari eng yaxshi eshitiladigan auskultativ nuqtalar o‘rtasidagi farqni bilish zarur.

Shunday qilib, klassik fizik diagnostika ham anatomik bilimlardan boshlanadi.

Tasviriy anatomiya

Zamonaviy shifokor anatomiyani nafaqat atlasdan, balki diagnostik tasvirlardan ham taniy olishi kerak.

Rentgenografiya suyaklar, bo‘g‘imlar va ayrim ko‘krak qafasi tuzilmalarini baholash uchun qo‘llaniladi.

Kompyuter tomografiya (CT) organizmning ko‘ndalang va multiplanar tasvirlarini beradi hamda travma, o‘smalar, qon ketish va ko‘plab boshqa patologiyalarni baholashda qo‘llaniladi.

Magnit-rezonans tomografiya (MRI) ayniqsa markaziy asab tizimi, bo‘g‘imlar va yumshoq to‘qimalarni baholashda yuqori anatomik kontrast beradi.

Ultratovush tekshiruvi abdominal a’zolar, yurak, qalqonsimon bez, qon tomirlari, homila va boshqa tuzilmalarni real vaqt rejimida ko‘rish imkonini beradi.

Angiografiya tomir anatomiyasi va patologiyasini baholash uchun qo‘llaniladi.

Gray’s Anatomy’ning hozirgi 43-nashrida regional anatomiya, neuroanatomiya, hujayra biologiyasi, embriogenez va rivojlanish bilan bir qatorda zamonaviy klinik anatomik yondashuvlar integratsiya qilingan. [4] Elsevier Shop

Jarrohlik anatomiyasi

Jarrohlik anatomiyasi klinik anatomiyaning eng amaliy yo‘nalishlaridan biridir.

Har qanday operatsiya oldidan jarroh:

- teri;
- teri osti to‘qimasi;
- fastsiyalar;
- mushaklar;
- arteriyalar va venalar;
- nervlar;
- ichki a’zolar

qaysi ketma-ketlikda joylashganini aniq bilishi kerak.

Anatomik qatlamlarni to‘g‘ri tushunish sog‘lom to‘qimalarning ortiqcha shikastlanishini kamaytiradi.

Jarrohlikda **xavfsiz anatomik yo‘llar (surgical planes)** tushunchasi mavjud. Ular to‘qimalar orasidagi tabiiy anatomik chegaralardan foydalanish orqali operatsiyani kamroq travmatik bajarishga imkon beradi.

Minimal invaziv jarrohlik, laparoskopik va robot-assistent operatsiyalar rivojlangani sari uch o‘lchamli topografik anatomiyani mukammal bilish yanada muhimlashmoqda.

Anatomiya va shoshilinch tibbiyot

Shoshilinch tibbiy yordamda qarorlar ba’zan bir necha daqiqa ichida qabul qilinadi. Bunday vaziyatlarda anatomik orientirlarni bilish hayotiy ahamiyatga ega.

Masalan:

- nafas yo‘lini ta’minlash;
- periferik yoki markaziy venoz kirish;
- plevral bo‘shliqni drenajlash;
- travmatik qon ketishini nazorat qilish;
- yurak-o‘pka reanimatsiyasi

kabi muolajalar anatomik bilimlarsiz xavfsiz bajarilmaydi.

Anatomik variantlar

“Inson anatomiyasi” deganda faqat bitta mutlaq standart tuzilish nazarda tutilmaydi. Normal anatomiyada ham ko‘plab individual variantlar mavjud.

Masalan:

- arteriyaning tarmoqlanish varianti;
- venoz tizimning individual xususiyatlari;
- mushaklarning qo‘shimcha tutamlari;
- ayrim organlar shakli va joylashuvi;
- nerv yo‘llarining anatomik farqlari

uchrashi mumkin.

Bunday anatomik variantlar ko‘pincha patologiya hisoblanmaydi, biroq diagnostika va jarrohlik amaliyotida muhim bo‘lishi mumkin.

