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CIRCULAR PLATE WITH A RADIAL TEMPERATURE GRADIENT

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Annotation. *Solutions for the stress-strain state of a circular plate subjected to internal and external pressures were obtained, accounting for temperature effects under plane strain conditions. A comparative graphical analysis was performed to evaluate the results with and without thermal influence.*

Keywords: *Circular plate, strain, volumetric expansion, radial displacement, stress, coefficient of thermal expansion.*

Annotatsiya: *Ichki va tashqi tomonlaridan ta’sir etuvchi bosim ostidagi yumaloq plastina kuchlangan-deformatsiyalangan holati, temperatura ta’siri hisobga olingan, tekis deformatsiya holatida yechimlari olindi. Olingan natijalar temperatura ta’siridan holi va e’tiborga olingandagi grafik ko‘rinishidagi natijalar taqqoslandi.*

Kalit so‘zlar: *Doiraviy plastina, deformatsiya, hajmiy kengayish, radial ko‘chish, kuchlanish, temperaturaviy kengayish koeffisienti.*

Аннотация. *Получены решения задачи о напряженно-деформированном состоянии круглая плита, находящейся под воздействием внутреннего и внешнего давления, с учетом температурного влияния в условиях плоской деформации. Проведен сравнительный анализ результатов в графическом виде для случаев с учетом и без учета температурного воздействия.*

Ключевые слова: *Круглая плита, деформация, объемное расширение, радиальное перемещение, напряжение, коэффициент температурного расширения.*

INTRODUCTION

The problem of circular plates has long been an important topic in solid mechanics and structural engineering. Classical contributions to this field were made

by scientists such of the Russian academician A.I. Gadolin, the French mathematician G. Lamé, and the German scientist T. von Kármán. Specifically, A.I. Gadolin performed strength and stiffness calculations for firearm barrels. The research conducted by Kármán was primarily devoted to studying the stress-strain state of thin-walled pipes. Given the wide range of applications for piping systems and the significant impact of thermal loads during their operation, this article investigates the stress-strain state of thick-walled pipes while accounting for temperature effects. In this study, a practical problem is solved, and relevant conclusions are drawn based on the results.

Problem Statement. Due to the axisymmetric loading acting on the circular plate, its deformation is symmetric with respect to the longitudinal z-axis. Considering that all characteristics of the stress-strain state within the pipe's cross-section are independent of the z-coordinate, the plane strain state is analyzed in a cylindrical coordinate system .Consequently, only the radial displacement u is non-zero, while all other displacement components are equal to zero (vanish).

The expression of strains in terms of displacements in cylindrical coordinates for the plane strain state:

$$\varepsilon_r = \frac{du}{dr}; \varepsilon_\alpha = \frac{u}{r}; \gamma_{r\alpha} = 0; \quad (1)$$

For the plane strain state, the relationship between normal stress and strain, accounting for thermal effects, is determined by Hooke's law as follows:

$$\sigma_r = 2G\varepsilon_r + \lambda(\varepsilon_r + \varepsilon_\alpha) - 3K\beta T;$$
$$\sigma_\alpha = 2G\varepsilon_\alpha + \lambda(\varepsilon_r + \varepsilon_\alpha) - 3K\beta T;$$
$$\tau_{r\alpha} = 0; \quad (2)$$

Shear modulus $G = \frac{E}{2(1+\nu)};$

$$\lambda = \frac{\nu}{(1-2\nu)}\frac{E}{(1+\nu)};$$

$$K = \frac{E}{3(1-2\nu)};$$

$$E = E(t)$$

$$\nu = \nu(t)$$

$$\beta = \beta(t)$$

Table 1. Material properties and their expressions.

The equilibrium equation in cylindrical coordinates for the plane strain state is given as follows:

$$\frac{d\sigma_r}{dr} + \frac{\sigma_r - \sigma_\alpha}{r} = 0 \qquad (3)$$

The boundary conditions for the problem under internal and external pressures are defined as follows:

$$\sigma_r|_{r=a} = -P_a$$
$$\sigma_r|_{r=b} = -P_b \qquad (4)$$

Solution of the problem. By substituting the expressions for strains and stresses into the equilibrium equation (3), the governing equation is derived:

$$\frac{d^2u}{dr^2} + \frac{du}{rdr} - \frac{u}{r^2} = (1+\nu)\beta\frac{dT}{dr} \qquad (5)$$

According to , $\frac{d}{dr}[\frac{1}{r}\frac{d}{dr}(ru)] = \frac{d^2u}{dr^2} + \frac{du}{rdr} - \frac{u}{r^2}$ we can rewrite the equation (5) as follows:

$$\frac{d}{dr}[\frac{1}{r}\frac{d}{dr}(ru)] = (1+\nu)\beta\frac{dT}{dr} \quad (6)$$

After integrating both sides of equation (6), we obtain the following:

$$\frac{d}{dr}(ru) = (1+\nu)\beta T + A \quad (7)$$

$$u = (1+\nu)\beta\frac{J}{r} + Ar + \frac{B}{r} \quad (8)$$

Where J is the temperature functional

$$J = \int_a^r T(klnr + d)dr \quad (9)$$

The strains are determined as follows:

$$\varepsilon_\alpha = \frac{u}{r} = (1+\nu)\beta\frac{J}{r^2} + A + \frac{B}{r^2} \quad (10)$$

$$\varepsilon_r = \frac{du}{dr} = (1+\nu)\beta T - (1+\nu)\beta\frac{J}{r^2} + A + \frac{B}{r^2} \quad (11)$$

By substituting expressions (10) and (11) into the stress expressions (2), the normal stresses varying along the coordinate $\rho$are determined:

$$\sigma_r = \frac{E}{1-\nu}\left[(1+\nu)\left(\frac{A}{1-2\nu} - \frac{B}{r^2}\right) - \beta\frac{J}{r^2}\right] \quad (12)$$

$$\sigma_\alpha = \frac{E}{1-\nu}\left[(1+\nu)\left(\frac{A}{1-2\nu} + \frac{B}{r^2}\right) + \beta\frac{J}{r^2} - \beta t\right] \quad (13)$$

$$\tau_{r\alpha} = 0 \quad (14)$$

The integration constants A and B are determined from the boundary conditions (4).

$$-P_a = \frac{E}{1-\nu}\left[\left(\frac{A}{1-2\nu} - \frac{B}{r^2}\right)\right] \quad (15)$$

$$-P_b = \frac{E}{1-\nu}\left[(1+\nu)\left(\frac{A}{1-2\nu} - \frac{B}{b^2}\right) - \beta\frac{J_b}{b^2}\right] \quad (16)$$

Where

$$J_b = \int_a^b T(klnr + d)dr \quad (17)$$

Solving the system of equations 15 and 16, we obtain the following results:

$$A = (1+\nu)\frac{1-2\nu}{b^2-a^2}\left[\frac{1-\nu}{E}(P_a a^2 - P_b b^2) + \beta J_b\right] \quad (18)$$

$$B = (1+\nu)\frac{a^2}{b^2-a^2}\left[\frac{1-\nu}{E}(P_a b^2 - P_b b^2) + \beta J_b\right] \quad (19)$$

The coefficient of linear thermal expansion is determined from experimental data using the following formula:

$$\beta = \frac{l_0 - l_1}{l_0 \Delta t} \quad (20)$$

Where l_0 is the length corresponding to temperature t_0, l_1 is the length corresponding to temperature t_1, and Δt is the temperature increment.

Using the determined values of the integration constants, the radial displacement, strains, and stresses for the plane strain problem are calculated by means of the following equations.

$$u = (1+\nu)\{\beta\frac{J}{r} + \frac{1-2\nu}{b^2-a^2}r\left[\frac{1-\nu}{E}(P_a a^2 - P_b b^2) + \beta J_b\right] +$$

$$\frac{a^2}{(b^2-a^2)r}\left[\frac{1-\nu}{E}(P_a b^2 - P_b b^2) + \beta J_b\right]\}$$

$$\sigma_r = \frac{E}{1-\nu}\left\{(1+\nu)\left[\frac{(1+\nu)\frac{1-2\nu}{b^2-a^2}\left[\frac{1-\nu}{E}(P_a a^2 - P_b b^2) + \beta J_b\right]}{1-2\nu}\right.\right.$$

$$\left.\left. - \frac{(1+\nu)\frac{a^2}{b^2-a^2}\left[\frac{1-\nu}{E}(P_a b^2 - P_b b^2) + \beta J_b\right]}{r^2} - \beta\frac{J}{r^2}\right]\right\}$$

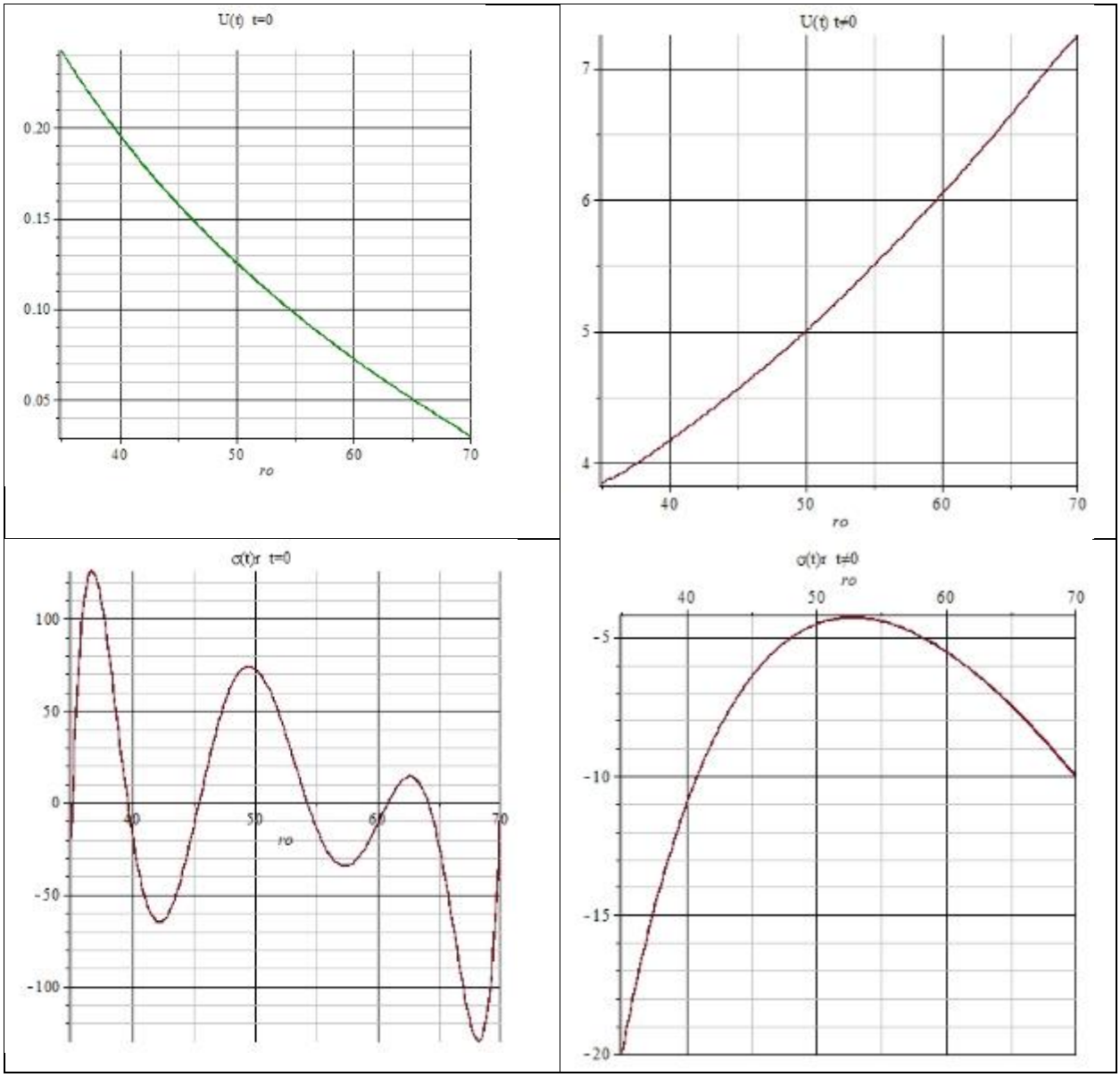
$$\sigma_\alpha = \frac{E}{1-\nu}\left[(1+\nu)\left(\frac{(1+\nu)\frac{1-2\nu}{b^2-a^2}\left[\frac{1-\nu}{E}(P_a a^2 - P_b b^2) + \beta J_b\right]}{1-2\nu} + \frac{(1+\nu)\frac{a^2}{b^2-a^2}\left[\frac{1-\nu}{E}(P_a b^2 - P_b b^2) + \beta J_b\right]}{r^2}\right) + \beta\frac{J}{r^2} - \beta t\right]$$

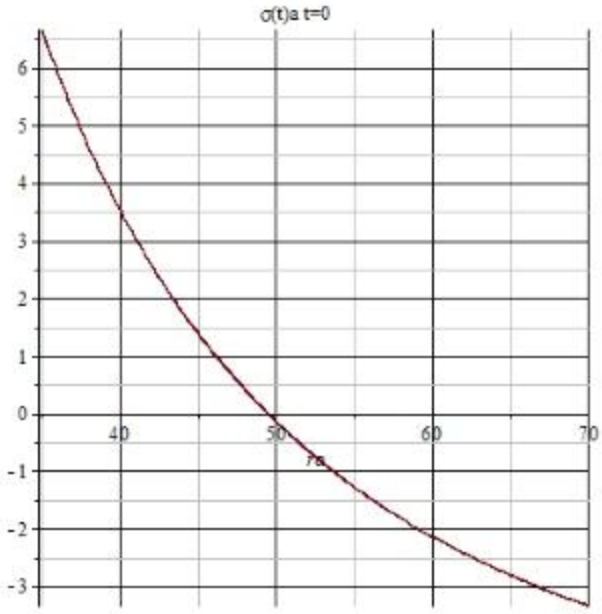
$$\tau_{r\alpha} = 0$$

Practical Problem. A circular plate with an inner radius $a = 35\ mm$ and an outer radius $b = 70mm$ undergoes axisymmetric elastic deformation under the influence of internal pressure $P_a = 20MPa$ and external pressure $P_b = 10MPa$. The pipe's material properties are defined by its Young's modulus $E = (E_0 + E_1 t)\cdot 10^3 MPa$, Poisson's ratio $\nu = 0.3$, and coefficient of thermal expansion $\beta = (\beta_0 + \beta_1 t)\cdot 10^{-6} C^{-1}$. A temperature field is described by the function $T(r) = -0.0025\ln r - 1$. For the purpose of this analysis, displacements and stresses are evaluated by neglecting the effects of temperature variation. The radial coordinate is considered to change according to

the law $r = a + m\Delta r$, $\Delta r = 9mm$, where $m = 0,\ldots,7$. Numerical results and their graphical representations were obtained for 10 radial increments within the region between the inner and outer radii.

Table 2. The Results of the problem for case $m = 7$.





CONCLUSION.

Based on the conducted analysis, it was established that accounting for the radial temperature distribution T(r) in a circular plate significantly affects its stress–strain state. The results show that all main mechanical parameters are distributed non-uniformly along the radius and strongly depend on the temperature field. The radial displacement u reaches its maximum value near the center of the plate and gradually decreases towards the outer edge. When thermal effects are considered, additional deformations occur due to thermal expansion, leading to noticeable changes, especially in the central region of the plate.

The circumferential (hoop) stress σ^{α} attains its maximum magnitude in regions with higher temperature gradients and decreases towards areas with lower temperature intensity. Thermal loading leads to a redistribution of stresses, where thermal stresses combine with mechanical stresses and significantly alter the overall stress state.

It is observed that radial stress σr is less sensitive to temperature variations compared to circumferential stress, although it still contributes to the overall equilibrium of the plate. The inclusion of the temperature function results in a

nonlinear stress distribution along the radius.

In general, the temperature gradient plays a crucial role in determining both the magnitude and distribution of stresses and deformations in a circular plate. The most significant effects are observed in regions with steep temperature gradients. Therefore, considering thermal effects is essential for accurate strength and reliability analysis of circular plates. Neglecting these effects may lead to incorrect evaluation of stress levels, especially in critical regions.

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GLITSIRRET KISLOTASINING AMINOPROPIL IMIDAZOL HOSILALARINI IN SILICO SINOVI: STRUKTURAVIY MODIFIKATSIYANING BIOLOGIK FAOLLIK SPEKTRIGA TA'SIRI

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Annotatsiya. *Ushbu tadqiqotda glitsirret kislotasining* ***(GLK)*** *3, 4, 5 va 6-aminopropil imidazol* ***(API)*** *bilan hosilalari in silico (PASS Online) tahlil qilindi. Natijalar shuni ko'rsatdiki, aminopropil zanjirining holati moddaning farmakologik yo'nalishini keskin o'zgartiradi.* ***GLK + 3API*** *hosilasi membrana destruksiyasi (antagonist) xususiyati bilan ajralib tursa,* ***GLK + 4,5,6API*** *hosilalari yuqori sitoprotektiv faollikni namoyon etdi. Eng yuqori* ***Pa*** *= 0.791 ko'rsatkichi* ***GLK + 3API*** *birikmasida qayd etildi.*

Abstract: *In this study, derivatives of glycyrrhetinic acid* ***(GLK)*** *with 3-, 4-, 5-, and 6-aminopropyl imidazole* ***(API)*** *were analyzed in silico using PASS Online. The results indicated that the position of the aminopropyl chain significantly alters the pharmacological profile of the compounds. The* ***GLK + 3API*** *derivative was distinguished by its membrane-destabilizing (antagonist) activity, whereas the* ***GLK + 4, 5, and 6API*** *derivatives exhibited pronounced cytoprotective activity. The highest Pa value of 0.791 was observed for the* ***GLK + 3API*** *compound.*

Kalit so'zlar: *Glitsirret kislota, Aminopropil imidazol hosilalari, In silico tahlil, PASS Online, Biologik faollik, Sitoprotektiv ta'sir, Membrana destruksiyasi, Strukturaviy modifikatsiya, Farmakologik xususiyatlar, Triterpen saponinlar.*

Keywords: *Glycyrrhetinic acid, Aminopropyl imidazole derivatives, In silico analysis, PASS Online, Biological activity, Cytoprotective effect, Membrane destabilization, Structural modification, Pharmacological properties, Triterpenoid saponins.*

KIRISH (INTRODUCTION)



Shirinmiya (Glycyrrhiza glabra L.) qadim zamonlardan buyon xalq tabobati va zamonaviy farmatsevtikada eng ko'p o'rganilgan dorivor o'simliklardan biri hisoblanadi. Uning ildiz tarkibidagi biologik faol moddalar majmuasi, ayniqsa, saponinlar va flavonoidlar keng ko'lamli terapevtik xususiyatlarga ega. Shirinmiya ekstraktlari nafas yo'llari kasalliklarida ekspektorant (balg'am ko'chiruvchi), oshqozon-ichak trakti kasalliklarida esa yallig'lanishga qarshi va yarani davolovchi vosita sifatida o'zining yuqori samaradorligini isbotlagan.

Ushbu o'simlikning asosiy farmakologik uning tarkibidagi triterpen saponin — glitsirrizin kislotasi va uning aglikon shakli bo'lgan glitsirret kislotasidir (GLK). Glitsirret kislotasi **($C_{30}H_{46}O_4$)** pentatsiklik triterpenoidlar oilasiga mansub bo'lib, u zamonaviy bioorganik kimyoda "oltin molekula" deb yuritiladi. Buning sababi GLK quyidagi noyob xususiyatlarga ega:

Yallig'lanishga qarshi **(Anti-inflammatory)** ta'sir: U steroid gormonlarga o'xshash tuzilishga ega bo'lib, organizmdagi yallig'lanish mediatorlarini **(masalan, prostaglandinlar)** tormozlaydi.

Antitumor va Sitotoksiklik: So'nggi yillardagi tadqiqotlar GLK hosilalarining saraton hujayralarida apoptoz **(hujayra o'limi)** jarayonini ishga tushirish qobiliyatini ko'rsatmoqda. Gepatoprotektorlik: Jigarni toksik moddalar va virusli zararlanishlardan himoya qilishda GLK dunyo miqyosida tan olingan komponent hisoblanadi.

Biroq, tabiiy glitsirret kislotasining suvda yomon eruvchanligi va past biokiraverish **(bioavailability)** darajasi uning dori shaklida qo'llanilishini cheklab qo'yadi. Shu sababli, uning tuzilishiga imidazol kabi geterotsiklik halqalarni kiritish

— molekulaning ham gidrofilligini oshirish, ham uning biologik nishonlarga **(target)** bog'lanish qobiliyatini kuchaytirishning eng istiqbolli yo'nalishlaridan biridir. Ushbu tadqiqotda **GLK** molekulasining 30-holatidagi karboksil guruhini **(COOH)** turli aminopropil imidazol **(API)** zanjirlari bilan modifikatsiya qilish orqali yangi farmakologik xususiyatlarni bashorat qilish maqsadi qo'yilgan.

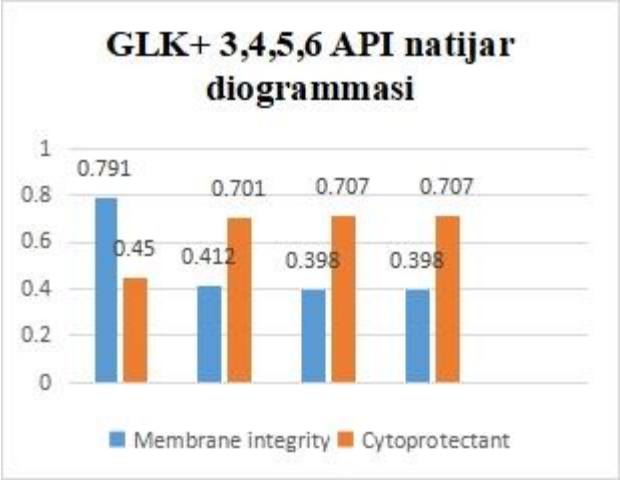
Activity Name	GLK+3-API	GLK+4-API	GLK+5-API	GLK+6-API
Membrane integrity antagonist	**0.791**	0.412	0.398	0.398
Cytoprotectant	0.450	**0.701**	**0.707**	**0.707**
NF-kB stimulant	0.699	0.696	0.693	0.693
Transcription factor stimulant	0.699	0.696	0.693	0.693

MUHOKAMA (DISCUSSION)

GLK+3-API ning o'ziga xosligi: Bu modda boshqalaridan farqli o'laroq "Membrane integrity antagonist" sifatida namoyon bo'lmoqda. Bu shuni anglatadiki, aminopropil guruhining 3-holatda bo'lishi molekulaning hujayra membranalari bilan o'zaro ta'sirini kuchaytiradi. Bu xususiyat saratonga qarshi dori vositalari uchun xosdir.

Zanjir uzunligining ta'siri (SAR): Zanjir 4, 5 va 6-holatlarga o'tganda moddaning tabiati Sitoprotektorlik (hujayralarni tashqi zarardan himoya qilish) tomonga o'zgaradi. 5-API va 6-API natijalari deyarli bir xil **(Pa = 0.707),** demak zanjir ma'lum uzunlikka yetgandan keyin faollik barqarorlashadi.

NF-kb va Transkripiya: Barcha hosilalarda NF-kappa stimulyatsiyasi deyarli bir xil darajada **(Pa = 0.693 - 0.699)** saqlanib qolgan. Bu shuni ko'rsatadiki, GLK-Imidazol skeletining o'zi immun tizimini faollashtirish qobiliyatiga ega va bunga yon zanjirning o'rni kamroq.



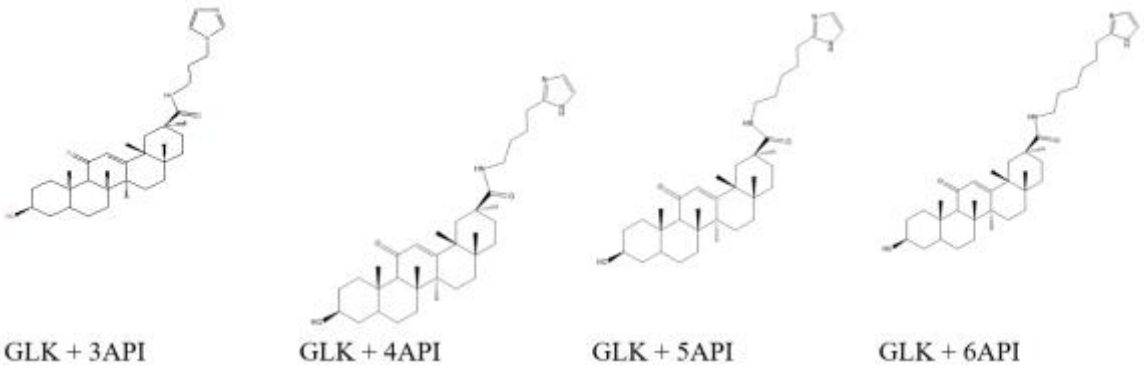
XULOSA (CONCLUSION)

Glitsirret kislotasining aminopropil imidazol hosilalari orasida **GLK+3-API** eng yuqori bashorat qilingan faollikka **(Pa=0.791)** ega.

Aminopropil zanjirining holati moddaning farmakologik profilini sitotoksiklikdan sitoprotektorlikka o'zgartiruvchi asosiy omil **(SAR)** ekanligi aniqlandi.

Ushbu moddalarni antitumor va immunomodulyator dori vositalari sifatida in vitro sinovlardan o'tkazish tavsiya etiladi.

Modda nomi	**Membrane integrity**	**Cytoprotectant**
GLK+3-API	0.791	0.45
GLK+4-API	0.412	0.701
GLK+5-API	0.398	0.707
GLK+6-API	0.398	0.707



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BOSHLANG‘ICH SINFLARDA MANTIQIY MASALALAR ORQALI MATEMATIK TAFAKKURNI RIVOJLANTIRISH

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Annotatsiya: *Mazkur maqolada boshlang‘ich sinf o‘quvchilarida matematik tafakkurni rivojlantirishda mantiqiy masalalarning pedagogik ahamiyati yoritilgan. Mantiqiy masalalar orqali o‘quvchilarning tahliliy fikrlashi, mustaqil qaror qabul qilishi va matematik bilimlarni ongli o‘zlashtirish ko‘nikmalarini shakllantirish masalalari ilmiy-nazariy jihatdan tahlil qilingan. Tadqiqot natijalari mantiqiy masalalardan samarali foydalanish boshlang‘ich ta’limda matematika fanini o‘qitish samaradorligini oshirishini ko‘rsatadi.*

Kalit so‘zlar: *boshlang‘ich ta’lim, matematika, mantiqiy masalalar, matematik tafakkur, fikrlash faoliyati.*

Введение: *В данной статье рассматривается педагогическая значимость логических задач в развитии математического мышления у учащихся начальных классов. В исследовании анализируется влияние логических заданий на формирование аналитического мышления, самостоятельного принятия решений и осознанного усвоения математических знаний. Результаты показывают, что систематическое использование логических задач на уроках математики повышает познавательную активность учащихся и улучшает результаты обучения в начальном образовании.*

Ключевые слова: *начальное образование, математика, логические задачи, математическое мышление, познавательная активность.*

Introduction: *This article examines the pedagogical significance of logical problems in developing mathematical thinking among primary school students. The study analyzes how logical tasks contribute to the formation of analytical thinking, independent decision-making, and conscious acquisition of mathematical knowledge. The results show that systematic use of logical problems in mathematics lessons increases students’ cognitive activity and improves learning outcomes in primary education.*

Key words: *primary education, mathematics, logical problems, mathematical thinking, cognitive activity.*

KIRISH (INTRODUCTION).

Boshlang‘ich ta’lim bosqichi o‘quvchilarda bilim olish jarayonining poydevori hisoblanadi. Ayniqsa, matematika fanini o‘qitishda o‘quvchilarning faqat hisoblash ko‘nikmalarini emas, balki matematik tafakkurini rivojlantirish muhim vazifalardan biri hisoblanadi. Zamonaviy ta’lim jarayonida o‘quvchilarning mustaqil fikrlashi, mantiqiy tahlil qilishi va muammoli vaziyatlardan chiqish yo‘llarini topa olishi dolzarb masalaga aylangan.

Shu jihatdan, mantiqiy masalalar boshlang‘ich sinf o‘quvchilarining intellektual rivojlanishida muhim didaktik vosita bo‘lib xizmat qiladi. Mantiqiy

masalalar o‘quvchilarda qiziqish uyg‘otib, ularni faol fikrlashga undaydi hamda matematik bilimlarni chuqurroq o‘zlashtirishga yordam beradi.

Mavzuga oid adabiyotlarning tahlili (Literature review). Boshlang‘ich sinflarda mantiqiy masalalar orqali matematik tafakkurni rivojlantirish masalasi pedagogika va metodika sohasida keng o‘rganilgan yo‘nalishlardan biridir. Ilmiy manbalarda ta’kidlanishicha, boshlang‘ich ta’lim bosqichi o‘quvchilarda mantiqiy fikrlash, tahlil qilish, umumlashtirish va xulosa chiqarish ko‘nikmalarini shakllantirishning eng muhim davri hisoblanadi. Boshlang‘ich ta’lim metodikasiga oid ilmiy tadqiqotlarda (jumladan, matematikani o‘qitish metodikasi bo‘yicha ishlarda) mantiqiy masalalar:

o‘quvchilarning tafakkur operatsiyalarini rivojlantirish vositasi;

muammoli vaziyat yaratish usuli;

mustaqil fikrlashni shakllantirish omili sifatida talqin etiladi;

Psixologik tadqiqotlarda esa (masalan, bolalar tafakkuri rivoji haqidagi ishlarda) 6–10 yosh oralig‘ida bolalarda konkret-amaliy tafakkurdan mantiqiy tafakkurga o‘tish jarayoni kechishi ta’kidlanadi. Shu sababli aynan boshlang‘ich sinflarda mantiqiy masalalardan foydalanish ilmiy jihatdan asoslangan hisoblanadi.

1-sinf darsliklarida mantiqiy masalalar ko‘proq: taqqoslash (katta-kichik, uzun-qisqa), ortiq-kam, oddiy ketma-ketlik, rasm asosida fikrlash, ko‘rinishida beriladi.

2-sinfda mantiqiy topshiriqlar murakkablashadi. O‘quvchilar: ikki amalli masalalar, yashirin savolli topshiriqlar, sodda mantiqiy vaziyatlar bilan ishlay boshlaydilar.

4-sinfga kelib mantiqiy masalalar yanada murakkablashadi. O‘quvchilar: ko‘p bosqichli masalalar, mantiqiy jadval va diagrammalar, ehtimoliy vaziyatlar, qonuniyatni aniqlash bilan ishlaydilar.

3-sinf oraliq bosqich bo‘lib, bu davrda: ko‘paytirish va bo‘lish asosidagi mantiqiy masalalar, geometrik mantiqiy topshiriqlar, vaqt, masofa, tezlikka oid sodda masalalar kiritiladi.

Tadqiqot metodologiyasi (Research Methodology). Matematik tafakkur — bu o‘quvchining matematik tushunchalarni anglash, ular orasidagi bog‘lanishlarni aniqlash, mantiqiy xulosalar chiqarish va bilimlarni amaliyotda qo‘llay olish qobiliyatidir. Boshlang‘ich sinfda matematik tafakkurni shakllantirish o‘quvchilarning keyingi ta’lim bosqichlarida muvaffaqiyatli o‘qishiga asos yaratadi.

Mantiqiy masalalarning ta’lim jarayonidagi ahamiyati. Mantiqiy masalalar o‘quvchilarni tayyor algoritmlardan foydalanishga emas, balki fikrlashga, tahlil qilishga va izlanishga undaydi. Bunday masalalar orqali o‘quvchilarda:

- mustaqil fikrlash;
- tahlil va sintez qilish;
- taqqoslash va umumlashtirish;
- sabab–oqibat bog‘lanishlarini aniqlash ko‘nikmalari rivojlanadi.

Natijada o‘quvchilarning matematik tafakkuri izchil va barqaror shakllanadi.

Matematika darslarida mantiqiy masalalardan foydalanish jarayoni o‘quvchilarning yosh va individual xususiyatlarini inobatga olgan holda tashkil etilishi lozim. Dars boshida qisqa mantiqiy savollar yordamida o‘quvchilarning diqqati jamlanadi, dars davomida esa mavzuga mos mantiqiy masalalar orqali bilimlar mustahkamlanadi.

Masalan, “Qonuniyatni aniqlang”, “Ortiqcha elementni toping”, “Bir nechta yechimni toping” kabi topshiriqlar o‘quvchilarning tafakkur faolligini oshiradi va matematik bilimlarni chuqurroq anglashiga yordam beradi.

1-Masala: 2023 sonini chapdan o‘ngga ham, o‘ngdan chapga ham bir xil o‘qiladigan ya’ni ikki simmetrik (palindrom) sonlar yig‘indisi ko‘rinishida yozing.

Yechim: Chapdan ham, o‘ngdan ham bir xil o‘qiladigan sonlar palindrom sonlar deyiladi. Misollar: 11, 22, 33; 101, 111, 121; 2002, 2112 va hokazo

2023 — to‘rt xonali son, shuning uchun bitta katta palindrom son, bitta kichik palindrom son tanlash qulay. Ikki xonali palindromlardan boshlaymiz:

[11, 22, 33,……,99]

Hisoblash: Masalan, 22 ni olaylik: [2023 - 22 = 2001]

22 — palindrom, 2001 — palindrom (chapdan ham, o‘ngdan ham bir xil o‘qiladi)

Yakuniy javob: {2023 = 2001 + 22}

2-Masala: Pinokkioning: bo‘yi — 1 m 4 dm, burnining dastlabki uzunligi — 9 cm. Har safar yolg‘on gapirganda burni 2 marta uzayadi. Burni bo‘yidan katta bo‘lib ketgach, Pinokkio yolg‘on gapirishni to‘xtatdi. Savol: Pinokkio necha marta yolg‘on gapirgan?

Yechish: Avval bo‘yini santimetrga o‘tkazamiz: [1m 4dm = 100 cm + 40 cm = 140 cm] Demak: Pinokkio bo‘yi = 140 cm, Dastlabki burun uzunligi = 9 cm

Yolg‘onlar soni	Burun uzunligi (cm)
0	9
1	9 * 2 = 18
2	18* 2 = 36
3	36 *2 = 72
4	72* 2 = 144

Taqqoslash: 3 marta yolg‘ondan keyin: 72 cm (hali bo‘yidan kichik), 4 marta yolg‘ondan keyin: 144 cm [144cm > 140 cm]. Demak, aynan 4-marta yolg‘on gapirganda burni bo‘yidan katta bo‘lib ketgan.

3-Masala: Aziza 8391276540 sonini yozdi. Avval shu sondan 5 ta raqamni o‘chirib, iloji boricha eng katta son hosil qildi. Keyin yana shu sondan 5 ta raqamni o‘chirib, iloji boricha eng kichik son hosil qildi. Hosil bo‘lgan sonlar ayirmasini toping.

1-qadam. Eng katta sonni hosil qilish. 5 ta raqamni o‘chirib, eng katta 5 xonali son olish uchun: chapdan o‘ngga qarab, imkon qadar katta raqamlarni saqlab qolamiz.

Berilgan son: 8391276540

Eng katta 5 xonali son: 98765

2-qadam. Eng kichik sonni hosil qilish. Endi 5 ta raqamni o‘chirib, eng kichik 5 xonali son olish kerak. Son 0 bilan boshlanmasligi kerak. Imkon qadar kichik raqamlar tanlanadi.

Eng kichik variant: 12340

3-qadam. Ayirmani hisoblaymiz: 98765 - 12340 = 86425

Yakuniy javob: 86425

4-Masala: Raqs tanlovida 10 dan 99 gacha sonlar (ikkixonali) berilgan. Qizlar: raqami 2, 5 yoki 10 ga bo‘linadiganlar. O‘g‘il bolalar: qolgan barcha raqamlar. Savol: Tanlovda necha nafar qiz bola qatnashgan?

1-qadam. Oraliqdagi sonlar soni

10 dan 99 gacha sonlar soni: 99 - 10 + 1 = 90

2-qadam. Bo‘linadigan sonlarni hisoblash

Qizlar soni = sonlar 2, 5 yoki 10 ga bo‘linadigan sonlar soni.

A) 2 ga bo‘linadiganlar

10 dan 99 gacha juft sonlar: 2 ga bo‘linadiganlar soni = {99 - 10}{2} + 1 = {89}{2} + 1 = 44 + 1 = 45

2 ga bo‘linadiganlar = 45

B) 5 ga bo‘linadiganlar

10 dan 99 gacha 5 ga bo‘linadiganlar:

Birinchi = 10, oxirgi = 95

Formuladan: (\frac{95 - 10}{5} + 1 = \frac{85}{5} + 1 = 17 + 1 = 18)

5 ga bo‘linadiganlar = 18

C) 10 ga bo‘linadiganlar

10 dan 99 gacha 10 ga bo‘linadiganlar:

Birinchi = 10, oxirgi = 90

Formuladan: (\frac{90 - 10}{10} + 1 = \frac{80}{10} + 1 = 8 + 1 = 9)

10 ga bo‘linadiganlar = 9

3-qadam. Qo‘shishdan oldin takrorlarni chiqarish

10 ga bo‘linadigan sonlar 2 ga va 5 ga bo‘linadiganlarni ham hisoblagan.

Demak: Qizlar soni = 2 ga + 5 ga - 10 ga, 45 + 18 - 9 = 54

Javob: 54

Tahlil va natijalar (Analysis and result). Boshlang‘ich sinflarda mantiqiy masalalardan muntazam foydalanish natijasida:

1. O‘quvchilarning matematik tafakkuri rivojlanadi.
2. Mustaqil fikrlash ko‘nikmasi shakllanadi.
3. Muammoni bosqichma-bosqich hal etish malakasi paydo bo‘ladi.
4. Dars jarayoni qiziqarli va interaktiv tus oladi.
5. O‘quvchilarda matematikaga nisbatan ijobiy munosabat shakllanadi.

Tahlillar shuni ko‘rsatadiki, mantiqiy masalalar oddiy hisob-kitobdan farqli ravishda o‘quvchilarning tafakkur jarayonini chuqurlashtiradi, ularni fikrlashga majbur qiladi va bilimlarni ongli ravishda egallashga yordam beradi. Mantiqiy masalalar boshlang‘ich ta’lim jarayonida mantiqiy masalalardan tizimli va maqsadli foydalanish matematik tafakkurni rivojlantirishning samarali vositasi bo‘lib xizmat qiladi hamda o‘quvchilarning keyingi ta’lim bosqichlari uchun mustahkam intellektual poydevor yaratadi.

XULOSA VA TAKLIFLAR (CONCLUSION/RECOMMENDATION).

Boshlang‘ich sinflarda mantiqiy masalalar orqali matematik tafakkurni rivojlantirish o‘quvchilarning nafaqat bilim darajasini, balki ularning umumiy intellektual salohiyatini oshirishda ham muhim omil hisoblanadi. Mantiqiy masalalar o‘quvchini tayyor javobni eslab qolishga emas, balki mustaqil ravishda fikrlashga, vaziyatni tahlil qilishga, muammoning yechimini turli usullar orqali izlashga undaydi. Bu jarayonda o‘quvchilarda mantiqiy fikrlash, taqqoslash, umumlashtirish, xulosa chiqarish, sabab-oqibat bog‘lanishlarini aniqlash kabi muhim tafakkur operatsiyalari shakllanadi va rivojlanadi. Shuningdek, mantiqiy masalalar o‘quvchilarning diqqatini jamlash, sabr-toqat bilan ishlash, fikrini asoslab berish va o‘z qarorini himoya qilish ko‘nikmalarini mustahkamlaydi. Bunday topshiriqlar dars jarayonini qiziqarli va interaktiv tashkil etishga xizmat qiladi,

o‘quvchilarning matematika faniga bo‘lgan qiziqishini oshiradi hamda ularning darsdagi faolligini kuchaytiradi. Eng muhimi, mantiqiy masalalar real hayotiy vaziyatlarga yaqin bo‘lgani sababli o‘quvchilarda bilimlarni amaliyotda qo‘llash malakasini ham rivojlantiradi.

Shu bois matematika darslarida mantiqiy masalalardan tizimli, maqsadli va izchil foydalanish pedagogik jihatdan maqsadga muvofiqdir. Ularni o‘quvchilarning yosh xususiyatlari va bilim darajasiga mos holda tanlash, oddiydan murakkabga tamoyili asosida berib borish, muhokama va tahlil jarayonini to‘g‘ri yo‘lga qo‘yish orqali yuqori samaradorlikka erishish mumkin. Natijada, boshlang‘ich sinf o‘quvchilarida mustahkam matematik tafakkur shakllanib, keyingi bosqichlardagi ta’lim uchun zarur bo‘lgan mustahkam poydevor yaratiladi.