Zamonaviy Thieme va Sobotta atlaslarida anatomik variantlar va ularning klinik ahamiyatiga alohida e’tibor beriladi. Sobotta Atlasining 17-nashri anatomik tuzilmalarni disseksiya, topografiya, kesim anatomiyasi va klinik holatlar bilan bog‘lab beradi. [5] Elsevier Shop

Anatomiya va boshqa tibbiy fanlarning integratsiyasi

Anatomiyani boshqa fundamental fanlardan ajratib o‘rganib bo‘lmaydi.

Anatomiya + gistologiya — a’zoning makroskopik va mikroskopik tuzilishini birlashtiradi.

Anatomiya + fiziologiya — “qanday tuzilgan?” va “qanday ishlaydi?” savollariga javob beradi.

Anatomiya + embriologiya — kattalar organizmining tuzilishi qanday shakllanganini va tug‘ma nuqsonlarning kelib chiqishini tushuntiradi.

Anatomiya + patologik anatomiya — normal va kasallikdagi morfologik tuzilishni taqqoslashga yordam beradi.

Anatomiya + patologik fiziologiya — strukturaviy o‘zgarishlarning funksional oqibatlarini tushunishga imkon beradi.

Anatomiya + radiologiya — normal va patologik tasvirlarni interpretatsiya qilish uchun zarur.

Anatomiya + jarrohlik — xavfsiz operativ kirish va muolaja bajarishning asosidir.

Shu sababli anatomiya tibbiyotda alohida fan emas, balki fundamental va klinik fanlarni birlashtiruvchi asosiy integratsion fanlardan biridir.

Anatomiyani o‘rganishning zamonaviy usullari

Tibbiyot talabasi anatomiyani faqat matn yodlash orqali samarali o‘zlashtira olmaydi. Eng samarali yondashuv bir necha metodni birlashtirishdir.

Birinchidan, darslik orqali anatomik tuzilmaning asosiy tavsifini o‘rganish kerak.

Ikkinchidan, anatomik atlas yordamida uning fazoviy joylashuvi o‘rganiladi. Masalan, Netter Atlasining 8-nashri klinik jihatdan muhim anatomik munosabatlarni 550 dan ortiq tasvir va tanlangan radiologik tasvirlar yordamida ko‘rsatadi. [6] Elsevier Shop

Uchinchidan, skelet, mulyaj, anatomik preparat yoki kadaver materialida struktura topilishi kerak.

To‘rtinchidan, CT va MRI kesimlarida shu anatomik tuzilmani aniqlash kerak.

Beshinchidan, olingan bilim klinik vaziyat bilan bog‘lanishi zarur.

Masalan, braxial pleksusni o‘rganayotgan talaba:

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ildizlar → trunkuslar → divisionlar → cordlar → terminal shoxlar
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ketma-ketligini bilishi, so‘ng qaysi nervning zararlanishi qaysi mushak va teri sohasidagi funksional buzilishga olib kelishini tushunishi kerak.

Bunday yondashuv anatomiyani yodlangan faktlardan klinik bilimga aylantiradi.

Bo‘lajak shifokor uchun anatomiyaning ahamiyati

Anatomiyani yaxshi biladigan talaba keyingi klinik fanlarni o‘zlashtirishda sezilarli ustunlikka ega bo‘ladi.

Chunki:

patologik o‘zgarishni bilish uchun — normal strukturani bilish kerak;

nevrologik simptomni lokalizatsiya qilish uchun — asab yo‘llarini bilish kerak;

rentgen yoki CT tasvirini tushunish uchun — kesim anatomiyasini bilish kerak;

operatsiya qilish uchun — topografik anatomiyani bilish kerak;

inyeksiya yoki kateterizatsiya qilish uchun — yuzaki va regional anatomiyani bilish kerak;

travmani baholash uchun — suyak, tomir va nervlarning o‘zaro joylashuvini bilish kerak.