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MOLECULAR DOCKING AND DYNAMICS STUDY OF LIG2 AS A POTENTIAL INHIBITOR OF CYP51 (PDB ID: 4WMZ)

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Abstract: *Invasive mycoses caused by Candida albicans remain a significant global health concern, particularly among immunocompromised individuals. Sterol 14-α-demethylase (CYP51) is a key enzyme in ergosterol biosynthesis and an important target for antifungal therapy. In this study, molecular dynamics simulations were performed to evaluate the stability of the CYP51-LIG2 complex. RMSD analysis showed that the LIG2-bound system remained stable within 0.30-0.40 nm, while the control exhibited higher deviations. RMSF results indicated reduced fluctuations in the LIG2-bound system. These findings suggest that LIG2 enhances protein stability and may serve as a promising antifungal candidate.*

Keywords: *Candida albicans, CYP51 (4WMZ), molecular dynamics, antifungal agents, LIG2, RMSD*

INTRODUCTION

Invasive mycoses caused by Candida albicans are widespread among immunocompromised patients and are associated with high mortality rates. Although this microorganism is a normal component of human microflora, it can exhibit pathogenic properties under conditions of immune suppression. One of the primary targets in antifungal therapy is sterol 14-α-demethylase (CYP51), a key enzyme involved in ergosterol biosynthesis. Azole drugs exert their antifungal effects by inhibiting this enzyme. However, the increasing resistance to these drugs necessitates the search for new effective compounds. Computational approaches, particularly molecular dynamics (MD) simulations, play an important role in evaluating the stability of protein-ligand systems. Therefore, in this study, the dynamic behavior of the CYP51-LIG2 complex was investigated.

Materials and methods. The crystal structure of CYP51 from Saccharomyces cerevisiae (PDB ID: 4WMZ) was obtained from the Protein Data Bank. The ligand (LIG2) was used for molecular dynamics analysis. MD simulations were prepared using CHARMM-GUI with CHARMM36m and CGenFF force fields. The system was solvated with TIP3P water and 0.15 M NaCl. After energy minimization, equilibration was performed under NVT (1 ns) and NPT (5 ns) conditions. A 500 ns production run was carried out with a 2 fs time step using GROMACS 2024.5. RMSD and RMSF analyses were performed, and results were visualized using Xmgrace.

Results and discussion. Molecular dynamics simulations demonstrated that the CYP51-LIG2 complex exhibits greater stability than the control system. As shown in Figure 1a, the RMSD profile indicates that the LIG2-bound system stabilized within the range of 0.30-0.40 nm, whereas the control system showed

higher deviations (0.50-0.70 nm).

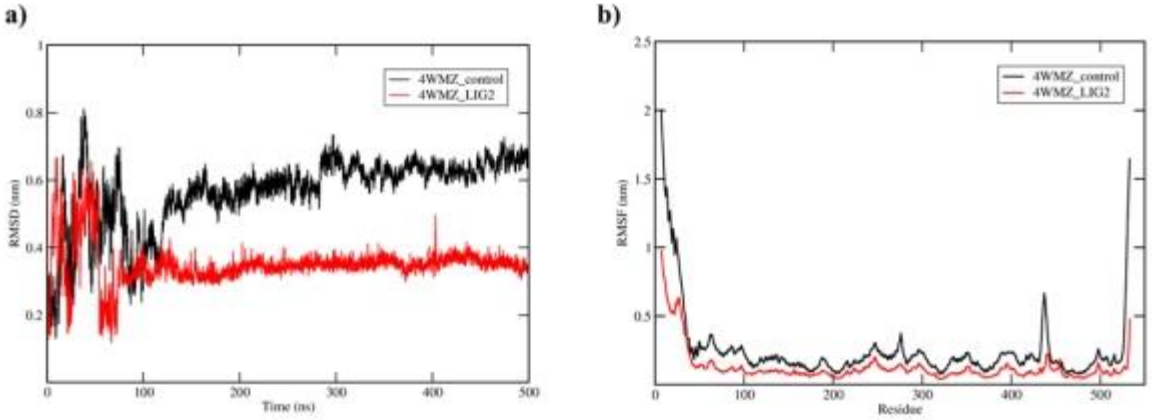

Figure 1. (a) RMSD and (b) RMSF profiles showing improved stability of the LIG2-bound system.

Furthermore, as shown in Figure 1b, RMSF analysis revealed reduced residue-level fluctuations in the LIG2-bound system, particularly around the active site, indicating restricted local flexibility.

CONCLUSION

The results indicate that LIG2 enhances the dynamic stability of CYP51 and reduces structural flexibility. These findings highlight the potential of LIG2 as a promising candidate for antifungal drug development and support further experimental investigation.

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FOSFAT CHIQINDILARIDAN KLINKER USULIDA EKSTRAKSION FOSFAT KISLOTA OLISH TEXNOLOGIYASI

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Annotatsiya: *Ushbu maqolada fosfat chiqindilaridan klinker usulida fosfat kislotasini olish texnologiyasi batafsil tahlil qilinadi. Maqolada fosfat xomashyosining tarkibi, ekstraksion jarayonning fizik-kimyoviy prinsiplari va samaradorligini oshirish yo'llari ko'rib chiqiladi. Shuningdek, ushbu texnologiyaning sanoat miqyosida qo'llanilishi va ekologik xavfsizlik masalalari ham muhokama qilinadi. Tadqiqot natijalari fosfat kislotasi ishlab chiqarishda chiqindilardan foydalanishning samarali va barqaror usulini taklif etadi.*

Kalit so'zlar: *fosfat chiqindilari, klinker usuli, fosfat kislota, ekstraksiya, sanoat texnologiyasi, ekologik xavfsizlik*

Abstract: *This article provides a detailed analysis of the technology for producing phosphoric acid from phosphate waste using the clinker method. The composition of phosphate raw materials, the physicochemical principles of the extraction process, and ways to improve its efficiency are discussed. The industrial application of this technology and environmental safety*

issues are also considered. The results of the study offer an effective and sustainable method for producing phosphoric acid from waste materials.

Keywords: *phosphate waste, clinker method, phosphoric acid, extraction, industrial technology, environmental safety*

KIRISH

Respublikamizda mavjud bo'lgan fosfat xom ashyolari asosida ekstraksion fosfat kislota (EFK)olish va uning asosida turli xil oddiy va kompleks o'g'itlar ishlab chiqarish yo'nalishida sezilarli darajada ilmiy va amaliy natijalarga erishilmoqda. O'zbekiston Respublikasining 2022-2026 yillarga mo'ljallangan yangi O'zbekistonni taraqqiyot strategiyasida «Mavjud imkoniyatlarni to'liq ishga solgan holda mahalliy sanoat tarmoqlari eksport salohiyatini yanada rivojlantirish - har bir tarmoq kesimida chora-tadbirlar rejasini ishlab chiqish va tasdiqlash, shu jumladan: mineral o'g'itlar va kimyo sanoati mahsulotlari eksportini 400 mln AQSH dollariga yetkazish...» kabi muhim vazifalar belgilab berilgan. Bu borada, jumladan mahalliy fosfat xom ashyolari va chiqindilaridan foydalangan holda tarkibida P_2O_5 miqdori ko'p va ftor miqdori kam bo'lgan EFK, undan esa ozuqa komponentlari yuqori va ftor miqdori kam bo'lgan oddiy va kompleks o'g'itlar olish texnologiyasini ishlab chiqish muhim ahamiyat kasb etadi.

Fosfat xom-ashyolar turlari: Ma'lumki, fosfat xom ashyolari asosan ikki turga bo'linadi: birinchisi-apatit rudalari va ikkinchisi esa fosforit rudalaridir. Xom ashyodagi fosfor umumiy formulasi $3Ca_3(PO_4)_2 \cdot CaX_2$ bo'lgan apatit minerali ko'rinishida bo'ladi, bu yerda X-ftor, xlor va gidroksil guruhi yoki ikkalasi almashgan holda bo'lishi mumkin. Fosfat qismdagi kalsiy izomorf holida stronsiy, siyrak yer elementlari, natriy va boshqa elementlar bilan almashingan bo'lishi ham mumkin. Fosfat anioni esa sulfat yoki silikat anionlariga almashingan holda bo'lishi mumkin. Ammo tabiatda kalsiyftorapatit $3Ca_3(PO_4)_2 \cdot CaF_2$ yoki $Ca_5(PO_4)_3F$, hamda gidroksilapatit $3Ca_3(PO_4)_2 \cdot Ca(OH)_2$ yoki $Ca_5(PO_4)_3OH$ eng ko'p tarqalgan.

Apatit rudalarida fosfor tutgan mineral asosan ftorapatitdan va qisman gidroksilapatit hamda izomorf almashingan shakllardan iborat bo'ladi. Apatit

rudalarida apatit mineralidan tashqari nefelin (Na, K)$AlSiO_4 \cdot nSiO_2$, piroksenlar – egirin $NaFe(SiO_3)_2$ va boshqalar, bundan tashqari titanomagnetit $Fe_3O_4 \cdot FeTiO_3 \cdot TiO_2$, ilmenit $FeTiO_3$, sfen $CaTiSiO_5$, dala shpatlari, qora slyuda va evdialit bo'ladi. Fosforit rudalarida fosfor ftorapatit $3Ca_3(PO_4)_2 \cdot CaF_2$, gidroksilapatit $3Ca_3(PO_4)_2 \cdot Ca(OH)_2$, karbonatapatit $Ca_{10}P_5O_{23}(OH)_3$, frankolit $Ca_{10}P_{5,2}C_{0,8}O_{23,2}F_2$ va kurskit $Ca_{10}P_{4,8}C_{1,2}O_{22,8}F_2(OH)_{1,2}$ ko'rinishida bo'ladi. Fosforit rudalari tarkibiga quyidagi qo'shimchalar bo'lishi mumkin: $[(R_2O+RO) \cdot R_2O_3 \cdot 4SiO_2 \cdot 2H_2O]$ turidagi glaukonit, bu yerda R_2O – Na_2O va K_2O, RO – MgO, CaO va FeO, R_2O_3 – Fe_2O_3 va Al_2O_3, limonit $Fe_2(OH)_6 \cdot Fe_2O_3$, kalsit $CaCO_3$, dolomit $CaCO_3 \cdot MgCO_3$, magnezial silikatlar Mg_2SiO_4, kaolin $H_2Al_2Si_2O_8 \cdot H_2O$, pirit FeS_2, dala shpatlari, kvars, granit va boshqalar hamda organik moddalar.

Fosforit konlari asosan dengiz suvlaridan fosfatlarni cho'kishi tufayli paydo bo'ladi. Turlari bo'yicha ular: qatlamli, shishli(jelvak), donadorli va chig'anoqli bo'ladi.

Fosfat xom-ashyolaridan ekstraksion fosfat kislota olish usullari.

Ekstraksion fosfat kislota (EFK) olish texnologiyasi an'anaviy suyuq fazali usullari

Tabiiy fosfatlarning kislotalar bilan parchalanishidan fosfor kislotasi va kalsiyning tegishli tuzlari hosil bo'ladi. Kalsiyli tuzlari suvda yaxshi eriydigan kislotalar (masalan, nitrat yoki xlorid kislota) ishlatilganda olingan eritmalarni o'g'itga aylantirish, o'simliklar tomonidan o'zlashmaydigan yoki qiyin o'zlashadigan fosfatli birikmalarga aylanishiga olib keladigan kimyoviy o'zgarishlarni oldini olish uchun kalsiyning bir qismini ajratib olish yoki bog'lash orqali amalga oshiriladi. Hozirgi kunda fosfat xom ashyolardan ekstraksion fosfat kislota olishning eng ko'p tarqalgan usullardan biri bu sulfat kislotali ekstraksiya qilish usulidir. Fosfatlarni sulfat kislotali parchalashda ajraladigan suvda kam eruvchi kalsiy sulfat qattiq fazaga o'tadi; o'g'it tarkibida ballast (keraksiz qo'shimcha) sifatida qatnashishi yoki eritmadan ajratib olinishi mumkin. Birinchi

holatda oddiy superfosfat, ikkinchisida esa ekstraksion fosfat kislota olinadi. Tabiiy fosfatlar sulfat kislota bilan ishlov berilganda, ftorapatitdan ekstraksion fosfat kislota (EFK) olishda quyidagi asosiy reaksiya sodir bo'ladi:

$Ca_5(PO_4)_3F + 5H_2SO_4 + 5nH_2O = 3H_3PO_4 + 5CaSO_4 \cdot nH_2O + HF\uparrow$

n ning miqdoriga qarab ushbu usul uch xil sharoitda olib boriladi:angidridli (n=0); yarim gidratli (n=1,5) va digidratli (n=2) (eng ko'p qo'llaniladi). Asosiy reaksiyadan tashqari bir vaqtda fosfatli xom ashyo tarkibidagi boshqa minerallar: kalsit, dolomit, temir- va alyumosilikatlar ham parchalanadi.

Masalan: $CaMg(CO_3)_2 + 2H_2SO_4 + (n-2)H_2O = CaSO_4 \cdot nH_2O + MgSO_4 + 2CO_2\uparrow$.

Hosil bo'lgan EFKdan turli darajadagi fosforli va kompleks o'g'itlar olish mumkin.

Klinker usulida ekstraksion fosfat kislota olish texnologiyasi

Klinker usulida ekstraksion fosfat kislota (EFK) olish texnologiyasi an'anaviy suyuq fazali usullardan farq qilib, asosan fosfat xom ashyosini yuqori haroratda qayta ishlashga asoslangan. Bu usul ko'pincha "quruq" yoki yarim quruq texnologiyalar turkumiga kiradi.

Klinker usulining afzalliklari

An'anaviy digidrat yoki yarimgidrat usullariga qaraganda klinker usuli bir qancha texnik ustunliklarga ega:

Yuqori konsentratsiya: Olinadigan kislota tarkibidagi P_2O_5 miqdori ancha yuqori (40-50% gacha) bo'ladi, bu esa keyinchalik bug'latish (konsentrlash) harajatlarini kamaytiradi.

Filtrlash tezligi: Klinker tarkibidagi kalsiy sulfat yirik kristallar shaklida bo'lgani uchun filtrlash jarayoni juda tez amalga oshadi.

Xom ashyo tanlamasligi: Bu usul tarkibida temir va alyuminiy oksidlari ko'p bo'lgan fosforitlarni qayta ishlashda samaraliroqdir.

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TALABA TA'LIMNI INDIVIDUAL O'ZLASHTIRISHDA SUN'IY INTELLEKT VA MA'LUMOTLARDAN FOYDALANISHI

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Annotatsiya: *Ushbu maqolada talabalar sun'iy intellektdan qanday maqsadlarda va qanday usullarda foydalanishi mumkinligi keng yoritiladi. Bunda o'quv jarayonini samaralashtirish, tadqiqot ishlari, amaliyot va kasbiy tayyorgarlik masalalari ko'rib chiqiladi. Talabalar ta'lim jarayonini individual tarzda o'zlashtirishda sun'iy intellekt va katta hajmdagi ma'lumotlarni zamonaviy usullarini tahlil qilish, adaptiv o'qitish tizimlari, shaxsiylashtirilgan ta'lim platformalari,sun'iy intellekt yordamida talabalarning shaxsiy ehtiyojlari, qobiliyatlari va o'rganish uslublariga moslashtirilgan individual ta'lim tizimlarining qanday ishlashi, ularning afzalliklari va xususiyatlari tahlil etiladi. Bundan tashqari maqolada individual ta'lim dasturlarini yaratish,undan foydalanish tartibi va ma'lumotlarni tahlil qilish texnologiyalarining qanday qo'llanilayotgani, hamda talabalarning natijalarini doimiy ravishda baholash va kuzatish imkoniyatlari va usullari haqida so'z yuritiladi.*

Kalit so'zlar:*Talaba, ta'lim, individual, o'zlashtirish, sun'iy intellekt,ma'lumotlar, ChatGPT, Claude, Google Gemini, Microsoft Copilot, akademik halollik.*

Abstract: *This article provides a broad overview of the purposes and methods for which students can use artificial intelligence. It examines the issues of improving the effectiveness of the educational process, research, practice and professional training. The article analyzes the use of artificial intelligence and modern methods of analyzing large amounts of data in the individual development of students' educational process, adaptive learning systems, personalized learning platforms, how individual educational systems adapted to the personal needs, abilities and learning styles of students with the help of artificial intelligence work, their advantages and features. In addition, the article discusses the creation of individual educational programs, the procedure for using them and the use of data analysis technologies, as well as the possibilities and methods for continuously assessing and monitoring student results.*

Keywords*: Student, education, individual, development, artificial intelligence, data, ChatGPT, Claude, Google Gemini, Microsoft Copilot, academic honesty.*

KIRISH

XXI asrda ta'lim tizimi tubdan o'zgarmoqda. Sun'iy intellekt (SI) texnologiyalari nafaqat sanoat va tibbiyot sohasida, balki ta'lim jarayonida ham keng qo'llanilmoqda.Talabalar — kelajakning o'qituvchilari — bu texnologiyalarni puxta o'zlashtirib, o'z kasbiy faoliyatlarida samarali qo'llashlari zarur..

Jahondagi turli mamlakatlar oliy ta'lim tizimini uyg'unlashtirish, ta'lim mazmuni, davomiyligi va tayyorlanadigan kadrlar darajalarining o'zaro muvofiqligini ta'minlash maqsadida kredit-modul tizimini tatbiq etishdi. Oliy ta'limdagi o'quv jarayoniga o'qitishni tashkil etishning kredit-modul tizimini joriy etish pedagogik salohiyat va talabaning o'z-o'zini tarbiyalash,individual ishlash faoliyati ko'nikmalarini shakllantirish omili bo'lib xizmat qiladi. Bilimlarni ijodiy o'zlashtirish, o'quv jarayonini tartibga solish doirasida va bilimlar hajmini hisobga olgan holda mutaxassislik, tanlov asosida ta'limni individuallashtirishda har bir bilim oluvchining hayotiy pozitsiyasi, ehtiyojlari, imkoniyatlari va qobiliyatlari inobatga olinadi.

ASOSIY QISM

Ta’limni individuallashtirish muammosi ko‘p jihatdan har bir ta’lim oluvchi shaxsiga yo‘naltirilganligi bilan tavsiflanadi. Ma’lumki, davlat tomonidan qabul qilinadigan o‘quv dasturlari va rejalar, asosan, o‘rta darajada o‘zlashtiruvchilar uchun mo‘ljallanadi. O‘z navbatida bunday dastur yuqori darajada o‘zlashtiruvchi talabalar uchun ancha yengillik qiladi va zeriktiradi. O‘z navbatida qiyin o‘zlashtiruvchi ham muammoga duch kelib, ularning mazkur dasturni o‘zlashtirishlari uchun qo‘shimcha mehnat talab etiladi. Shu nuqtayi nazardan talabalarning mustaqil faoliyatlarini individual asosda tuzish ularning bilim o‘zlashtirish sifatini yaxshilashga olib keladi.

Individual ta’lim jarayonida quyidagi turdagi kommunikativ jarayonlar amalga oshadi:

Birinchidan, o‘qituvchi har bir talaba uchun alohida muloqot shakli va mazmunini ishlab chiqadi va individual yondashadi;

Ikkinchidan, bilim oluvchi mustaqil ravishda ma’lum bir ta’lim vositasi (darslik, qo‘shimcha adabiyotlar, internet manbalari,sun’iy intellekt, axborot vositalari, ta’limiy dasturlar kabi) bilan muloqotga kirishadi;

Uchinchidan, bilim oluvchilar o‘zaro bilim o‘zlashtirish ko‘rsatkichlari mutanosib bo‘lgan hamkor bilan muloqotga kirishadilar. Bunda har ikkalasining bilim o‘zlashtirish ko‘rsatkichlari teng yoki yuqori darajada bilim o‘zlashtirish ko‘rsatkichlariga ega bo‘lgan talaba past o‘zlashtiruvchi talaba bilan yordam berish maqsadida muloqotga kirishadi.

Ta’limni individuallashtirishning afzalligi shundaki, o‘quv materiali talabaning bilim o‘zlashtirish ko‘rsatkichlariga to‘la moslashtiriladi, uning uchun maxsus dastur ishlab chiqiladi. Pedagogik manbalarda ta’limni individuallashtirish tushunchasi bilan bir qatorda ta’limning individualligi tamoyili, individual yondashuv, individual ta’lim kabi tushunchalar keng qo‘llaniladi.

Individual ta’lim – o‘quv jarayonining tashkiliy shakli, modeli bo‘lib, unda o‘qituvchi faqat bitta talaba bilan ishlaydi yoki talaba o‘zi uchun mo‘ljallangan alohida o‘quv materiali bilan ishlaydi. O‘quv materiali sifatida kitob,

kompyuter,internet,sun’iy intellekt yoki boshqa o‘quv dasturlaridan foydalanish mumkin.

Sun'iy intellekt — bu kompyuter dasturlari va algoritmlar majmuasi bo'lib, u insoniy tafakkurga o'xshash vazifalarni bajarish uchun mo'ljallangan. Sun'iy intellekt tizimlari millionlab matnlar, rasmlar va ma'lumotlarni o'rganib, savollarga javob berish, matn yozish, tarjima qilish, tahlil qilish kabi murakkab vazifalarni bajara oladi.

Hozirgi kunda eng keng tarqalgan sun'iy intellekt vositalari orasida ChatGPT, Claude, Google Gemini, Microsoft Copilot kabilarni ko'rsatish mumkin. Bu vositalar talabalar uchun bepul yoki arzon narxlarda mavjud bo'lib, o'zbek, rus va ingliz tillarida ishlashi mumkin.

Talabalar uchun kurs ishi va diplom ishi yozish ko'pincha qiyin va vaqt talab qiluvchi jarayondir. Sun'iy intellekt bu jarayonning har bir bosqichida yordam berishi mumkin: mavzu tanlashdan tortib,toki xulosa yozishgacha. Biroq shuni alohida ta'kidlash kerakki, sun'iy intellekt faqat yordamchi vosita bo'lib xizmat qilishi kerak — tayyor ishni ko'chirish akademik halollikni buzadi.

Pedagogika talabalarining maktab amaliyoti davrida sun'iy intellekt ayniqsa foydali bo'ladi. Talaba birinchi marta haqiqiy sinf oldiga chiqayotganida ko'p savollar tug'iladi: qanday dars o'tish kerak, qiyin xulqli o'quvchi bilan qanday muomala qilish kerak, ota-onalar bilan qanday muloqot o'rnatish kerak va hokazo. Talabaning amaliyoti davrida sun'iy intellektdan foydalanish sohalari qo’yidagicha:Har kunlik dars rejalarini tezkor tuzish va tayyorlashi,o'quvchilarning yosh xususiyatlariga mos topshiriq va mashqlar yaratishi,sinfdagi individual farqlarni hisobga olgan holda differensial yondashuv metodlarini topishi,ota-onalar bilan yig'ilish uchun nutq va taqdimot matnini tayyorlash,o'quvchi xatti-harakatini psixologik nuqtai nazardan tahlil qilish bo'yicha maslahat olishi,kasbiy o'z-o'zini tahlil (refleksiya) uchun savollar va yo'l-yo'riqlarida foydalanishi mumkin.

Zamonaviy o'qituvchi doimiy o'z-o'zini rivojlantirishi zarur. Sun'iy intellekt pedagogika sohasidagi yangi tendensiyalar, ilg'or xorij tajribasi va innovatsion

metodlar haqida ma'lumot berishi mumkin. Bundan tashqari, talaba o'zining zaif tomonlarini aniqlash va ularni mustahkamlash uchun sun'iy intellekt bilan suhbat o'tkazishi mumkin.

Kelajakdagi o'qituvchi sifatida talaba sun'iy intellektni nafaqat o'zi uchun, balki kelajakda o'z o'quvchilariga ham o'rgatishi kerak bo'ladi. Shuning uchun talabalar ushbu texnologiyalarni chuqur o'rganib, ularning imkoniyatlari va cheklovlarini yaxshi bilishlari lozim. Bu ularning raqobatbardosh o'qituvchi bo'lishiga muhim hissa qo'shadi.

- Vaqtni tejash — bir soatlik ish 10-15 daqiqaga qisqarishi mumkin.
- Doimo mavjudlik — kunning istalgan vaqtida, dam olish kunlarida ham ishlaydi.
- Ko'p tilli imkoniyat — o'zbek, rus, ingliz va boshqa tillarda ishlaydi.
- Individuallashtirish — har bir talabaning so'roviga mos javob beradi.
- Motivatsiya — yangi bilimlarni qiziqarli shaklda olish imkonini beradi.
- Xatolarni tuzatish — yozgan matnlarni grammatik va uslubiy jihatdan tekshiradi.

Sun’ iy intellektning shu bilan birga kamchiliklari ham bo’ladi. Ular qo’yidagilar:

- Noto'g'ri ma'lumot xavfi — sun'iy intellekt ba'zan noto'g'ri yoki eskirgan ma'lumot berishi mumkin, shuning uchun har doim tekshirish zarur.
- Akademik halollik — tayyor matnni o'zgicha ko'rsatish o'qituvchi oldida qalbaki taassurot yaratadi.
- Qaramlik xavfi — sun'iy intellektga haddan tashqari tayanish mustaqil fikrlash qobiliyatini susaytirishi mumkin.
- Ma'lumotlar xavfsizligi — shaxsiy yoki maxfiy ma'lumotlarni sun'iy intellektga kiritmaslik lozim.
- Internet talabi — ko'p sun'iy intellekt vositalari internetga ulangan holda ishlaydi.

Sun'iy intellektdan foydalanishda eng muhim masalalardan biri — akademik halollik. O'qituvchi va talaba axloqiy jihatdan yuksak bo'lishi zarur. Sun'iy

intellektdan olgan ma'lumot va g'oyalarni o'z so'zlari bilan qayta ifodalashi, tushunib ma’lumot to’plashi lozim

XULOSA

Sun'iy intellekt pedagogika yo'nalishi talabalari uchun ulkan imkoniyatlar eshigini ochmoqda. O'quv jarayonini samaralashtirish, ilmiy tadqiqot ishlarini yuritish, amaliyot davrida yordam olish va kasbiy rivojlanishda sun'iy intellekt haqiqiy ko'makchiga aylanishi mumkin. Biroq bu texnologiyadan ongli, maqsadli va axloqiy tarzda foydalanish zarur.

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AXLOQIY QADRIYATLAR MOHIYATI, TUZILMASI VA INSON QADRI TAMOYILINING AKSIOLOGIK MAQOMI

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Annotatsiya. *Ushbu maqolada axloqiy qadriyatlarning ijtimoiy-falsafiy tahlili, ularning tuzilmasini ochish va inson qadri tamoyilining aksiologik ahamiyati tahlil etilgan.Axloqiy qadriyatlar mohiyati va funktsiyalarini tahlil qilish, ularning tuzilmasi va ularning o’zaro bog’liqligini falsafiy jihatdan ochish orqali Inson qadri tamoyilining aksiologik ahamiyatini nazariy va amaliy jihatdan ko’rsatishga harakat qilingan.*

Kalit so’zlar*. axloqiy qadriyatlar , inson qadri, ma’naviyat, aksiologiya, aksiologik qarashlar, qadriyatlar tizimi.*

Abstract*. This article analyzes the socio-philosophical analysis of moral values, their structure, and the axiological significance of the principle of human dignity. The essence and functions of moral values, their structure and their interrelation are analyzed, and the axiological significance of the principle of Human Dignity is theoretically and practically demonstrated.*

Keywords*. moral values, human value, spirituality, Axiology, axiological views, value system.*

KIRISH (INTRODUCTION)

Axloqiy qadriyatlar – jamiyatning ma’naviy asosini tashkil qiluvchi, insonning axloqiy qarash va harakatlarini yo’naltiruvchi muhim kategoriyadir[1]. Ijtimoiy-falsafiy nuqtai nazardan, axloq va qadriyatlar inson hayotining barcha sohalarida aks etadi, jamiyatning ma’naviy barqarorligiga asos bo’lib xizmat qiladi[2].Mavzu dolzarbligi shundaki:

- **Axloqiy qadriyatlar mohiyati** insonning ma’naviy va axloqiy ruhini shakllantirishda asosiy rol o’ynaydi[3].
- **Tuzilmasi va funksional jihatlari** – qadriyatlar tarkibi, ustuvorliklari va o’zaro bog’liqligi falsafiy va ijtimoiy tahlil talab qiladi[4].
- **Inson qadri tamoyili** – inson qadri va huquqlari, uning jamiyatdagi eng asosiy me’yori sifatida, zamonaviy aks etuvi va amaliyotdagi ahamiyati[5][5].

ADBIYOTLAR TAHLILI (LITERATURE REVIEW)

Axloqiy qadriyatlar ilm-falsafada o’ta muhim mavzudir va ularning moxiyati, strukturasi va inson qadri tamoyili bilan bog’liq kontseptsiyalari zamonaviy tadqiqotlarda keng muhokama qilinib kelmoqda. Masalan, diniy, huquqiy va ijtimoiy kontekstda inson qadrining ma’no-mazmunini tahlil qilgan tadqiqotlar inson qadrining fundamental ahamiyatini ko’rsatadi, bunda qadr insonning huquqlari va ozodliklarini ta’minlashning asosiy sharti sifatida qaraladi.Falsafiy bilimlar doirasida aksiologiya — qadriyatlar nazariyasi sifatida tsennostь (qadriyat) fenomenining tabiatini, uning jamiyat va shaxs hayotidagi o’rnini o’rganadi, hamda qadriyatlar o’zaro bog’liqligini aniqlaydi.

Aksiologiya nazariy jihatdan insonning ma’naviy tuzilmasi va uning qadrlar ierarxiyasi bilan ishlaydi, bu qadriyatlar tizimi inson ma’naviyatini shakllantirishning markaziy qismi hisoblanadi.Jahon aksiologik tadqiqotlar holati shuni ko’rsatadiki, tə’lim va ma’rifat tizimida aksiologiyaning potentsiali katta ahamiyatga ega, chunki u talabalarning hayotdagi umumiy qadrlarini shakllantirish, ijtimoiy mas’uliyat hamda gumanistik qarashlarni rivojlantirishda muhim rolь o’ynaydi. SHu nuqtai nazardan, aksiologiya ta’lim falsafasi bo’yicha ham muhim

vosita sifatida qaraladi, u o'quvchilarni faqat bilim bilan emas, balki etik, ma'naviy va ijtimoiy qadriyatlarga asoslangan shaxs sifatida shakllantirishni maqsad qiladi. Inson qadri va uning axloqiy miqdorini baholash masalasi ham zamonaviy ilmiy muhokamalarning markazida turibdi. Zamonaviy tadqiqotda inson qadri ko'plab sohalarda, jumladan bioetika, huquq, antropologiya, psixologiya va ijtimoiy falsafada muhokama qilinib, uning ma'naviy-axloqiy ahamiyatini ko'rsatadi. Bu tadqiqotlar inson qadrining faqat huquqiy kontseptsiya emas, balki universal va madaniy jihatdan qiymatli kategoriya ekanligini ta'kidlaydi. Aksiologik yondashuvlar insonning qadriyatlar tizimi va ahloqiy qarorlar qabul qilish jarayonlarini aniqlashga o'ta muhim xissa qo'shadi. Shuningdek, aksiologiya insonning ichki ma'naviy yo'nalishlarini, uning haqiqiy qadr-e'tibori va jamiyatdagi ijobiy munosabatlarini shakllantirishda asosiy nazariy baza hisoblanadi.Xorijiy va milliy tadqiqotlardan ko'rinib turibdiki, aksiologiya qatorida ma'rifat, ta'lim va madaniyat sohalarida inson qadrining rolini ta'sirchan tarzda aks ettirish zarur, chunki qadriyatlarning moslashuvchan, dinamik xarakteri ularni jamiyatning global va lokal sharoitlariga moslashtiradi.

Zamonaviy ilmiy tadqiqotlar va avtoreferatlar ko'rsatadiki, axloqiy qadriyatlar inson hayotida asosiy ma'naviy va falsafiy funktsiyani bajaradi. Masalan, Kleindienst " ta'kidlaganidek, ta'lim va tarbiya jarayonida inson qadri va axloqiy normalarni shakllantirish jamiyatda ma'naviy barqarorlik va tinchlik muhitini ta'minlaydi"[6].

Ferdynus "inson qadrini universal kategoriya sifatida qarash muhimligini ta'kidlaydi va bunda qadriyatlar faqat huquqiy yoki madaniy doirada emas, balki insonning ichki ma'naviy tuzilmasi va axloqiy qarorlarida ham muhim rol o'ynaydi[7]. Shu nuqtai nazardan, aksiologiya qadriyatlarning tabiatini aniqlaydi va ularning strukturasini tahlil qilib, inson va jamiyat munosabatlarini ilmiy asosda o'rganadi[8].Shu bilan birga, Egamberdiyeva ta'kidlaydiki, zamonaviy jamiyatda qadriyatlar tizimi dinamik va kontekstga bog'liq bo'lib, milliy va global ta'sirlar ostida shakllanadi[9][4]. Bu esa inson qadri va axloqiy normalarni jamiyatda samarali

rivojlantirish uchun asos bo'lib xizmat qiladi.Shu tariqa, Usmonova va Kamariddinzoda ta'kidlashicha, yosh avlodning tarbiyasida estetik va ma'naviy qadriyatlar fuqarolik, ijtimoiy mas'uliyat va axloqiy qarashlarning asosini tashkil qiladi[10]. Bu qoidalar maktab va oliy ta'lim muassasalarida tarbiya jarayonini samarali tashkil qilishda muhimdir.

Xorijiy tadqiqotlar ham shu fikrni qo'llab-quvvatlaydi. Huijser va Nullens "inson qadrining huquqiy, etik va madaniy aspektlarini keng qamrab olgan holda, uning insonning jamiyatdagi o'rni va axloqiy qarorlari bilan bog'liqligini ta'kidlaydi"[11].SHuningdek, Asadova o'z tadqiqotlarida "aksiologik yondashuvlar orqali inson qadri va qadriyatlar tizimini shakllantirish masalasini ilmiy jihatdan tahlil qilgan"[12] Bu, o'z navbatida, mamlakatimizdagi zamonaviy ta'lim va axloqiy tarbiya jarayoni uchun amaliy ahamiyatga ega.

Umuman olganda, zamonaviy ilmiy adabiyotlar inson qadri, axloqiy qadriyatlar va aksiologiyaning ishonchli falsafiy asoslarini, qadriyatlar strukturasini aniqlaydi va ularning insonning ichki ma'naviy jihatlari bilan bog'liqligini ilmiy tahlil qiladi. Bu tadqiqotlar mazkur maqolaning nazariy bazasini tashkil etadi.Xulosa qilib aytganda, so'nggi besh yillik tadqiqotlar ko'rsatadiki: axloqiy qadriyatlar, inson qadri tamoyili va aksiologiya sohasidagi ilmiy fikrlar integratsiyalashtirilgan holda, ma'naviy va axloqiy barqarorlikni ta'minlash uchun zamonaviy, falsafiy va ijtimoiy asoslarni taqdim etadi.

METODOLOGIYA (METHODS)

Tadqiqot ob'ekti sifatida: zamonaviy jamiyatda axloqiy qadriyatlar va inson qadri tamoyilining ijtimoiy-falsafiy tarkibi va funktsiyalari qaraladi.Tadqiqot predmeti sifatida: qadriyatlar tizimi, ularning strukturasi, inson qadrining aksiologik maqomi va ularning tarbiya va ta'lim jarayonidagi aks etishi o'rganiladi.Tadqiqot usullari sifatida quyidagi usullardan foydalanildi:

-Analitik usul – ilmiy adabiyotlar, maqolalar va avtoreferatlar tahlili asosida axloqiy qadriyatlar va aksiologiya masalalari tahlil qilindi.

-Solishtirish usuli – xorijiy va milliy tajribalar o'rtasidagi farqlar va o'xshashliklar tahlil qilindi.

-Sistematizatsiya usuli – qadriyatlar va inson qadri tamoyillari turkumi, strukturasi va vazifalari to'liq sistemalashtirildi.

-Ijtimoiy-falsafiy tahlil – aksiologiya va etika nazariyalari asosida inson qadrining aksiologik maqomi, qadriyatlar tuzilmasi va ularning ijtimoiy ahamiyati tahlil qilindi.

NATIJALAR (RESULTS)

Zamonaviy xorijiy tadqiqotlar ko'rsatadiki**,** axloqiy qadriyatlar va inson qadri ta'lim va jamiyatda muhim rol o'ynaydi. Kleindienst ta'kidlaganidek, "Germaniya va AQShda ta'lim jarayonida inson qadri va axloqiy normalarga asoslangan metodika orqali ma'naviy barqarorlik va ijtimoiy mas'uliyat shakllantiriladi"[13]. Ferdynus esa "inson qadrining universal ahamiyatini ta'kidlab, u nafaqat huquqiy yoki madaniy doirada, balki har bir shaxsning ichki ma'naviy tuzilmasi va ijtimoiy-axloqiy qarorlarida ham muhim ekanligini ko'rsatadi"[14].Huijser va Nullensning tahlillari shuni ko'rsatadiki, "inson qadrining etik, huquqiy va madaniy aspektlari jamiyatdagi ijtimoiy munosabatlarning barqarorligini ta'minlaydi"[15]**.** Bu esa aksiologik yondashuvlar orqali zamonaviy ta'limda qadriyatlar va axloqiy tamoyillarning rivojlanishi uchun muhim asos yaratadi.Egamberdiyeva ta'kidlaydiki, "qadriyatlar tizimi dinamik bo'lib, milliy va global ta'sirlar ostida shakllanadi"[16]. Shuning uchun har bir jamiyatda axloqiy normalar va qadriyatlar o'z milliy xususiyatlari bilan birga global standartlarga ham moslashtirilishi kerak. O'zbekistonda axloqiy qadriyatlar va inson qadri tamoyilining shakllanishi so'nggi yillarda davlat va ta'lim siyosatida alohida e'tiborga olindi. Masalan, Yashil O'zbekiston strategiyasi doirasida maktab va oliy ta'lim muassasalarida axloqiy tarbiya, media savodxonlik va raqamli etika masalalari alohida dasturlar bilan qo'llab-quvvatlanmoqda[17].

Usmonova va Kamariddinzoda (2023) ta'kidlaganidek, yosh avlod tarbiyasida estetik va ma'naviy qadriyatlarning rivojlanishi, fuqarolik, ijtimoiy

mas'uliyat va axloqiy qarashlarni shakllantirishda muhim rolь o'ynaydi[18]. Bu jarayonda aksiologik yondashuvlar orqali milliy qadriyatlar va universal inson huquqlarini uyg'unlashtirish imkoni yaratiladi.Asadova (2025) va Baburin (2024)ning tadqiqotlari shuni ko'rsatadiki, O'zbekistonda axloqiy va aksiologik ta'lim jarayoni xorijiy tajribalar bilan birlashtirib, muloqot va axloqiy qaror qabul qilish qobiliyatini rivojlantirishga qaratilgan. Bu milliy ta'lim tizimida inson qadri va qadriyatlarini jamiyatda samarali integratsiya qilish imkonini beradi[19].

Xorijiy va O'zbekiston tajribalarini solishtirganda quyidagi asosiy farq va o'xshashliklar ko'zga tashlanadi:

- **O'xshashliklar:** Ikkala tajribada ham inson qadri va axloqiy qadriyatlar markaziy ahamiyatga ega, ta'lim va jamiyatda barqarorlikni ta'minlaydi.
- **Farqlar:** Xorijiy tajribalarda global standartlar va akademik yondashuvlar ustuvor bo'lsa, O'zbekistonda milliy qadriyatlar va zamonaviy raqamli etika integratsiyasi muhim ahamiyatga ega.

Xulosa qilib aytganda, O'zbekiston tajribasi xorijiy tajribalar bilan uyg'unlashtirilganda, axloqiy barqarorlik, inson qadri va aksiologik qadriyatlarning samarali shakllanishi va tarbiya jarayonidagi qo'llanilishi ta'minlanadi.

MUNOZARA (DISCUSSION)

Adbiyotlar tahlili va natijalar asosida aytish mumkinki, axloqiy qadriyatlar va inson qadri tamoyili faqat nazariy tushuncha emas, balki zamonaviy jamiyatda amaliy ahamiyatga ega. Xorijiy tajribalarda (Kleindinst, 2024; Ferdinus, 2024) ta'lim va ijtimoiy muhitda inson qadri va axloqiy normalarni rivojlantirish orqali ma'naviy barqarorlik va ijtimoiy mas'uliyat ta'minlanishi qayd etilgan[20].

O'zbekistonda ham so'nggi yillarda davlat orqali milliy qadriyatlar va zamonaviy axloqiy standartlarning uyg'unlashtirilishiga alohida e'tibor qaratilmoqda. Bu jarayonda maktab va oliy ta'lim muassasalarida ahloqiy tarbiya, raqamli etika va media savodxonlik dasturlari amalga oshirilmoqda.Solishtirish natijasi shuni ko'rsatadiki, xorijiy va milliy tajribalarda umumiy maqsad – inson qadri va qadriyatlarning shakllanishi – bir xil, ammo amalga oshirish uslublari farq qiladi.

Xorijda global standartlar va akademik yondashuv ustuvor bo'lsa, O'zbekistonda milliy qadriyatlar, madaniy an'analar va raqamli etika kontseptsiyalari birlashtirilmoqda. Munozarada shu ham ta'kidlanadiki, aksiologik yondashuvlar orqali inson qadrining shakllanishi nafaqat ta'limda, balki jamiyatdagi axloqiy munosabatlarning barqarorligini ham ta'minlaydi. Bu jarayon innovatsion texnologiyalar, zamonaviy raqamli muhit va milliy ma'naviy meros bilan uyg'unlashtirilishi lozim.