Shuning uchun anatomiya tibbiy ta’limning dastlabki bosqichida o‘tiladigan fan bo‘lsa-da, uning amaliy ahamiyati shifokorning butun kasbiy faoliyati davomida saqlanib qoladi.

Xulosa

Anatomiya inson organizmining normal tuzilishini o‘rganuvchi fundamental tibbiyot fanidir. Uning vazifasi a’zolarning nomi va joylashuvini yodlatish bilangina cheklanmaydi. Zamonaviy anatomiya organizm tuzilishini funksional, topografik, klinik, radiologik va jarrohlik jihatdan o‘rganishni nazarda tutadi.

Anatomik bilimlar fizik tekshiruv, kasalliklarni lokalizatsiya qilish, instrumental diagnostika natijalarini interpretatsiya qilish, jarrohlik amaliyotlarini rejalashtirish va invaziv tibbiy muolajalarni xavfsiz bajarishda asosiy o‘rin tutadi.

Ayniqsa “Davolash ishi” yo‘nalishidagi talabalar uchun anatomiyani puxta o‘zlashtirish fiziologiya, patologik anatomiya, patologik fiziologiya, radiologiya, nevrologiya, terapiya, travmatologiya, akusherlik-ginekologiya va jarrohlik fanlarini chuqur tushunishning zarur shartidir.

Shunday qilib, inson organizmining normal tuzilishini bilish — kasallikni anglashning boshlanishi, anatomik tafakkur esa klinik fikrlashning muhim tarkibiy qismidir. Anatomiya haqiqatan ham tibbiyotning mustahkam poydevoridir.

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THE ROLE OF ARTIFICIAL INTELLIGENCE IN IMPROVING LOAN CLASSIFICATION AND CREDIT RISK ASSESSMENT

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Annotatsiya. Ushbu tezis kreditlarni tasniflash va kredit riskini baholash jarayonlarida sun’iy intellekt texnologiyalarining rolini tahlil qiladi. Tadqiqotda mashinaviy o‘qitish, ansambl modellari, neyron tarmoqlar va izohlanadigan sun’iy intellekt yondashuvlarining qarz oluvchining to‘lovga layoqatini baholash, muammoli kreditlarni erta aniqlash hamda kredit portfelini segmentlashdagi imkoniyatlari ko‘rib chiqiladi. Taklif etilgan konseptual model an’anaviy moliyaviy ko‘rsatkichlarni tranzaksion va xulq-atvor ma’lumotlari bilan birlashtiradi. Natijalar shuni ko‘rsatadiki, sun’iy intellektdan foydalanish risk signallarini aniqlash tezligini oshirishi, tasniflashning aniqligi va izchilligini yaxshilashi hamda kredit qarorlarini qo‘llab-quvvatlash tizimlarini kuchaytirishi mumkin. Shu bilan birga, model tavakkali, ma’lumotlar sifati, diskriminatsiya, maxfiylik va izohlanuvchanlik masalalari qat’iy boshqaruvni talab qiladi.

Kalit so‘zlar: sun’iy intellekt, kredit riski, kredit tasnifi, mashinaviy o‘qitish, kredit skoringi, muammoli kreditlar, model izohlanuvchanligi.

Аннотация. В тезисе рассматривается роль технологий искусственного интеллекта в классификации кредитов и оценке кредитного риска. Анализируются возможности машинного обучения, ансамблевых моделей, нейронных сетей и объяснимого искусственного интеллекта при оценке кредитоспособности заемщика, раннем выявлении проблемных кредитов и сегментации кредитного портфеля. Предлагаемая концептуальная модель объединяет традиционные финансовые показатели с транзакционными и поведенческими данными. Результаты показывают, что применение искусственного интеллекта способно ускорить выявление сигналов риска, повысить точность и последовательность классификации и усилить системы

поддержки кредитных решений. Одновременно риски моделей, качество данных, дискриминация, конфиденциальность и объяснимость требуют строгого управления.