Shuningdek, Usmonova va Kamariddinzoda ta'kidlaganidek, yosh avlod tarbiyasida estetik va ma'naviy qadriyatlarni shakllantirish, ularning fuqarolik va ijtimoiy mas'uliyatini yuksaltirishda muhim rol o'ynaydi[21].Bu natijalar milliy va xorijiy tajribalarni uyg'unlashtirish orqali samarali ta'lim va axloqiy tarbiyani ta'minlash imkonini beradi.Xulosa qilib aytganda, munozara qismi natijalarni nazariy va amaliy jihatdan bog'lab, inson qadri va axloqiy qadriyatlarning shakllanishi, ularning tarbiyada qo'llanilishi va jamiyatdagi barqarorlikka ta'siri haqida keng fikrlarni taqdim etadi.

XULOSA VA TAVSIYALAR (CONCLUSION & RECOMMENDATIONS)

Tadqiqot natijalari shuni ko'rsatdiki, axloqiy qadriyatlar va inson qadri tamoyili insonning ma'naviy barqarorligi va ijtimoiy muvozanatini ta'minlashda markaziy ahamiyatga ega. Xorijiy tajribalarda inson qadri va axloqiy normalar ta'lim va jamiyatda ma'naviy barqarorlik va ijtimoiy mas'uliyat shakllantirishda asosiy rol o'ynaydi.

O'zbekistonda ham so'nggi yillarda davlat siyosatlari va ta'lim dasturlari orqali milliy qadriyatlar va zamonaviy raqamli etika standartlari uyg'unlashtirilmoqda. Bu jarayonda maktab va oliy ta'lim muassasalarida axloqiy tarbiya, media savodxonlik va raqamli etika sohalarida dasturlar amalga oshirilmoqda.

Solishtirish natijalari shuni ko'rsatadiki, xorijiy va milliy tajribalarda umumiy maqsad bir xil: inson qadri va axloqiy qadriyatlarning shakllanishi. Farqlari esa amalga oshirish uslublarida: xorijda global standartlar va akademik yondashuv

ustuvor bo'lsa, O'zbekistonda milliy qadriyatlar, madaniy an'analar va raqamli etika kontseptsiyalari integratsiyalanadi.

Tavsiyalar:

1. **Ta'lim va tarbiyada integratsiya:** Milliy qadriyatlar va global axloqiy standartlar uyg'unlashtirilib, maktab va oliy ta'lim dasturlariga integratsiya qilinish kerak.
2. **Raqamli etika va media savodxonlik:** Yosh avlodning raqamli muhitda axloqiy qaror qabul qilish qobiliyatini rivojlantirish uchun alohida kurslar va treninglar tashkil qilish.
3. **Axloqiy va aksiologik baholash:** Jamiyatda va ta'lim muassasalarida inson qadri va qadriyatlar bo'yicha barqaror monitoring tizimini joriy etish.
4. **Xorijiy tajriba bilan uyg'unlashtirish:** Xorijiy tajribalardan olingan ilmiy va pedagogik yondashuvlarni milliy kontekstda tatbiq etish.
5. **Ilmiy tadqiqotlarni rivojlantirish:** Axloq, aksiologiya va inson qadri sohasidagi ilmiy tadqiqotlar, avtoreferatlar va maqolalar bilan muntazam yangilab borish.

Xulosa qilib aytganda, tadqiqot axloqiy qadriyatlar, inson qadri tamoyili va aksiologiyani nazariy va amaliy jihatdan uyg'unlashtirish orqali jamiyatda ma'naviy barqarorlik va etik siyosatni rivojlantirish imkonini beradi. Bu natijalar davlat siyosati, ta'lim va ilmiy tadqiqotlarda amaliy qo'llanilishi mumkin.

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EXPLORING THE ROLE OF TECHNOLOGY IN ENHANCING LANGUAGE LEARNING AND PEDAGOGICAL PRACTICES

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Abstract: *The rapid advancement of digital technologies has significantly transformed the landscape of language education. This paper examines the influence of technology on language learning by analyzing key approaches such as Mobile-Assisted Language Learning (MALL), Computer-Assisted Language Learning (CALL), and the integration of various digital tools and online platforms. Drawing on recent scholarly studies, including Handayani (2024), Kaxxarovna and Xaydarova (2025), Noyan et al. (2023), Polat (2017), and Tan (2023), the study highlights how technology enhances learner autonomy, engagement, motivation, and personalized learning experiences. At the same time, the paper addresses critical challenges such as unequal access to digital resources, issues of content quality, and the need for effective pedagogical integration. The findings suggest that a balanced combination of technological tools and traditional teaching methods leads to more effective language acquisition outcomes. The study concludes with recommendations for educators and future research directions.*

Keywords: *Language learning, digital technology, MALL, CALL, learner autonomy, educational technology, digital tools.*

INTRODUCTION

In recent decades, technological innovation has profoundly reshaped educational practices across the globe. Language learning, in particular, has undergone significant transformation due to the integration of digital tools and platforms. Traditionally, language instruction relied heavily on face-to-face interaction, textbooks, and teacher-centered methodologies. However, the emergence of modern technologies has expanded learning environments beyond physical classrooms, enabling more flexible, accessible, and interactive approaches. According to Tan (2023), technological tools allow learners to engage with language materials anytime and anywhere, fostering continuous learning. Similarly, Noyan et al. (2023) emphasize that digital environments support individualized learning paths and enhance learner engagement. These developments have led to the rise of innovative approaches such as MALL and CALL, which play a central role in modern language education.

This paper aims to explore the impact of technology on language learning by examining its benefits, challenges, and implications for teaching practices. It also synthesizes findings from recent research to provide a comprehensive understanding of technology-enhanced language learning.

LITERATURE REVIEW

The role of technology in language learning has been widely discussed in recent academic research. Polat (2017) highlights that Computer-Assisted Language Learning (CALL) has evolved from simple drill-based systems into interactive, multimedia-rich environments that support the development of all language skills. Similarly, Noyan et al. (2023) provide a comprehensive review of Mobile-Assisted Language Learning (MALL), emphasizing its effectiveness in enhancing learner motivation and improving accessibility.

Tan (2023) points out that mobile-assisted learning has experienced rapid growth over the past two decades, becoming one of the most influential tools in language education. The portability and accessibility of mobile devices enable learners to study anytime and anywhere, making learning more flexible and learner-centered.

Handayani (2024) focuses on the role of digital tools in increasing student engagement, concluding that technology fosters immersive learning environments that enhance active participation. In addition, Kaxxarovna and Xaydarova (2025) argue that modern technologies are essential in contemporary language pedagogy, as they facilitate innovative teaching strategies and contribute to improved learning outcomes.

Overall, the literature indicates that technology plays a crucial role in transforming language learning into a more interactive, accessible, and effective process.

Development of Technology-Enhanced Language Learning

Mobile-Assisted Language Learning (MALL)

Mobile-Assisted Language Learning (MALL) has emerged as one of the most influential developments in modern education. It refers to the use of mobile devices, such as smartphones and tablets, to support language learning. Due to the widespread availability of these devices, MALL provides learners with unprecedented access to educational content anytime and anywhere.

Tan (2023) emphasizes that MALL has evolved significantly over the past two decades, becoming a key component of digital education. It allows learners to practice vocabulary, grammar, and communication skills independently, thereby promoting learner autonomy. Similarly, Noyan et al. (2023) note that many mobile applications incorporate gamification elements, which increase motivation and engagement among learners.

Another important feature of MALL is personalization. Adaptive learning systems can tailor content based on learners' performance, enabling them to focus

on their individual weaknesses. This personalized approach contributes to more efficient and targeted learning outcomes.

Moreover, MALL supports informal learning by allowing learners to engage with language materials outside the classroom environment. This flexibility is particularly beneficial for students with busy schedules or limited access to traditional educational resources.

Computer-Assisted Language Learning (CALL)

Computer-Assisted Language Learning (CALL) represents a broad category of technology-based language instruction. According to Polat (2017), CALL has evolved from simple drill-and-practice programs into complex, interactive systems that integrate rich multimedia content.

Modern CALL environments incorporate videos, simulations, and interactive exercises designed to develop all four language skills: listening, speaking, reading, and writing. One of the key advantages of CALL is its ability to provide immediate feedback, which enables learners to identify and correct their errors in real time.

In addition, CALL platforms facilitate collaborative learning through online discussions, group projects, and virtual classrooms. These features allow learners to interact with peers and instructors, thereby enhancing their communicative competence.

Kaxxarovna and Xaydarova (2025) emphasize that the integration of modern technologies in language pedagogy not only improves linguistic abilities but also fosters critical thinking and digital literacy. Therefore, CALL plays a significant role in developing well-rounded and autonomous learners.

Digital Tools and Online Platforms

In addition to Mobile-Assisted Language Learning (MALL) and Computer-Assisted Language Learning (CALL), a wide range of digital tools has emerged to support language learning. These include video conferencing platforms, learning management systems (LMS), virtual reality (VR), and online language communities.

Handayani (2024) argues that digital tools significantly increase student engagement by providing interactive and immersive learning experiences. For instance, virtual reality technologies can simulate real-life situations, enabling learners to practice language skills in authentic contexts.

Online platforms also support various learning models, such as blended learning and flipped classrooms. These approaches combine traditional face-to-face instruction with digital resources, offering greater flexibility and adaptability in the learning process.

Furthermore, digital tools facilitate real-time communication with native speakers, which helps learners improve their pronunciation, fluency, and cultural understanding.

Advantages of Technology in Language Learning

Improved Accessibility

One of the most significant advantages of technology in language learning is the enhanced accessibility it provides. Through the use of digital tools, learners can access a wide range of educational resources regardless of their geographical location, economic background, or institutional affiliation. This is particularly beneficial for students living in remote or underserved areas, where access to qualified teachers or educational institutions may be limited.

Moreover, online platforms, mobile applications, and cloud-based resources enable learners to study at any time, eliminating traditional constraints associated with fixed schedules and physical classrooms. This flexibility supports diverse learning needs and allows students to balance their education with personal and professional responsibilities.

In addition, technology promotes inclusive education by offering resources tailored to learners with disabilities. Features such as subtitles, speech recognition, screen readers, and customizable interfaces make language learning more accessible for individuals with varying needs. As a result, technology not only broadens access but also enhances educational equity.

Furthermore, digital platforms encourage lifelong learning by enabling individuals to continuously develop their language skills beyond formal education. Learners can revisit materials, explore new content, and remain actively engaged in language practice throughout their lives, fostering ongoing personal and professional development.

Enhanced Engagement and Motivation

Technology significantly increases learner engagement and motivation by transforming traditional learning into a more interactive and dynamic experience. Unlike conventional methods that often rely on passive learning, digital tools incorporate multimedia elements such as videos, animations, audio recordings, and interactive exercises, which make learning more stimulating and enjoyable.

Gamification is one of the most effective strategies used in digital language learning. Features such as points, badges, leaderboards, and rewards create a sense of achievement and competition, encouraging learners to participate actively and consistently. These elements make the learning process more enjoyable and help maintain long-term motivation.

Furthermore, simulations and virtual environments allow learners to practice language skills in realistic contexts. For example, learners can engage in role-playing activities, virtual conversations, or interactive scenarios that mimic real-life situations. This type of experiential learning not only improves language proficiency but also builds confidence.

According to Handayani (2024), students who use digital tools demonstrate higher levels of engagement and motivation compared to those who rely solely on traditional methods. The interactive nature of technology helps sustain learners' interest and encourages them to take an active role in their learning process.

Advantages of Technology in Language Learning

Personalized Learning Experiences

Another major advantage of technology in language learning is its ability to provide personalized learning experiences. Unlike traditional classroom settings,

where instruction is often standardized, digital technologies enable adaptive learning that responds to individual learners' needs, preferences, and proficiency levels. Adaptive learning systems utilize algorithms and data analytics to adjust the difficulty and content of lessons based on learners' performance. For example, if a learner struggles with a particular grammar structure or set of vocabulary, the system can offer additional practice and targeted feedback. This individualized approach ensures that learners concentrate on their specific weaknesses, leading to more efficient and effective learning outcomes.

In addition, technology allows learners to control their own learning pace, which helps reduce the anxiety and pressure often associated with traditional classroom environments. Advanced learners can progress more rapidly, while others can take the necessary time to fully comprehend the material.

Personalization also extends to content selection, enabling learners to choose materials that align with their interests and goals. For instance, learners focusing on business English, academic writing, or conversational skills can access specialized resources tailored to their objectives. This relevance increases motivation and makes the learning process more meaningful.

Overall, personalized learning not only enhances efficiency but also boosts learners' confidence, as they experience continuous progress aligned with their individual needs.

Development of Learner Autonomy

Technology plays a crucial role in fostering learner autonomy, which is an essential component of successful language acquisition. By providing access to a wide variety of resources and tools, technology empowers learners to take control of their own learning process.

Learners can independently select materials, set learning goals, monitor their progress, and evaluate their performance. This level of control encourages responsibility and self-discipline, which are important skills not only for language learning but also for lifelong education.

Digital tools such as online quizzes, self-assessment tests, and progress tracking systems allow learners to reflect on their achievements and identify areas for improvement. Immediate feedback provided by many applications helps learners correct mistakes and adjust their learning strategies in real time.

Furthermore, technology supports self-directed learning outside the classroom. Learners can engage in activities such as watching videos, listening to podcasts, participating in online discussions, or using language learning apps. These activities complement formal instruction and provide additional opportunities for practice.

The development of autonomy also increases learners' confidence and motivation, as they become active participants rather than passive recipients of knowledge. Over time, autonomous learners are more likely to achieve higher levels of language proficiency and maintain their learning independently.

Challenges in Technology-Enhanced Language Learning

Unequal Access to Technology

Despite the numerous benefits that technology brings to language learning, it is not equally accessible to all learners. The availability of modern devices, high-speed internet, and supportive digital infrastructures varies significantly across different regions and socio-economic groups. Students in rural or underserved areas often face difficulties accessing mobile applications, online courses, and virtual classrooms due to limited connectivity or outdated devices.

This digital divide can exacerbate existing educational inequalities, leaving some learners at a disadvantage compared to peers with better technological access. Noyan et al. (2023) emphasize that inequitable access to digital resources may hinder continuous practice, limit exposure to interactive learning opportunities, and reduce engagement. Therefore, addressing this challenge is essential to ensure that the benefits of technology-enhanced learning are distributed fairly across all learners.

Strategies to overcome this challenge include government and institutional support for providing affordable devices, subsidized internet access, and community

learning centers equipped with modern technology. Creating offline-friendly learning resources can also help bridge the accessibility gap.

Quality of Digital Content

Another significant challenge is the quality and reliability of digital content. The internet hosts a vast number of language learning resources, but not all of them meet academic standards or pedagogical effectiveness. Learners may encounter poorly structured lessons, outdated materials, or inaccurate information, which can impede progress or lead to the reinforcement of errors.

Educators play a critical role in guiding students to identify and use high-quality resources. Polat (2017) emphasizes that teacher supervision and curated content recommendations are essential to maintain academic rigor in technology-enhanced learning environments. Additionally, learners should be trained in digital literacy skills, such as evaluating sources, cross-checking information, and distinguishing credible materials from unreliable ones.

Teacher Readiness and Pedagogical Integration

Effective integration of technology into language learning is not automatic; it requires careful planning and teacher preparedness. Many educators may lack the necessary digital competencies to effectively use technological tools in the classroom. Without proper training, teachers may struggle to incorporate digital resources in ways that complement learning objectives, reducing the potential impact of technology.

Kaxxarovna and Xaydarova (2025) stress that technology should serve as a complementary tool rather than a replacement for traditional teaching methods. Teachers must develop skills in instructional design, classroom management in digital environments, and the selection of appropriate technology for specific learning goals. Continuous professional development and hands-on training programs are therefore essential to ensure successful technology integration.

Overreliance on Technology

While technology offers numerous advantages, an overreliance on digital tools can create significant challenges in language learning. Excessive dependence on online applications and automated feedback may limit opportunities for face-to-face interaction, collaborative problem-solving, and the development of critical thinking skills. In such cases, learners may adopt a more passive approach to learning, especially when they rely heavily on gamified applications or AI-based corrections.

Therefore, a balanced approach is essential. Integrating digital tools with traditional instructional methods, peer interaction, and teacher-led guidance can help address these limitations. Such an approach ensures that learners not only develop technological proficiency but also acquire essential interpersonal communication skills necessary for real-world language use.

Implications for Educational Practice

The integration of technology into language learning requires careful and strategic planning. Educators should adopt a balanced approach that combines the advantages of digital tools with the structure and guidance of traditional teaching methods. For instance, blended learning models, flipped classrooms, and hybrid learning formats can effectively leverage the strengths of both approaches.

Teacher training programs should incorporate components of digital literacy, technology-assisted instructional design, and strategies for engaging learners in online environments. Equipping teachers with these competencies is essential for the successful implementation of technology-enhanced learning.

Furthermore, educational institutions need to invest in modern infrastructure, including high-speed internet, up-to-date devices, and access to a wide range of digital learning platforms. Such investments ensure that both teachers and students can fully benefit from technological advancements.

Ensuring equitable access to resources is also fundamental to realizing the full potential of technology in education. Without addressing issues of accessibility and inclusion, the effectiveness of digital learning initiatives may be limited.

FUTURE RESEARCH DIRECTIONS

Future research in technology-enhanced language learning should focus on several key areas.

First, more attention should be given to the long-term effects of technology use. While many studies highlight short-term benefits, further research is needed to examine how sustained use of MALL, CALL, and other digital tools influences language acquisition over extended periods.

Second, reducing the digital divide remains a critical issue. Future studies should explore effective strategies to ensure equitable access to technological resources, particularly in low-resource or underserved regions.

Third, emerging technologies such as artificial intelligence, virtual reality, and augmented reality require deeper investigation. Research should evaluate their effectiveness, practical applications, and potential limitations in language learning contexts.

Fourth, teacher preparation is another important area for research. Studies should examine how to enhance teacher readiness and provide effective professional development programs that support the integration of technology into language pedagogy.

Finally, more research is needed on learner outcomes. Investigating how technology impacts learner autonomy, motivation, and engagement across diverse cultural and educational settings can provide valuable insights for curriculum design and instructional practices.

By addressing these areas, educators and policymakers can better maximize the benefits of technology in language learning while minimizing potential challenges.

CONCLUSION

In conclusion, technology has profoundly transformed the landscape of language learning by providing learners with unprecedented opportunities for accessibility, engagement, and personalization. Tools such as Mobile-Assisted

Language Learning (MALL), Computer-Assisted Language Learning (CALL), and various digital platforms create flexible and interactive environments in which learners can practice and develop their language skills independently.

These technologies promote learner autonomy by enabling students to take greater control over their learning pace, content, and strategies. As a result, learners often experience increased motivation, confidence, and overall effectiveness in language acquisition. Furthermore, the integration of multimedia resources, gamified applications, and virtual learning environments enhances the learning experience by making it more engaging and dynamic.

Importantly, technology also facilitates authentic and context-based language practice. Through interactive exercises, simulations, and real-time communication, learners can develop not only linguistic competence but also practical communication skills. This prepares them for real-world interactions across diverse cultural and professional contexts.

However, despite these advantages, it is essential to maintain a balanced approach that integrates technology with traditional teaching methods. Such balance ensures the development of both digital proficiency and interpersonal communication skills.

Overall, when implemented thoughtfully, technology serves as a powerful tool that enhances the quality, accessibility, and effectiveness of language learning in the modern educational landscape.

Despite the numerous benefits of technology in language learning, significant challenges remain. Unequal access to devices and reliable internet connections continues to be a major barrier, particularly in remote or economically disadvantaged regions. Moreover, the quality of digital content varies widely, and learners may encounter inaccurate, poorly structured, or inappropriate materials that can impede progress. Teacher readiness is also a critical factor; the effective integration of technology into pedagogy requires professional training, ongoing

support, and strategic planning to ensure that digital tools complement, rather than replace, traditional instructional methods.

Therefore, achieving optimal language learning outcomes necessitates a balanced and thoughtful approach. Educational institutions and policymakers must address accessibility issues, provide high-quality digital resources, and invest in teacher training programs that enhance technological competencies. Blended learning models, which combine traditional classroom instruction with digital resources, have demonstrated particular promise in promoting both learner engagement and skill development.

Looking ahead, future research should evaluate the long-term effects of technology-enhanced language learning, explore innovative applications such as artificial intelligence and virtual or augmented reality, and identify effective strategies to bridge the digital divide. By addressing these challenges and leveraging the full potential of digital tools, educators can create inclusive, adaptive, and highly effective language learning environments that meet the diverse needs of modern learners.

In summary, technology is not merely an auxiliary tool but a transformative force in language education. When implemented thoughtfully and equitably, it has the potential to revolutionize the teaching and learning of languages, fostering lifelong learning, enhancing learner autonomy, and improving communicative competence in increasingly interconnected global contexts.