Ключевые слова: искусственный интеллект, кредитный риск, классификация кредитов, машинное обучение, кредитный скоринг, проблемные кредиты, объяснимость модели.

Abstract. This thesis examines the role of artificial intelligence (AI) in improving loan classification and credit risk assessment. It focuses on machine learning, ensemble methods, neural networks, and explainable AI as tools for estimating borrower creditworthiness, detecting early signs of deterioration, and segmenting loan portfolios. The proposed conceptual framework combines conventional financial variables with transactional and behavioral data to support more dynamic risk assessment. The findings indicate that AI can improve the speed, consistency, and discriminatory power of loan classification while strengthening early-warning and credit decision-support systems. However, model risk, data quality, bias, privacy, governance, and explainability remain critical constraints that require robust control frameworks.

Keywords: artificial intelligence, credit risk, loan classification, machine learning, credit scoring, non-performing loans, explainable AI.

INTRODUCTION

Credit risk remains one of the principal sources of financial loss for banks and other lending institutions. Traditional credit assessment relies heavily on financial ratios, credit history, collateral quality, delinquency status, and expert judgment. Although these methods remain indispensable, they may respond slowly to changes in borrower behavior and can be limited when relationships among risk factors are nonlinear or when large volumes of heterogeneous data must be processed.

Artificial intelligence offers a complementary approach to conventional credit analysis. Machine-learning algorithms can identify complex patterns in borrower data, detect interactions among variables, and update risk estimates as new information becomes available. In practice, AI can support several stages of the credit cycle, including application scoring, probability-of-default estimation, loan grading, early-warning detection, collections prioritization, and portfolio monitoring.

The objective of this thesis is to examine how AI can improve loan classification and credit risk assessment, to identify the main analytical components of an AI-enabled framework, and to evaluate the benefits and constraints associated with its implementation. Particular attention is given to the need to combine predictive performance with transparency, regulatory compliance, and human oversight.

MAIN PART

Loan classification is the process of grouping credit exposures according to their level of risk and expected performance. In conventional banking practice, classification is usually based on repayment status, borrower financial condition, collateral coverage, restructuring history, and forward-looking information. AI does not eliminate these criteria; instead, it can process them jointly with additional data and estimate deterioration risk in a more granular and timely manner.

Machine-learning models commonly used in credit risk include logistic regression enhanced with regularization, decision trees, random forests, gradient-boosting algorithms, support vector machines, and neural networks. Their usefulness depends on the structure of the data and the purpose of the model. Tree-based ensemble methods are particularly effective for tabular banking data because they can model nonlinearities and variable interactions. Neural networks can be valuable when datasets are very large or when unstructured information such as text is included.

An AI-supported credit-risk system can use both static and dynamic variables. Static variables include borrower income, leverage, debt-service coverage, sector, collateral, maturity, and credit history. Dynamic variables may include changes in account turnover, payment frequency, arrears patterns, cash-flow volatility, utilization of credit lines, digital transaction behavior, and changes in external credit indicators. The inclusion of dynamic information is especially important for early identification of credit deterioration.

For model development, the target variable must be defined clearly. Depending on the institution, the model can predict default within a fixed horizon, transition to a weaker loan grade, entry into non-performing status, or movement between impairment stages. Model outputs can then be mapped to internal risk grades or classification categories. A robust system should also produce probability of default (PD) estimates and, where relevant, interact with loss given default (LGD) and exposure at default (EAD) components in expected-credit-loss calculations.

Explainability is a central requirement. Highly accurate predictions are not sufficient if credit officers, validators, auditors, regulators, or customers cannot understand the main reasons behind a decision. Techniques such as feature importance, partial dependence, SHAP-based explanations, and reason codes can help identify which variables drive an individual or portfolio-level risk estimate. Explainability also supports model validation and can reveal unintended dependence on inappropriate variables.

Governance is equally important. AI models may reproduce historical bias, deteriorate when economic conditions change, or generate unreliable outputs when data quality falls. Therefore, lenders need data-governance rules, independent model validation, back-testing, performance thresholds, override policies, documentation, and periodic recalibration. Human judgment should remain available for exceptional cases and for decisions involving incomplete or contradictory information.

PROPOSED AI-BASED FRAMEWORK AND RESULTS

The proposed framework consists of five sequential layers: data integration, feature engineering, predictive modeling, explainability and validation, and credit decision support. The first layer consolidates borrower, loan, repayment, transaction, collateral, and macroeconomic data. The second transforms raw information into risk indicators. The third estimates default or migration risk using multiple candidate models. The fourth evaluates model stability, discrimination, calibration, fairness, and interpretability. The fifth converts model outputs into actionable loan classifications and monitoring priorities.

Risk component	AI-supported indicator	Expected management use
Repayment behavior	Days-past-due trend, payment irregularity, missed-payment sequence	Early warning and watch-list assignment
Cash-flow condition	Declining inflows, rising volatility, weakening debt-service capacity	Reassessment of borrower grade
Exposure behavior	Rapid utilization growth, repeated limit exhaustion, concentration increase	Portfolio monitoring and limit review

Borrower profile	Leverage, profitability, liquidity, credit history, sectoral sensitivity	PD estimation and loan classification
Model explanation	Key variable contributions and reason codes	Credit officer review and validation
Model performance	AUC/Gini, precision-recall, calibration, stability metrics	Validation, recalibration, and governance

The analytical results of the proposed framework indicate four major improvements over a purely rule-based approach. First, AI can capture nonlinear relationships among borrower characteristics and repayment behavior, which improves risk differentiation between borrowers with similar conventional ratios. Second, dynamic data allow risk estimates to be updated earlier than classifications based only on overdue status. Third, automated risk scoring increases consistency across branches and credit officers. Fourth, explainability tools make it possible to combine algorithmic predictions with expert review instead of treating the model as a black box.

A practical classification architecture can divide exposures into low-risk, moderate-risk, elevated-risk, and high-risk groups based on calibrated probability-of-default ranges and deterioration signals. Borrowers with stable cash flows, low delinquency risk, and no adverse behavioral indicators remain in the low-risk group. Exposures showing early deterioration are moved to enhanced monitoring. High-risk exposures trigger intensive review, provisioning analysis, collateral reassessment, or restructuring consideration. The exact thresholds should be calibrated to the institution's portfolio and validated against realized defaults rather than copied from another bank.

The main limitation of AI-based assessment is that higher predictive accuracy can create false confidence if the underlying data are incomplete, biased, or unstable. Performance can also decline under structural economic change. For this reason, stress testing, challenger models, periodic recalibration, and independent validation are necessary. AI should therefore be viewed as an advanced decision-support technology, not as a substitute for sound credit policy and professional judgment.

CONCLUSION

Artificial intelligence can materially strengthen loan classification and credit risk assessment by processing large and diverse datasets, detecting nonlinear patterns, identifying early signs of deterioration, and producing more granular risk estimates. Its

greatest value lies in combining traditional financial analysis with dynamic borrower behavior and in supporting continuous portfolio monitoring.

Effective implementation requires more than a high-performing algorithm. Banks must establish clear target definitions, reliable data pipelines, transparent classification rules, explainability mechanisms, validation procedures, fairness controls, and human oversight. When these conditions are satisfied, AI can improve the timeliness and consistency of credit decisions while supporting stronger risk management and more proactive treatment of problem exposures.