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API SERVISLARIGA QARATILGAN HUJUMLARNI ANIQLASH

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Annotatsiya *Zamonaviy raqamli ekotizimda API-servislar mikroservislar o‘rtasidagi strategik bog‘lovchi sifatida xizmat qiladi. Ushbu tadqiqot API-trafikdagi anomal xatti-harakatlarni aniqlashda sun’iy intellekt (AI) va mashinali o‘rganish usullarining samaradorligini o‘rganadi. FT-ANN (FastText va ANN), RoBERTa asosida ma’lumot sintezi va CNN-LSTM gibrid modellari tahlil qilindi. Tizimning samaradorligi CSIC 2010 va ATRDF 2023 to‘plamlarida baholandi, inyeksiya aniqlashda 0.97 F1-score va DDoS hujumlarini aniqlashda 99% dan yuqori aniqlik kuzatildi. Natijalar shuni ko‘rsatadiki, AI va Zero Trust arxitekturasini integratsiya qilish API xavfsizligini ta’minlashda eng samarali yechimdir.*

Abstract *In the modern digital ecosystem, API services serve as strategic connectors between microservices. This study explores the effectiveness of artificial intelligence (AI) and machine learning methods in detecting anomalous API traffic. FT-ANN (FastText with ANN), RoBERTa-based data synthesis, and CNN-LSTM hybrid models were analyzed. System performance was evaluated on the CSIC 2010 and ATRDF 2023 datasets, achieving an F1-score of 0.97 for injection detection and over 99% accuracy for DDoS attacks. The results demonstrate that integrating AI with Zero Trust architecture provides a highly effective solution for ensuring API security.*

Kalit so‘zlar: *API xavfsizligi, anomal holatlarni aniqlash, mashinali o‘rganish, sun’iy intellekt, FastText, RoBERTa, Zero Trust arxitekturasi, kiberhujumlar, inyeksiya hujumlari, DDoS, API Gateway, real vaqt rejimida monitoring.*

Keywords: *API security, anomaly detection, machine learning, artificial intelligence, FastText, RoBERTa, Zero Trust Architecture, cyberattacks, injection attacks, DDoS, API Gateway, real-time monitoring.*

KIRISH

Zamonaviy raqamli ekotizimda API (Application Programming Interface) servislari dasturiy ta’minot tizimlari va ma’lumot almashinuvi xizmatlari o‘rtasidagi o‘zaro hamkorlikni ta’minlovchi asosiy protokol hamda tartiblar to‘plami sifatida markaziy o‘rinni egallaydi. Biz hozirda odamlar, ilovalar va tizimlar o‘rtasidagi aloqadorlik jadal sur’atlarda o‘sib borayotgan “API iqtisodiyoti” davrida yashamoqdamiz. APIlar raqamli infratuzilmaning poydevori bo‘lib xizmat qiladi va mikroservislar arxitekturasida turli komponentlar o‘rtasidagi integratsiyani muvofiqlashtirishda strategik ahamiyat kasb etadi.

Biroq, ilovalarni tezkor ishlab chiqish (Agile development) jarayonida xavfsizlik dizayni va mustahkamlash rejalarining yetishmasligi APIlarni kiberhujumchilar uchun ochiq nishonga aylantirmoqda. So‘nggi tadqiqotlar shuni ko‘rsatadiki, web-API hujumlari bir necha oy ichida 400 foizga o‘sgan va tashkilotlarning 22 foizi ushbu zaifliklar tufayli ma’lumotlar sizib chiqishini boshdan kechirgan. Ayniqsa, inyeksiya (Injection) kamchiliklari, jumladan, SQL inyeksiyasi (SQLi), Cross-Site Scripting (XSS) va OS buyruq inyeksiyalari kabi tahdidlar API xavfsizligidagi eng jiddiy o‘nta xavfdan biri deb topilgan.

Shuningdek, DDoS hujumlari va identifikatsiya ma’lumotlarining buzilishi (Broken Authentication) tizim barqarorligiga hamda foydalanuvchi maxfiyligiga jiddiy zarar yetkazmoqda.

Hozirgi vaqtda ko‘plab tashkilotlar o‘z APIlarini an’anaviy statik qoidalarga asoslangan himoya devorlari (WAF) va cheklangan monitoring imkoniyatlari orqali himoya qiladi, ammo bu usullar zamonaviy hujum vektorlariga, ayniqsa, “nolinchi kun” (zero-day) zaifliklariga qarshi kurashishda samarasizdir. An’anaviy usullar kontekstga asoslangan murakkab patternlarni tushuna olmasligi sababli, noto‘g‘ri ijobiy natijalar (false positives) ko‘payishiga olib keladi.

Shu bois, API xavfsizligi har qachongidan ham moslashuvchan va dinamik bo‘lishi, anomal xatti-harakatlarni tezda aniqlay oladigan hisoblash intellekti usullarini talab etadi. Mazkur tadqiqotning maqsadi API servislariga qaratilgan hujumlarni aniqlashda sun’iy intellekt (AI) va mashinali o‘rganish (ML) metodlarining samaradorligini o‘rganishdir. Tadqiqot doirasida FastText embedding va ANN (Approximate Nearest Neighbor) qidiruviga asoslangan gibrid tizimlar, RoBERTa modeli yordamida ma’lumotlarni sintezlash hamda “Nol ishonch” (Zero Trust) arxitekturasini tatbiq etish orqali API xavfsizligini ta’minlashning yangi yondashuvlari tahlil qilinadi.

Tadqiqot API-servislarga qaratilgan turli hujumlarni aniqlash uchun gibrid va ko‘p bosqichli intellektual yondashuvni qo‘llaydi. Yondashuv ma’lumotlarni tayyorlash, modelni o‘qitish va deteksiya jarayonlarini o‘z ichiga oladi. Ma’lumotlar sifatida CSIC 2010 (elektron tijorat trafigi) va ATRDF 2023 (Log4j, RCE, SQLi, XSS kabi zamonaviy hujumlar) to‘plamlari ishlatildi. Ma’lumotlarga ishlov berish jarayonida URL-lar dekodlandi, matnlar kichik harflarga o‘tkazildi, API-ga xos tokenizatsiya usullari va Byte-Level Byte Pair Encoding (BBPE) tatbiq qilindi.

SQLi va OS command inyeksiyalarini aniqlash uchun FastText + ANN modeli qo‘llanildi. FastText modeli normal trafik namunalariga asoslanib o‘qitildi, keyin API so‘rovlari embedding vektorlarga aylantirilib, Hierarchical Navigable Small

Worlds (HNSW) grafigi orqali indekslandi. Har bir API endpointi uchun anomal holatlarni aniqlash adaptiv threshold yordamida belgilandi.

Sinfiy muvozanatsizlik va ma’lumot tanqisligini bartaraf etish uchun RoBERTa asosida GAN tamoyillariga o‘xshash ma’lumot sintezi ishlatildi. Generator tokenlarni kontekstga mos ravishda yangilaydi, discriminator esa Pseudo Labeling va OOD (Out of Distribution) skorlari orqali sifatni tekshiradi va faqat ishonchli sintetik ma’lumotlarni treningga qo‘shadi.

DDoS hujumlarini aniqlashda CNN-LSTM gibrid modeli ishlatiladi, bu model fazoviy xususiyatlarni ajratib, vaqtinchalik ketma-ketliklarni tahlil qiladi. GraphQL so‘rovlari xavfsizligi uchun LLM va SBERT yordamida query embeddinglar yaratildi, murakkablik chegaralari dinamik tarzda belgilandi.

Shuningdek, MINES tizimi yordamida API signaturalari va ma’lumotlar bazasi o‘rtasidagi bog‘liqliklar tahlil qilinadi. Tizim pre-konditsiyalarni Python kodiga aylantirib, ularni Zero Trust arxitekturasi (PDP va IdP komponentlari) bilan integratsiya qiladi. Bu yondashuv API xavfsizligini maksimal darajada ta’minlaydi va anomal holatlarni tushuntirib beradi.O‘tkazilgan eksperimentlar va modellar tahlili API xavfsizligini ta’minlashda intellektual tizimlarning yuqori samaradorligini ko‘rsatdi. Olingan asosiy natijalar quyidagilardan iborat:

- Inyeksiya hujumlarini aniqlash: FT-ANN freymvorki CSIC 2010 ma’lumotlar to‘plamida 0.9713 F1-score natijasini qayd etdi. Zamonaviyroq ATRDF 2023 to‘plamida esa ushbu model barcha metrikalar (F1-score, Precision, Recall) bo‘yicha 1.0 (mukammal) ko‘rsatkichga erishdi.
- DDoS hujumlaridan himoya: API Gateway darajasida qo‘llanilgan CNN-LSTM gibrid modellari DDoS klassifikatsiyasida 99.63% aniqlikni ta’minladi. Bu ko‘rsatkich an’anaviy signaturalarga asoslangan vositalardan sezilarli darajada yuqoridir.
- GraphQL xavfsizligi: Malicious (zararli) GraphQL so‘rovlarini aniqlashda CNN modellari SQL inyeksiyasi uchun 96.78%, XSS hujumlari uchun esa Random Forest va MLP klassifikatorlari 99% dan yuqori aniqlik ko‘rsatdi.

- Adaptiv cheklovlar samaradorligi: AI-ga asoslangan adaptiv rate limiting tizimi trafik surj (to‘lqin) holatlarida o‘tkazuvchanlik qobiliyatini an’anaviy statik cheklovlarga qaraganda ikki baravargacha (100 dan 200 req/sec gacha) oshirishi va rad etilgan qonuniy so‘rovlar sonini keskin kamaytirishi isbotlandi.
- Invariant tahlili: MINES tizimi orqali API va ma’lumotlar bazasi o‘rtasidagi invariantlarni tekshirish web-tamper hujumlarini aniqlashda recall ko‘rsatkichini mavjud SOTA modellariga qaraganda 14% ga yaxshiladi.

Tadqiqot natijalari shuni ko‘rsatadiki, an’anaviy xavfsizlik devorlari (WAF) va statik qoidalar bugungi kunda dinamik o‘zgaruvchan “nolinchi kun” (zero-day) hujumlariga qarshi yetarli emas. AI tizimlari, xususan, RoBERTa modeliga asoslangan ma’lumotlar sintezi va few-shot learning texnikalari hatto kam sonli namunalar bilan ham yangi tahdidlarni 91.5% recall bilan aniqlash imkonini beradi.

Biroq, AI modellarini real vaqt rejimida qo‘llashda hisoblash resurslari va kechikish (latency) muammosi saqlanib qolmoqda. Eksperimentlar shuni ko‘rsatdiki, ML inferensiyasi CPU-ga asoslangan tizimlarda kechikishlarni oshirishi mumkin, bu esa ishlab chiqarish (production) muhitida GPU/TPU kabi apparat tezlatkichlarini qo‘llashni taqozo etadi. Shuningdek, Explainable AI (XAI) va SHAP tahlili orqali model qarorlarini tushuntirib berish bank va moliya kabi qat’iy tartibga solinadigan sohalarda xavfsizlik auditini o‘tkazishda hal qiluvchi ahamiyatga ega.

XULOSA

API servislarini kiberhujumlardan himoya qilishning eng samarali strategiyasi — sun’iy intellektga asoslangan deteksiya modellarini “Nol ishonch” (Zero Trust) arxitekturasiga integratsiya qilishdir. Bu yondashuv nafaqat so‘rovning kelib chiqishini, balki uning xatti-harakati va kontekstual ma’nosini ham qat’iy tekshirish imkonini beradi.

Kelajakdagi tadqiqotlar API trafigidagi murakkab vaqtinchalik va fazoviy bog‘liqliklarni yanada chuqurroq tahlil qilish uchun Grafik neyron tarmoqlarini

(GNN) tatbiq etishga hamda modellarni ko‘p bulutli (multi-cloud) va edge computing muhitlarida optimallashtirishga yo‘naltirilishi lozim.

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AXBOROT XAVFSIZLIGI STANDARTLARINI JORIY ETISH AMALIYOTI

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Annotatsiya *Ushbu ilmiy maqolada zamonaviy global raqamlashuv sharoitida axborot xavfsizligi standartlarini (Information Security Standards) tatbiq etishning strategik va amaliy ahamiyati tadqiq etiladi. Tadqiqot doirasida kiber-tahdidlarning zamonaviy dinamikasi, xususan, Ransomware va APT hujumlarning iqtisodiy oqibatlari tahlil qilingan. Alan Kalderning IT-boshqaruvi (IT Governance) konsepsiyasi hamda ISO/IEC 27001 standarti asosidagi PDCA sikli metodologik asos sifatida olingan. Maqolada axborot xavfsizligini boshqarish tizimlarining (ISMS) samaradorligi, audit jarayonlaridagi tipik zaifliklar va O‘zbekiston milliy standartlarining xalqaro talablar bilan uyg‘unlashuvi masalalari keng yoritilgan. Tadqiqot natijalari kiber-barqarorlikni ta’minlashda inson omili va korporativ madaniyatning rolini asoslab beradi.*

Abstract *This scientific article examines the strategic and practical significance of implementing information security standards in the context of modern global digitalization. The research analyzes the contemporary dynamics of cyber threats, particularly the economic consequences of Ransomware and APT attacks. Alan Calder's IT Governance concept and the PDCA cycle based on the ISO/IEC 27001 standard are adopted as the methodological foundation. The article extensively covers the effectiveness of Information Security Management Systems (ISMS), typical vulnerabilities in audit processes, and the harmonization of Uzbekistan's national*

standards with international requirements. The research results substantiate the role of the human factor and corporate culture in ensuring cyber resilience.

Kalit so‘zlar: *Axborot xavfsizligi, ISO/IEC 27001, IT-boshqaruvi, kiber-tahdidlar, risk-menejment, PDCA sikli, kiber-barqarorlik, kiber-gigiyena, axborot aktivlari.*

Keywords: *Information Security, ISO/IEC 27001, IT Governance, Cyber Threats, Risk Management, PDCA Cycle, Cyber Resilience, Cyber Hygiene, Information Assets.*

KIRISH

Insoniyat tarixidagi to‘rtinchi sanoat inqilobi va u bilan chambarchas bog‘liq bo‘lgan global raqamli transformatsiya (Digital Transformation) jarayonlari jamiyat hayotining barcha jabhalarida axborot aktivlarining (Information Assets) strategik qiymatini tubdan o‘zgartirib yubordi. Bugungi kunda axborot nafaqat oddiy ma’lumotlar to‘plami, balki davlatlarning suvereniteti, korporatsiyalarning raqobatbardoshligi va jismoniy shaxslarning daxlsizligini belgilovchi eng qimmatli resurs sifatida talqin etilmoqda. Biroq, ushbu aktivlarning raqamli ekotizimga to‘liq integratsiyalashuvi ularni turli ko‘rinishdagi kiber-tahdidlar nishoniga aylantirib, global xavfsizlik arxitekturasiga jiddiy chaqiriqlar tashlamoqda.

So‘nggi yillarda kiber-tahdidlar dinamikasi o‘zining murakkablashuvi va destruktiv kuchi bilan xarakterlanmoqda. Xususan, tovlamachi dasturlar (Ransomware) hujumlari nafaqat alohida foydalanuvchilarni, balki yirik ishlab chiqarish korxonalari, sog‘liqni saqlash tizimlari va moliya institutlarini falaj holatiga keltirmoqda. Fishing (Phishing) operatsiyalari va davomiy rivojlangan tahdidlar (Advanced Persistent Threats - APT) esa davlat organlarining maxfiy ma’lumotlar bazasiga kirib borish va strategik infratuzilmani nazorat qilishga yo‘naltirilgan murakkab geosiyosiy qurolga aylandi. Statistik ma’lumotlarga ko‘ra, kiber-jinoyatchilikning global iqtisodiyotga yetkazadigan zarari har yili trillionlab dollarni tashkil etmoqda, bu esa kiber-xavfsizlikni ta’minlash mexanizmlarini qayta ko‘rib chiqishni taqozo etmoqda.

Ushbu muammolarni tizimli tartibga solish maqsadida axborot xavfsizligi standartlari (Information Security Standards) shakllandi. Ularning tarixiy

evolyutsiyasi 1990-yillarda Britaniyaning BS 7799 standarti bilan boshlanib, keyinchalik xalqaro ISO/IEC 27001 darajasiga ko‘tarildi. Shuningdek, AQShning NIST (National Institute of Standards and Technology) freymvorklari va boshqaruvga yo‘naltirilgan COBIT (Control Objectives for Information and Related Technologies) metodologiyalari axborot xavfsizligini biznes-jarayonlar bilan uyg‘unlashtirishning asosiy vositalari sifatida maydonga chiqdi. Standartlarning evolyutsion jarayoni shuni ko‘rsatadiki, axborot xavfsizligi endilikda shunchaki texnik “fayrvollar” yoki antiviruslar majmui emas, balki kompleks boshqaruv falsafasiga aylangan.

Mazkur tadqiqotning dolzarbligi shundaki, ko‘pgina mahalliy tashkilotlar standartlarni joriy etishni shunchaki hujjatlarni rasmiylashtirish yoki sertifikat olish (compliance-driven approach) deb tushunadilar. Tadqiqotning asosiy maqsadi axborot xavfsizligi standartlarini joriy etishning amaliy samaradorligini tahlil qilish, ularning real kiber-tahdidlarga qarshi barqarorligini baholash va Alan Kalderning boshqaruv tamoyillari asosida milliy kiberxavfsizlik strategiyasini takomillashtirish yo‘llarini ilmiy asoslab berishdan iboratdir.

Ushbu tadqiqotda axborot xavfsizligini boshqarishning murakkab va ko‘p qirrali tabiatini hisobga olgan holda, tizimli yondashuv (Systemic Approach) va qiyosiy tahlil (Comparative Analysis) metodlari asos qilib olindi. Tizimli yondashuv axborot xavfsizligini tashkilotning barcha bo‘g‘inlari — odamlar, jarayonlar va texnologiyalarning o‘zaro mantiqiy bog‘liqligi sifatida o‘rganish imkonini beradi. Ushbu metod nima uchun tanlandi? Chunki zamonaviy kiber-hujumlarning 80% dan ortig‘i texnik zaifliklardan emas, balki boshqaruvdagi va inson omili bilan bog‘liq tizimli xatolardan foydalanadi.

Tadqiqotning metodologik yadrosini Alan Kalderning “IT Governance” (IT-boshqaruvi) konsepsiyasi tashkil etadi. Kalderga ko‘ra, axborot xavfsizligi faqat IT-bo‘limining vazifasi emas, balki tashkilotning yuqori rahbariyati (Board level) darajasida nazorat qilinishi shart bo‘lgan strategik mas’uliyatdir. Ushbu konsepsiya doirasida ISO/IEC 27001 standarti boshqaruvning hisobdorlik (Accountability) va

risklarga asoslangan yondashuv (Risk-based approach) tamoyillari bilan bog‘landi. Mazkur metodik bog‘liqlik standartlarni qog‘ozda emas, balki amaliyotda ishlatish uchun nazariy platforma yaratadi.

Tahlil jarayonida PDCA (Plan-Do-Check-Act) sikli tadqiqotning dinamik modeli sifatida qo‘llanildi. Bu metod quyidagi bosqichlarni ilmiy asoslashga xizmat qildi:

- Rejalashtirish: Aktivlarni inventarizatsiya qilish va xatarlarni baholash (Risk Assessment) metodologiyasi o‘rganildi.
- Bajarish: Tanlangan xavfsizlik nazorat vositalarini (Controls) amaliyotga tatbiq etish mexanizmlari tahlil qilindi.
- Tekshirish: Ichki va tashqi audit jarayonlari hamda samaradorlik ko‘rsatkichlarini (KPI) monitoring qilish usullari tadqiq etildi.
- Harakat qilish: Audit natijalari asosida tizimni doimiy takomillashtirish (Continual Improvement) strategiyasi ishlab chiqildi.

Shuningdek, O‘zbekiston Respublikasi Kiberxavfsizlik markazi tomonidan belgilangan davlat standartlari (O‘z DSt) va xalqaro ISO/IEC metodologiyalarining muvofiqligini o‘rganish uchun qiyosiy tahlil metodi ishlatildi. Bu orqali milliy qonunchilikning xalqaro talablarga moslashish darajasi va mahalliylashtirishdagi texnik tafovutlar aniqlandi.

Tadqiqot natijasida axborot xavfsizligini boshqarish tizimini (ISMS) joriy etishning tashkiliy va texnik ko‘rsatkichlari bo‘yicha muhim xulosalar olindi. Birinchidan, standartlarni tizimli qo‘llayotgan tashkilotlarda axborot aktivlarining maxfiyligi va yaxlitligini buzuvchi insidentlar soni sezilarli darajada kamaygan. Statistik tahlillarga ko‘ra, ISO/IEC 27001 sertifikatiga ega kompaniyalarda kiber-insidentlar oqibatida yuzaga keladigan moliyaviy yo‘qotishlar standart joriy etilmagan raqobatchilarga qaraganda o‘rtacha 55-60% ga kamroq ekanligi ma’lum bo‘ldi.