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КЛИНИКО-ЛАБОРАТОРНАЯ И ФУНКЦИОНАЛЬНАЯ ОЦЕНКА БЕРЕМЕННЫХ ПОСЛЕ ОСТРОГО ПИЕЛОНЕФРИТА КАК ОСНОВА ДИФФЕРЕНЦИРОВАННОЙ РЕАБИЛИТАЦИИ

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Актуальность. Острый пиелонефрит при беременности относится к системным инфекциям мочевых путей и требует своевременной антибактериальной терапии и наблюдения за возможными материнскими и акушерскими осложнениями [1,2]. После купирования лихорадки, болевого синдрома и других проявлений активной инфекции клиническая задача меняется: необходимо определить степень восстановления, риск повторной инфекции и наличие факторов, способных повлиять на объём последующего наблюдения и реабилитации. Современная EAU-классификация использует категории локализованной и системной инфекции мочевых путей; беременность рассматривается как фактор риска. Поэтому термин «неосложнённый пиелонефрит», сохранённый в названии диссертационного проекта, в протоколе целесообразно дополнительно операционализировать, например через отсутствие обструкции, абсцесса и другой урологической патологии, меняющей тактику лечения [2].

Цель. Обосновать комплекс клинических, лабораторных, функциональных и акушерских показателей, пригодных для оценки состояния беременной после купирования острого пиелонефрита и для последующей дифференциации восстановительных мероприятий.

Материалы и методы поиска литературы. 2 октября 2026 г. выполнен целевой поиск в PubMed/MEDLINE и Cochrane Library, а также проверены актуальные документы ACOG, EAU и ISUOG. Использовались сочетания терминов pregnancy, pyelonephritis, urinary tract infection, follow-up, renal function, urine culture и Doppler. Приоритет отдавался руководствам, систематическим обзорам и работам последних 5–7 лет; более ранние источники учитывались при отсутствии современных данных. Обзор не позиционировался как систематический, PRISMA-процесс не выполнялся.

Основные положения и обсуждение. Критерии завершения лечения острой инфекции и критерии готовности к восстановительному этапу не идентичны. Для

первого важны клиническое улучшение, отсутствие системной нестабильности, адекватная противоинфекционная терапия и микробиологическая оценка. Для второго требуется более широкий анализ: срок гестации, тяжесть перенесённого эпизода, предыдущие инфекции мочевых путей, уролитиаз или нарушения уродинамики, сопутствующие заболевания, акушерский анамнез и течение текущей беременности [1,2,7].

Клинический контроль включает температуру тела, гемодинамику, наличие боли в поясничной области, дизурии, тошноты, слабости и признаков дегидратации. Общий анализ крови и маркеры воспаления могут дополнять оценку при сохраняющейся симптоматике, но отдельный лабораторный показатель не является самостоятельным критерием клинического восстановления. Анализ мочи позволяет выявить пиурию, гематурию и другие отклонения. После лечения пиелонефрита ACOG рекомендует контрольный посев мочи для исключения остаточной инфекции; при повторных симптомах бактериологическое исследование приобретает особое значение [1].

Функцию почек у беременных следует интерпретировать с учётом физиологического увеличения клубочковой фильтрации и снижения сывороточного креатинина. Стандартные расчётные формулы eGFR при беременности не валидированы для рутинной оценки; практическое значение имеет динамика сывороточного креатинина в соответствующем клиническом контексте [4,5]. Физиологическая дилатация мочевых путей и уростаз также не должны автоматически трактоваться как сохраняющаяся патология. Ультразвуковое исследование почек наиболее обосновано при затяжном или рецидивирующем течении, подозрении на обструкцию, конкремент или абсцесс, а не как обязательный маркер «реабилитационного эффекта» у каждой стабильной пациентки [2].

Состояние плода и плацентарного кровообращения необходимо оценивать по стандартным акушерским показаниям. Допплерометрия маточно-плацентарного и плодово-плацентарного кровотока может быть обоснована при соответствующем акушерском риске или как заранее определённая исследовательская переменная, но не является универсальным обязательным тестом после пиелонефрита и не валидирована как самостоятельный критерий эффективности реабилитации [6]. Нормализация лабораторного анализа, уменьшение симптомов и улучшение клинически значимых материнских или

перинатальных исходов представляют разные уровни результата и не должны подменять друг друга.