Risk-menejment (Xatarlarni boshqarish) jarayonining samaradorligi: Tahlillar shuni ko‘rsatadiki, xatarlarni baholashning miqdoriy va sifat usullarini qo‘llash tashkilotlarga o‘z IT-budjetini eng zaif nuqtalarni himoya qilishga yo‘naltirish

imkonini beradi. Standartlar joriy etilgan tashkilotlarda resurslarni taqsimlash samaradorligi 30-35% ga oshgan. Bunda asosiy natija sifatida “tahdidlarni prognoz qilish” imkoniyatining paydo bo‘lishi ko‘rsatildi.

Audit jarayonlarida aniqlanadigan tipik zaifliklar va ularning tahlili: Tadqiqot davomida o‘tkazilgan audit natijalarining statistik tahlili quyidagi eng ko‘p uchraydigan zaifliklarni (vulnerabilities) ko‘rsatdi:

- Identifikasiya va kirish nazorati (Access Control): 45% hollarda sobiq xodimlarning akkauntlari o‘z vaqtida o‘chirilmaganligi yoki “privileged” huquqlarning me’yordan ortiqligi aniqlangan.
- Yamoqlarni boshqarish (Patch Management): 30% holatlarda operatsion tizimlar va dasturiy ta’minotning kritik yangilanishlari o‘z vaqtida o‘rnatilmagan .

Xodimlarning xabardorlik darajasi: 65% tashkilotlarda xodimlar oddiy fishing hujumlarini aniqlash bo‘yicha yetarli bilimga ega emasligi ma’lum bo‘lgan.

Kiber-barqarorlik (Cyber Resilience) darajasi bo‘yicha o‘tkazilgan keyslar tahlili shuni isbotladiki, standartga ega tashkilotlarda kiber-hujumdan keyin tizimni to‘liq tiklash vaqti (RTO - Recovery Time Objective) o‘rtacha 4-6 soatni tashkil etsa, tizimsiz yondashadigan korxonalarda bu jarayon 2-3 kungacha cho‘zilib, biznesning butkul to‘xtab qolishiga olib kelgan.

Natijalarni muhokama qilish jarayonida asosiy e’tibor inson omili va korporativ madaniyat muammosiga qaratildi. Tadqiqot shuni ko‘rsatadiki, eng ilg‘or texnik himoya vositalari ham, agar xodimlar kiberxavfsizlik qoidalariga rioya qilmasa, samarasiz bo‘lib qoladi. Alan Kalder ta’kidlaganidek, axborot xavfsizligi shunchaki “texnologik loyiha” emas, balki “xulq-atvor o‘zgarishi”dir. Tashkilotlarda xavfsizlikni joriy etishdagi eng katta to‘siq — bu xodimlarning yangi tartib-qoidalarga qarshiligi va rahbariyatning ushbu jarayonga faqat rasmiyatchilik sifatida qarashidir.

O‘zbekiston sharoitida xalqaro standartlarni mahalliylashtirishda bir qator texnik va huquqiy to‘siqlar mavjud. Birinchidan, xalqaro terminologiyaning o‘zbek tilidagi

huquqiy va texnik talqinida nomuvofiqliklar uchrab turadi, bu esa audit sifatiga salbiy ta’sir qiladi. Ikkinchidan, mahalliy kompaniyalarning ko‘pchiligi litsenziyalangan dasturiy ta’minot va bulutli xizmatlardan foydalanishda xalqaro xavfsizlik sertifikatlarini tekshirishga yetarli e’tibor qaratmaydilar.

Kelajakdagi kiber-tahdidlarga, jumladan sun’iy intellektga (AI) asoslangan avtomatlashtirilgan hujumlarga qarshi an’anaviy “statik” standartlar yetarli emas. Muhokama natijasida shunday xulosaga kelindiki, endilikda tashkilotlar “Advanced” standartlar va adaptiv xavfsizlik modellariga (Adaptive Security Architecture) o‘tishlari, real vaqt rejimida monitoring qilish tizimlarini (SIEM/SOC) yo‘lga qo‘yishlari zarur.

XULOSA

Tadqiqot doirasida axborot xavfsizligi standartlarini joriy etish amaliyoti bo‘yicha quyidagi beshta asosiy xulosa shakllantirildi: Axborot xavfsizligi standartlari shunchaki texnik talablar emas, balki tashkilotning kiber-barqarorligini ta’minlovchi va biznesning uzluksizligini kafolatlovchi strategik boshqaruv asbobidir. Alan Kalderning IT-boshqaruvi tamoyillariga ko‘ra, ISMS muvaffaqiyati bevosita yuqori rahbariyatning siyosiy irodasi va resurslar bilan ta’minlash darajasiga bog‘liq. Xavfsizlikni ta’minlash bir martalik harakat emas, balki doimiy monitoring va takomillashtirishni talab qiluvchi uzluksiz jarayondir. Texnologik himoyadan ko‘ra, korporativ madaniyatni o‘zgartirish va xodimlarning kiber-xabardorligini oshirish kiber-hujumlar xavfini 70% dan ortiqqa kamaytiradi. O‘zbekiston kiber-makonining xavfsizligi milliy standartlarning xalqaro ISO/IEC va NIST talablari bilan uyg‘unlashishi hamda mahalliy mutaxassislarning xalqaro sertifikatsiyadan o‘tishi bilan bevosita bog‘liqdir.

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TEXTUAL ANALYSIS OF FITRAT'S POEM "KIM DEYAY SENI" IN THE COLLECTION UZBEK YOUNG POETS (1922)

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Annotation: *The article analyzes the poetry collection* Uzbek Young Poets*, published in 1922 by the Turkestan State Publishing House in Tashkent, and examines its importance in the formation of modern Uzbek poetry. The collection brought together works by young Uzbek poets such as Fitrat, Cholpon, Elbek, and Botu and played a crucial role in the development of the syllabic (barmoq) meter in Uzbek poetry. The study focuses on Fitrat's poem "Kim deyay seni," which opens the collection. Using comparative textual analysis, the poem is examined across several later editions published in 1987, 2000, and 2011. The research demonstrates that the original 1922 version preserves a stronger emotional expression and richer poetic nuance, while later editions reflect editorial interventions or orthographic changes. The study highlights the*

importance of textual criticism in restoring the authentic form of early twentieth-century Uzbek poetic texts

Keywords: *Uzbek Young Poets, Fitrat, textual criticism, Jadid literature, Uzbek poetry, poetic collections, textual variants, barmoq meter.*

INTRODUCTION

The poetry collection *Uzbek Young Poets* was published in 1922 by the Turkestan State Publishing House in Tashkent. Consisting of 105 pages, the book occupies an important place in the history of Uzbek literature, as it became one of the first collective publications presenting the works of representatives of modern Uzbek poetry. In many respects, the collection continued the literary tradition established by earlier poetic compilations such as Bahrombek Davlatshoyev's *Milliy ash'ori Tarjimon*, Munavvarqori's *Milliy she'rlar majmuasi yoxud Adab ad-din* and *Sabzazor*, and Hoji Muin's *Yangi adabiyot*.

Unlike traditional classical poetry collections, the book does not begin with a basmala (praise to God) or a na‘t (salutation to the Prophet Muhammad). Instead, the foreword written on behalf of the Uzbek Scientific Council emphasizes the role of literature in awakening the nation, spreading enlightenment, and guiding society toward cultural and intellectual development.

According to literary scholar Sh. Nazarova, although the foreword is formally attributed to the council, the style and intellectual tone clearly reveal the influence of Fitrat. The systematic arrangement of poems also suggests that the collection was compiled by a single knowledgeable literary figure.

The collection includes poems by four major poets of the Jadid literary movement: Fitrat, Cholpon, Elbek, and Botu. Among them, Fitrat's works occupy a central position, and the collection begins with his poems.

This study focuses on the textual analysis of Fitrat's poem "Kim deyay seni," comparing the original 1922 version with several later editions. The aim is to identify

textual variations and evaluate their impact on the poetic meaning and emotional tone of the work.

METHODS

The research is based on the principles of textual criticism and comparative literary analysis**.** Several editions of Fitrat's poem "Kim deyay seni" were examined and compared:

- the original publication in the collection *Uzbek Young Poets* (1922);
- the version published in the newspaper *O'zbekiston adabiyoti va san'ati* (1987, No. 50);
- the edition included in Fitrat's *Selected Works* (2000);
- the version published in *Saylanma* (2011).

The study analyzes lexical, stylistic, and orthographic differences between these versions. Particular attention is given to how textual changes influence the poem's rhythm, emotional tone, and semantic nuance. The analysis also considers the broader poetic context and the conventions of Uzbek lyrical expression.

RESULTS

The comparative analysis revealed several significant textual variations between the editions. One example concerns the word "jahonning." In most editions, the word appears in its original form, while the 2011 *Saylanma* edition contains the variant **"**jahoinning.**"** This difference appears to be the result of a typographical or editorial error rather than a deliberate stylistic change.

Another important variation occurs in the line **"ketma, tur biroz,"** which appears in later editions as **"ketmay tur, biroz."** In the original version, the phrase "ketma" expresses a direct emotional plea from the lyrical hero. Its concise structure strengthens the rhythm and intensity of the line. In contrast, the later variant introduces a negative grammatical construction ("ketmay"), which slightly softens the emotional appeal.

A particularly meaningful difference is found in the final stanza between the words **"qo'zim"** and **"ko'zim."** The 1922 edition uses "qo'zim," a traditional Uzbek

expression of affection that conveys tenderness and emotional closeness. Later editions replace it with “ko‘zim,” which, although also used as a term of endearment, carries a more neutral connotation.

Furthermore, the original line

“Gulmi sen, ko‘zim, jonmi sen, qo‘zim”

demonstrates a richer poetic structure, as it combines two different affectionate forms of address. Substituting “qo‘zim” with “ko‘zim” leads to repetition and weakens the stylistic expressiveness of the line.

DISCUSSION

The textual variations observed in different editions of the poem illustrate the complex process of transmitting literary texts across time. In many cases, editorial interventions, orthographic standardization, or simple printing errors can significantly alter the original form of a poem. In the case of Fitrat’s poem “Kim deyay seni,” the original 1922 version appears to preserve a stronger emotional and stylistic authenticity. The use of concise and expressive forms such as “ketma, tur biroz” and “qo‘zim” contributes to the poem’s lyrical intensity and reflects the poet’s characteristic style.

Later editorial changes, while sometimes intended to modernize spelling or simplify language, may unintentionally weaken the poem’s emotional resonance and poetic balance. This demonstrates the importance of textual criticism in literary studies, particularly when dealing with early twentieth-century Uzbek texts that have undergone multiple reprints and editorial revisions.

The findings also confirm that the collection *Uzbek Young Poets* represents a significant stage in the development of modern Uzbek poetry, not only for its literary content but also for its role in shaping new poetic forms and stylistic tendencies.

CONCLUSION

The poetry collection *Uzbek Young Poets* (1922) occupies an important place in the formation of modern Uzbek literature. By bringing together the works of

young poets such as Fitrat, Cholpon, Elbek, and Botu, it contributed to the emergence of a new poetic tradition and the consolidation of the barmoq meter.

The textual analysis of Fitrat's poem "Kim deyay seni" demonstrates that later editions introduced several lexical and stylistic changes that affect the poem's emotional tone and poetic structure. The original 1922 version appears to preserve a more authentic and expressive form of the text.

Therefore, the application of textual criticism is essential for reconstructing the original versions of early Uzbek literary works and for ensuring the accurate interpretation of their artistic meaning.

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BIOLOGIYA DARSLARIDA REFLEKS JARAYONLARINI RAQAMLI TEXNOLOGIYALAR ASOSIDA O'QITISH METODIKASI

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Annotatsiya: *Mazkur tezisda refleks jarayonlarini biologiya darslarida raqamli texnologiyalar asosida o‘qitishning metodik yechimlari yoritiladi. Metodologiya sifatida didaktik modellashtirish, aralash ta’lim dizayni, formatif baholash va pedagogik tajriba-sinov qo‘llanadi. Ilmiy yangilik refleks yoyining dinamik parametrlarini simulyatsiyada boshqarish, o‘quvchi xatolarini raqamli izlar orqali tahlil qilish hamda kompetensiyaviy natijalarni mezonli baholash tizimini ishlab chiqishdi*

Kalit so‘zlar: *refleks; refleks yoyi; nerv tizimi; raqamli texnologiyalar; simulyatsiya; virtual laboratoriya; formatif baholash.*

Аннотация: *В данном тезисе освещены методические решения обучения рефлекторным процессам на уроках биологии на основе цифровых технологий. В качестве методологии используются дидактическое моделирование, дизайн смешанного обучения, формативное оценивание и педагогический эксперимент. Научная новизна заключается в управлении динамическими параметрами рефлекторной дуги в симуляции, анализе ошибок учащихся с помощью цифровых следов и разработке системы критериального оценивания результатов компетенций.*

Ключевые слова: *рефлекс; рефлекторная дуга; нервная система; цифровые технологии; симуляция; виртуальная лаборатория; формативное оценивание.*

Abstract: *This thesis substantiates a digital-technology-based methodology for teaching reflex processes in biology lessons. The study applies instructional design, didactic modeling, and classroom experimentation using interactive simulations, virtual labs, and sensor-supported tasks. Scientific novelty lies in dynamic visualization of reflex arcs, learning analytics for error diagnosis, and criterion-based assessment aligned with competence outcomes.*

Keywords: *reflex; reflex arc; digital learning; simulation; virtual laboratory; learning analytics; formative assessment*

KIRISH

Zamonaviy ta’lim tizimida raqamli texnologiyalarni o‘quv jarayoniga keng joriy etish dolzarb masalalardan biri hisoblanadi. Ayniqsa, biologiya fanini o‘qitishda murakkab jarayonlar, jumladan refleks mexanizmlarini o‘quvchilarga tushunarli va qiziqarli tarzda yetkazish muhim ahamiyat kasb etadi. Refleks jarayonlari inson va hayvonlar organizmida nerv tizimi faoliyatining asosiy ko‘rinishlaridan biri bo‘lib, ularni chuqur anglash biologik bilimlarning shakllanishida muhim o‘rin tutadi.

Biologiya ta’limida refleks jarayonlarini o‘qitish nafaqat anatomiya va fiziologiya bo‘yicha faktlarni yodlash, balki tirik tizimlarda boshqaruv, moslashuv va tezkor javob reaksiyalarini sabab-oqibat bog‘lanishida tushuntirishni talab qiladi. Amaliyot shuni ko‘rsatadiki, refleks yoyining bo‘g‘inlari, qo‘zg‘alishning o‘tishi, sinapsdagi uzatish va markaziy nerv tizimi darajasida integratsiya kabi jarayonlar o‘quvchi ongida ko‘pincha statik, parchalanib qolgan tasvir sifatida shakllanadi. Bu holat, bir tomondan, refleks mexanizmlarining vaqt bo‘yicha dinamik tabiatiga mos kelmaydi, ikkinchi tomondan esa laboratoriya sharoitida etarli darajada xavfsiz, takrorlanadigan va individual tezlikda bajariladigan tajriba tashkil etishdagi cheklovlar bilan bog‘liq. Shuning uchun raqamli texnologiyalar refleks jarayonlarini o‘qitishda aynan dinamik vizuallashtirish, parametrlarni boshqarish, qayta-qayta sinash va o‘quv natijalarini tezkor tahlil qilish imkonini beruvchi didaktik vosita sifatida qaralishi lozim.

Tadqiqotning maqsadi biologiya darslarida refleks jarayonlarini o‘qitish uchun raqamli texnologiyalar integratsiyasiga tayangan metodikani ishlab chiqish va uning samaradorligini didaktik-mezoniy baholashdan iborat. Mazkur maqsad refleks jarayonlarini o‘zlashtirishning uch darajali modelini taklif etishni talab qiladi: birinchi daraja struktura-tushunchaviy daraja bo‘lib, refleks yoyining bo‘g‘inlari va ularning vazifalarini anglash; ikkinchi daraja jarayon-dinamik daraja bo‘lib, qo‘zg‘alish o‘tishining vaqt va sharoitga bog‘liq o‘zgarishini tushunish; uchinchi daraja esa qo‘llash va tahlil darajasi bo‘lib, real hayotiy vaziyatlarda reflektor javobni oldindan aytish, izohlash va diagnostika qilish ko‘nikmasini shakllantirishni ko‘zda tutadi. Metodikaning asosiy g‘oyasi raqamli muhitda refleks jarayonini “ko‘rish”, “boshqarish” va “izohlash” ketma-ketligini o‘quv harakatlariga aylantirishdir, chunki biologik bilimning mazmuniy markazi aynan tizimli sabab-oqibat bog‘lanishlarini tushunishdan iborat.

Metodologik asos sifatida konstruktivistik yondashuv va kompetensiyaviy ta’lim talablari o‘zaro uyg‘unlashtiriladi: o‘quvchi bilimni tayyor ko‘rinishda qabul qilmaydi, balki simulyatsiya va virtual tajriba orqali o‘z gipotezasini sinab, natijani

interpretatsiya qiladi; shu jarayonda o‘qituvchi yo‘naltiruvchi va diagnostik rolni bajaradi. Raqamli texnologiyalardan foydalanish, bu yerda, shunchaki ko‘rgazmalilik emas, balki o‘quvchi faoliyatini ma’lumotga aylantiradigan va qayta aloqa beradigan tizim sifatida ko‘riladi. Didaktik modellashtirish orqali refleks jarayonining ta’limiy modeli tuziladi: retseptor, afferent yo‘l, markaz, efferent yo‘l va effektor bo‘g‘inlari animatsion bloklarga ajratilib, ularning o‘zaro ta’siri vaqt shkalasi va signal amplitudasi kabi parametrlar bilan bog‘lanadi. Bunda simulyatsiya “qora quti” bo‘lib qolmasligi uchun har bir parametrning fiziologik mazmuni o‘quv topshiriqlari orqali ochib beriladi, aks holda raqamli ko‘rsatish jarayonni soddalashtirib yuborish xavfini kuchaytiradi.

Metodika uch bosqichda amalga oshiriladi. Birinchi bosqich muammoli kirish bo‘lib, kundalik hayotdagi tezkor javob reaksiyasi misolida refleks tushunchasining zarurati asoslanadi va o‘quvchida “nega aynan shunday javob yuz beradi” degan savol uyg‘otiladi. Ikkinchi bosqich raqamli tajriba bo‘lib, interaktiv simulyatsiyada refleks yoyining bo‘g‘inlari bilan ishlash, signalning kechikishi va kuchini o‘zgartirish, markaziy integratsiya rolini ko‘rsatadigan vaziyatlarni tahlil qilish amalga oshiriladi. Uchinchi bosqich refleks jarayonini real vaziyatlarga transfer qilish bo‘lib, keys-topshiriqlar, mini-loyihalar va formatif baholash savollari orqali o‘quvchi o‘z bilimini qo‘llaydi. Mazkur bosqichlar aralash ta’lim dizayni bilan uyg‘unlashtiriladi: sinfda muhokama va yo‘naltirilgan tajriba, uyda esa qisqa videodars, interaktiv test va refleksiv yozuvlar bilan mustahkamlash amalga oshiriladi. Shu tariqa raqamli texnologiya darsning maqsadiga xizmat qiladigan, o‘quvchini faol fikrlashga undaydigan vosita bo‘lib qoladi.

Raqamli vositalar tarkibi metodik jihatdan minimal yetarlilik tamoyiliga ko‘ra tanlanadi. Birinchidan, interaktiv simulyatsiyalar refleks yoyini dinamik ko‘rsatish va “agar shunday bo‘lsa, nima bo‘ladi” turidagi tajribalarni xavfsiz bajarish imkonini beradi; bu yondashuv tabiiy fanlarni o‘qitishda simulyatsiya va modellashtirishning ta’limiy qiymatini asoslab bergan tadqiqotlar bilan mos keladi [5]. Ikkinchidan, virtual laboratoriya muhitida shartli va shartsiz reflekslar,

tormozlanish va qo‘zg‘alish muvozanati kabi murakkab tushunchalar ssenariy asosida berilib, o‘quvchi bosqichma-bosqich kuzatuv protokolini to‘ldiradi; bu jarayon o‘quvchini ilmiy metod elementlariga, xususan, kuzatish, o‘lchash, faraz qo‘yish va xulosa chiqarishga o‘rgatadi [6]. Uchinchidan, sensorli tajriba modullari (masalan, reaksion vaqtni o‘lchashga oid oddiy mobil ilovalar) raqamli muhitni real hayotdagi o‘lchov bilan bog‘lab, “virtual” va “haqiqiy” tajriba o‘rtasida ko‘prik yaratadi; bunday integratsiya STEAM elementlarini biologiya mazmuniga sun’iy qo‘shmasdan, tabiiy ravishda kiritish imkonini beradi. To‘rtinchidan, o‘quv analitikasi vositalari o‘quvchining xatolari tipologiyasini aniqlashga xizmat qiladi: masalan, ayrim o‘quvchilar retseptorni effektor bilan adashtiradi, boshqalar esa markaziy integratsiyani shunchaki “signal o‘tadigan joy” deb talqin qiladi. Raqamli izlar tahlili o‘qituvchiga differensial yondashuvni asoslash imkonini beradi, ya’ni kimga vizuallashtirishni kuchaytirish, kimga mantiqiy zanjirlarni qayta qurish, kimga esa terminologik aniqlik bo‘yicha yordam kerakligini ko‘rsatadi.