Заключение. Дифференцированная оценка после острого пиелонефрита должна объединять клинико-анамнестические данные, микробиологический контроль, оценку функции почек и акушерского состояния с учётом срока беременности. Возврат лихорадки, боли в поясничной области, дизурии, рвоты, гемодинамической нестабильности, ухудшения функции почек или акушерских тревожных симптомов требует повторной медицинской оценки и исключения рецидива либо осложнения, а не продолжения плановой реабилитации.

Ключевые слова: беременность; острый пиелонефрит; инфекция мочевых путей; медицинская реабилитация; функция почек; посев мочи; акушерская оценка; допплерометрия.

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EFFECT OF THE TGFB1 Arg25Pro POLYMORPHISM ON TREATMENT EFFICACY AND CLINICAL-FUNCTIONAL PARAMETERS IN CHRONIC HEART FAILURE

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Relevance of the Study

Chronic heart failure (CHF) is one of the common and severe complications of ischemic heart disease (IHD), in the development of which myocardial remodeling and fibrotic processes play an important role [1–2]. The TGFβ1 gene is involved in the molecular regulation of these processes. Therefore, investigation of the TGFβ1 Arg25Pro (rs1800471) polymorphism is relevant to the genetic assessment and prediction of the risk of CHF in patients with IHD [5].

Identifying the association between this polymorphism and the development and clinical course of CHF may help stratify patients into risk groups and improve early preventive measures and individualized therapeutic approaches [3–4].

Aim of the Study

To determine the role of the TGFB1 gene polymorphism in the development of chronic heart failure and to assess its prognostic significance.

Materials and Methods

The analysis included 42 patients receiving empagliflozin and 61 patients who did not receive the drug. The study was conducted in accordance with standard diagnostic criteria for CHF, using instrumental, biochemical, molecular genetic, and statistical research methods.

Results

Among patients not treated with empagliflozin, the Arg/Arg genotype of the TGFβ1 gene was the most common, identified in 46 individuals. In this subgroup, LVEF increased from 48.67 ± 2.00% to 49.80 ± 2.00%, an absolute increase of 1.13 percentage points, which was statistically significant ($p=0.008$). By comparison, patients receiving empagliflozin showed a more pronounced improvement in LVEF, with an increase of 3.22% versus 1.13% in those who did not receive the drug. Therefore, among Arg/Arg genotype carriers, the increase in LVEF observed during empagliflozin treatment was approximately 2.9-fold greater than that recorded in

patients who did not receive empagliflozin. A difference was also observed between the empagliflozin-treated and untreated groups among Arg/Pro genotype carriers. In 13 patients with the Arg/Pro genotype who received empagliflozin, LVEF increased from 39.14 ± 2.90% to 40.92 ± 3.05%. Although the increase was 1.78 percentage points, it did not reach statistical significance (p=0.140) (Table 4.7). In 15 patients with the Arg/Pro genotype who did not receive empagliflozin, the mean LVEF was 45.13 ± 4.47% before treatment and 45.13 ± 4.18% at the end of follow-up, indicating virtually no change (p=1.0).

The Pro/Pro genotype was detected in 2 patients in the empagliflozin-treated group, in whom LVEF increased from 28.5 ± 4.5% to 30.0 ± 6.0%. The magnitude of the change was 1.5 percentage points; however, the change was not statistically significant (p=0.8). The Pro/Pro genotype was not detected in the group of patients who did not receive empagliflozin (n=0).

Conclusion

The results for the TGFβ1 Arg25Pro polymorphism showed differences in LVEF dynamics by genotype. In patients with the Arg/Arg genotype who did not receive empagliflozin, LVEF increased by 1.13 percentage points, whereas no change in LVEF was observed in patients with the Arg/Pro genotype. Notably, the greater improvement in LVEF among empagliflozin-treated patients with the Arg/Arg genotype may indicate a potential role of this

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