Metodikaning mazmuniy yadrosi refleks jarayonini tizimli tushunishga olib boradigan topshiriqlar dizaynidir. Bunda o‘quv topshiriqlari uch turga ajratiladi: rekonstruktiv topshiriqlar refleks yoyini bo‘g‘inlari bo‘yicha qayta tuzishni, ya’ni “qismlardan butunni” yig‘ishni talab qiladi; variativ topshiriqlar parametrlar o‘zgarganda natija qanday o‘zgarishini tahlil ettiradi; diagnostik topshiriqlar esa berilgan simptom yoki vaziyatga ko‘ra refleks yoyining qaysi bo‘g‘inida buzilish bo‘lishi mumkinligini asoslashga yo‘naltiriladi. Mazkur topshiriqlar orqali refleks jarayonlari faqat biologik fakt sifatida emas, balki biologik tizimlarda axborot uzatish va boshqaruvning umumiy prinsipi sifatida ochib beriladi; bu prinsiplar keyinchalik endokrin boshqaruv, homeostaz va adaptatsiya mavzularini o‘zlashtirish uchun ham tayanch bo‘lib xizmat qiladi.

Baholash tizimi formatif va summativ baholash uyg‘unligida quriladi. Formatf baholashda simulyatsiya ichida darhol qayta aloqa beruvchi savollar, konsept-xaritalar va “nima uchun” asoslash talab qilinadigan qisqa yozma izohlar qo‘llanadi. Summativ baholash esa mezonli rubrikalar orqali amalga oshirilib, unda

uch ko‘rsatkich asosiy hisoblanadi: terminologik aniqlik, sabab-oqibat zanjirini asoslash, va bilimni yangi vaziyatga transfer qilish. Raqamli topshiriqlarda ko‘p uchraydigan xato shundaki, o‘quvchi animatsiyani tomosha qilib, to‘g‘ri javobni “topadi”, lekin izohlashda qiynaladi; shu sababli metodikada izoh talab qiluvchi savollar ulushi yetarli darajada yuqori bo‘lishi shart. Ta’lim natijalarini ishonchli baholash uchun o‘quvchi javoblari bilan bir qatorda jarayon ko‘rsatkichlari ham tahlil qilinadi: vazifani bajarish ketma-ketligi, qayta urinishlar soni, parametrlarni o‘zgartirish strategiyasi. Bu ko‘rsatkichlar o‘quvchining fikrlash uslubini aniqlashga va keyingi darslarda individual yordamni rejalashtirishga xizmat qiladi.

Tadqiqotning ilmiy yangiligi uch jihatda mujassam. Birinchidan, refleks jarayonlarini o‘qitish uchun “dinamik parametrli” simulyatsiya asosida metodik model taklif etiladi, bunda o‘quvchi signal kuchi, kechikish, tormozlanish kabi tushunchalarni bevosita o‘zgartirib, natijani tahlil qiladi; bu yondashuv raqamli didaktikaning faol tajriba tamoyiliga mos keladi [3;5]. Ikkinchidan, o‘quv analitikasi orqali xatolar tipologiyasini aniqlash va shu asosda differensial yondashuvni tashkil etish mexanizmi ishlab chiqiladi; mazkur mexanizm raqamli ta’lim muhitida o‘qituvchi qarorlarini dalillarga tayanib qabul qilish imkonini beradi [4]. Uchinchidan, kompetensiyaviy natijalarni mezonli baholash tizimi refleks jarayonlari mazmuniga moslashtiriladi va darsning har bir bosqichi bilan mantiqan bog‘lanadi, bu esa “o‘qitish-baholash” uzviyligini kuchaytiradi [2].

XULOSA

Xulosa sifatida aytish mumkinki, refleks jarayonlarini raqamli texnologiyalar asosida o‘qitish metodikasi biologiya darslarida murakkab fiziologik mexanizmlarni dinamik, tushunarli va tekshiriladigan o‘quv faoliyatiga aylantiradi. Taklif etilgan bosqichli yondashuv simulyatsiya, virtual laboratoriya va sensorli o‘lchovlarni didaktik maqsadga bo‘ysundirish orqali o‘quvchining struktura-tushunchaviy bilimini jarayon-dinamik tushunish bilan bog‘laydi hamda bilimni amaliy vaziyatlarga transfer qilishni kuchaytiradi. Natijada o‘quvchi refleksni faqat atama sifatida emas, balki tirik tizimlarning boshqaruv mexanizmi sifatida izohlash,

asoslash va qo‘llash darajasiga ko‘tariladi, o‘qituvchi esa raqamli izlar tahlili yordamida individuallashtirilgan ta’limni tashkil etish imkoniyatiga ega bo‘ladi.

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THE IMPACT OF WARS TAKING PLACE IN THE WORLD ON THE WORLD ECONOMY: ANALISIS USING THE EXAMPLE OF THE OIL MARKET

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Abstract: *This scientific article analyzes the impact of military conflicts taking place in the modern world on the world economy, especially economic changes occurring through the oil*

market. Within the framework of the study, global energy supply, price formation and macroeconomic indicators are studied using the example of the Russia-Ukraine war and conflicts in the Middle East. The mechanisms of influence on inflation, production costs and international trade systems through changes in oil prices are revealed. Also, based on data from the International Monetary Fund and the International Energy Agency, the negative impact of wars on global economic growth is scientifically substantiated. The results of the study show that military conflicts cause sharp changes in the price of energy resources, which has different effects on the economies of developed and developing countries. In particular, economic pressure increases for oil-importing countries, while exporting countries may benefit in the short term.

Keywords: *war, oil market, global economy, inflation, energy security, geopolitics*

INTRODUCTION

The modern world economy, as an increasingly complex global system, is sensitive to any political or military instability. In particular, major conflicts that have arisen in recent years, including the Russia-Ukraine war, have significantly affected the global economic balance. This conflict has affected energy markets, transport chains and financial systems not only regionally, but also globally, creating new problems in the world economy. As one of the main energy sources of the modern economy, oil ensures the uninterrupted operation of global production, transport and industrial sectors. Therefore, any sharp changes in oil prices have a direct and indirect impact on the world economy. Military conflicts, in turn, lead to price changes by disrupting the oil supply chain. For example, it is known from history that oil prices rose sharply during political instability in the Middle East or the Persian Gulf War. Today, the oil market is of strategic importance in the global economy. Oil-exporting countries (for example, OPEC members) play an important role in price formation. At the same time, major importing countries are forced to reconsider their energy policies in order to maintain economic stability. The main economic problems arising from military conflicts are disruption of energy supply, a sharp increase in oil prices, increased inflation, a slowdown in global trade and a deterioration in the investment climate. In this regard, the oil market plays a central role in understanding the economic consequences of wars. Since almost all sectors

of the global economy can be influenced through oil prices. This makes the scientific study of this topic relevant. The main objective of this study is to analyze the impact of military conflicts on the world economy using the example of the oil market and to identify the mechanisms of this impact.

BODY PART

In the modern global economy, the oil market is of strategic importance, it is not only a source of energy, but also one of the main factors of economic stability. Military conflicts are one of the most important factors that disrupt the balance in this market. Wars affect the economy through the oil market mainly through three main channels: supply shocks, price changes and market expectations. First, military conflicts lead to a decrease in production in oil-producing regions or the closure of transport routes. For example, as a result of the Russia-Ukraine war, serious disruptions in the supply of energy resources to the European market occurred. Second, a decrease in supply leads to an increase in oil prices. This process is described in economics as a “price shock”. A sharp increase in prices increases production costs and, as a result, causes an increase in the price of final products. This in turn increases inflationary pressure. Thirdly, market participants’ expectations also play an important role. In conditions of geopolitical instability, investors tend to flee to safe assets, which leads to destabilization of financial markets. Speculative activity in the oil futures market in particular increases. At the same time, according to the International Energy Agency, even small disruptions in global oil supplies can lead to significant price changes. This indicates that oil has a “multiplier effect” in the global economy. Fluids in oil prices have a direct impact on macroeconomic indicators. This effect is especially evident in the level of inflation, gross domestic product (GDP) and employment. First, an increase in oil prices increases inflation. Because energy is the main resource in almost all production processes. Increased transport, logistics and industrial costs lead to an increase in the general price level. According to research by the International Monetary Fund, a 10% increase in oil prices can increase global inflation by an

average of 0.3–0.5%. Secondly, an increase in oil prices slows down economic growth. High energy costs reduce producers' profits and reduce investment. This leads to a decrease in economic activity. Oil-importing countries in particular suffer the most from this process. Third, changes in oil prices also affect exchange rates. The currencies of oil-exporting countries may strengthen, while importing countries may face balance of payments problems. This threatens global financial stability. Changes in oil prices also have different effects across sectors. For example, if the energy sector's revenues increase, the transport and manufacturing sectors may suffer. This leads to a reshaping of the economic structure. Military conflicts that have occurred in recent years have had a significant impact on the global economy through the oil market. In particular, the Russia-Ukraine war is a vivid example of this process. As a result of this conflict, sanctions imposed on Russia have had a negative impact on global oil and gas supplies. European countries have been forced to look for alternative energy sources. This has led to a sharp increase in energy prices. As a result, inflation in European countries has reached its highest levels in the last decade. In addition, conflicts in the Middle East also have a significant impact on oil price fluctuations. This region contains a large part of global oil reserves, and any political instability immediately affects the global market. For example, during the Persian Gulf War, oil prices increased several times. Another important factor in modern conditions is the disruption of the global logistics system. Military conflicts endanger transportation routes, which increases the cost of oil supplies. As a result, final prices will be even higher. At the same time, according to World Bank analyses, wars reduce global trade and worsen the investment climate. This leads to a decrease in economic growth rates in the long term. The economic impact of wars varies across countries. This difference largely depends on the role of the country in the oil market. Oil-exporting countries can benefit from higher oil prices in the short term. Their export revenues increase and budget revenues increase. For example, OPEC members benefit economically from higher prices.

CONCLUSION AND PRACTICAL RECOMMENDATIONS

The results of this study show that in the conditions of the modern global economy, military conflicts are one of the most important factors that directly and indirectly affect economic stability. In particular, this effect is manifested more strongly and quickly through energy resources, in particular the oil market. As the study found, supply disruptions, logistical problems, and geopolitical uncertainties resulting from wars lead to sharp changes in global energy prices. In particular, the example of the Russia-Ukraine war shows that conflicts involving major energy-exporting countries cause economic instability not only regionally, but also globally. The increase in oil and gas prices as a result of this conflict led to increased inflation, increased production costs, and a slowdown in global economic growth. The analysis shows that oil prices are a universal factor affecting all sectors of the economy. Rising energy prices lead to increased costs in the transport, industry, agriculture and service sectors. This, in turn, leads to an increase in the general price level, that is, inflation.

Firstly, countries need to diversify energy sources in order to ensure energy security. In this regard, expanding the use of renewable energy sources is important. Solar, wind and other alternative energy sources will help reduce dependence on oil. Secondly, it is important to form strategic oil reserves and manage them effectively. Such reserves will help reduce economic damage in emergency situations. Through this, countries can increase their resilience to short-term price shocks. Thirdly, it is necessary to strengthen international cooperation. To ensure stability in the energy market, a coordinated policy should be pursued between countries. The role of international organizations such as OPEC is important in this regard. Fourthly, it is necessary to strengthen measures aimed at controlling inflation in economic policy.

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WEB - ILOVALARGA QARATILGAN HUJUMLAR (SQLi XSS) VA HIMOYA MEXANIZMLARI

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Annotatsiya: *Ushbu maqolada zamonaviy axborot tizimlarida keng tarqalgan xavfsizlik muammolaridan biri bo‘lgan veb-ilovalarga qaratilgan hujumlar, xususan SQL Injection va Cross-Site Scripting (XSS) turlari chuqur tahlil qilinadi. Tadqiqotning maqsadi mazkur hujumlarning texnik ishlash mexanizmlarini o‘rganish va ularga qarshi samarali, ko‘p qatlamli himoya tizimlarini baholashdan iborat. Tadqiqot metodologiyasi hujum vektorlarini tahlil qilish, kirish ma’lumotlarini sanitizatsiya qilish, parametrli so‘rovlar kabi klassik usullar hamda CNN va LSTM neyron tarmoqlariga asoslangan gibrid chuqur o‘rganish modellarini eksperimental baholashni o‘z ichiga oladi. Natijalar shuni ko‘rsatadiki, parametrli so‘rovlar SQLi hujumlarini bartaraf etishda deyarli 100% samaradorlikka ega. Shuningdek, taklif etilgan sun’iy intellekt modeli kiberhujumlarni 99.84% aniqlik bilan taniy olishini isbotladi. Tadqiqot xulosasiga ko‘ra, veb-ilovalarni ishonchli himoya qilish uchun an’anaviy filtrlash usullarini zamonaviy chuqur o‘rganish algoritmlari va xavfsiz kod yozish standartlari bilan integratsiya qilish zarur.*

Abstract: *This article provides a comprehensive analysis of web application attacks, specifically SQL Injection (SQLi) and Cross-Site Scripting (XSS), which represent significant security challenges in modern information systems. The purpose of the study is to explore the technical operational mechanisms of these attacks and evaluate effective, multi-layered defense systems. The methodology includes an analysis of attack vectors, input sanitization, and the use of parameterized queries, alongside the experimental evaluation of hybrid deep learning models based on CNN and LSTM neural networks. The results demonstrate that parameterized queries achieve nearly 100% effectiveness in mitigating SQLi attacks. Furthermore, the proposed artificial intelligence model proved capable of identifying cyberattacks with an accuracy of 99.84%. The conclusion emphasizes that for reliable web application protection, it is essential to integrate traditional filtering methods with modern deep learning algorithms and secure coding standards.*

Kalit so‘zlar: *SQL inyeksiyasi, Cross-Site Scripting (XSS), veb-ilovalar xavfsizligi, himoya mexanizmlari, kiritilgan ma’lumotlarni sanitizatsiya qilish, chuqur o‘rganish, CNN va LSTM modellari, parametrli so‘rovlar, kiberhujumlar, OWASP Top 10.*

Keywords: *SQL Injection (SQLi), Cross-Site Scripting (XSS), Web Application Security, Defense Mechanisms, Input Sanitization, Deep Learning, CNN and LSTM Models, Parameterized Queries, Cyberattacks, OWASP Top 10.*

KIRISH (INTRODUCTION)

Ushbu maqolada zamonaviy axborot tizimlarida keng tarqalgan xavfsizlik muammolaridan biri bo‘lgan veb-ilovalarga qaratilgan hujumlar, xususan SQL Injection va Cross-Site Scripting (XSS) turlari chuqur tahlil qilinadi. Bugungi kunda biznes va raqamli dunyo veb-ilovalariga tobora ko‘proq tayanayotgan bir vaqtda, kiberhujumlar va axborot xavfsizligiga bo'lgan tahdidlar ham doimiy ravishda rivojlanib bormoqda. 2021-yilda e’lon qilingan hisobotlarga ko‘ra, kiberjinoyatchilikning global iqtisodiyotga yetkazgan zarari 2020-yilning o‘zida 1400 milliard dollardan oshgani taxmin qilingan. Veb-ilovalar xavfsizligi doirasida SQL in’ektsiyasi va XSS hujumlari eng keng tarqalgan zaifliklar hisoblanib, ular tizim ma’lumotlari va funksionalligiga jiddiy zarar yetkazishi mumkin.

SQL Injection (SQLi) — bu hujumchi tomonidan veb-ilova orqali ma’lumotlar bazasiga yuboriladigan SQL so‘rovlariga ta’sir o‘tkazish va ularni manipulyatsiya qilish imkonini beruvchi zaiflikdir. Tajovuzkorlar SQL sintaksisidan foydalangan holda, ma’lumotlar bazasidan maxfiy korporativ ma’lumotlarni, foydalanuvchilar ro‘yxatini yoki shaxsiy mijoz ma’lumotlarini o‘g‘irlashlari, o‘zgartirishlari yoki o‘chirib tashlashlari mumkin. Statistik ma’lumotlarga ko‘ra, davlat idoralari veb-saytlarining taxminan 32 foizi aynan SQL Injection hujumlariga nisbatan zaif ekanligi aniqlangan.

Cross-Site Scripting (XSS) — bu hujumchiga zaif veb-sahifalarga zararli JavaScript kodlarini kiritish imkonini beruvchi veb-zaiflik turi hisoblanadi. Ushbu zararli skriptlar foydalanuvchi brauzerida ishga tushgandan so‘ng, tajovuzkor sessiya cookie-fayllarini o‘g‘irlashi, tizim sozlamalarini o‘zgartirishi yoki foydalanuvchini zararli veb-saytlarga yo‘naltirishi mumkin. OWASP hisobotlariga ko‘ra, dunyodagi veb-saytlarning qariyb 65 foizi XSS hujumlariga qarshi zaifliklarga ega.

CWE/SANS “Top 25” eng xavfli dasturiy ta’minot xatolari ro‘yxatida SQL in’ektsiyasi va Cross-Site Scripting doimiy ravishda birinchi o‘rinlarda qayd etiladi. Shuningdek, Open Web Application Security Project (OWASP) tashkiloti in’ektsion nuqsonlarni (SQL injection) veb-ilovalarga ta’sir qiluvchi eng og‘ir xavfsizlik

zaifliklaridan biri sifatida e’tirof etgan. Ushbu tadqiqotning asosiy maqsadi SQL Injection va XSS hujumlarining texnik ishlash mexanizmlarini chuqur o‘rganish hamda ularni aniqlashda zamonaviy gibrid chuqur o‘rganish modellarining samaradorligini tahlil qilishdan iborat.

METODOLOGIYA (METHODS)

Ushbu tadqiqotda web-ilovalarga qaratilgan SQL in’eksiyasi va XSS hujumlarini aniqlash hamda ularning oldini olish uchun kompleks tahliliy va eksperimental metodologiya qo‘llanildi. Tadqiqot metodologiyasi ma’lumotlarni yig‘ish, ularga dastlabki ishlov berish (preprocessing) va gibrid chuqur o‘rganish modellarini yaratish bosqichlarini o‘z ichiga oladi.

1. Ma’lumotlar to‘plami va ularni yig‘ish (Datasets)

Tadqiqot natijalarining ishonchliligini ta’minlash uchun uchta asosiy ma’lumotlar to‘plamidan foydalanildi:

HTTP CSIC 2010: Bu benchmark to‘plami 61,000 dan ortiq normal va zararli (SQLi, XSS, Buffer overflow va h.k.) web-so‘rovlarni o‘z ichiga oladi.

SQLi–XSS Payload dataset: Kaggle va GitHub platformalaridan olingan 100,000 dan ortiq zararli SQL va XSS kodlaridan iborat ochiq ma’lumotlar to‘plami.

Testbed dataset: Tadqiqot doirasida Damn Vulnerable Web Application (DVWA) va bWAPP laboratoriya muhitlarida real hujum ssenariylari yaratildi. So‘rovlar Burp Suite vositasi yordamida tutib olindi va jami 11,350 ta (shundan 4,537 tasi normal) so‘rovdan iborat shaxsiy dataset shakllantirildi.

2. Ma’lumotlarga dastlabki ishlov berish (Preprocessing)

Hujumchilar filtrlar va IDS tizimlarini aylanib o‘tish uchun turli kodlash usullaridan foydalanganliklari sababli, ma’lumotlarga quyidagi ishlov berish bosqichlari qo‘llanildi:

Dekodlash (Decoding): URL encoding, HTML entity, Hex va Unicode formatidagi kodlar o‘zining asl holatiga qaytarildi.

Tokenizatsiya va Standartlashtirish: XSS hujumlarini aniqlashda JavaScript teglari va funksiya nomlari asosida noyob tokenlar ajratib olindi. SQL so‘rovlarida esa kalit so‘zlar, parametrlar va mantiqiy operatorlar standart shaklga keltirildi.

Vektorlashtirish: Qayta ishlangan matnli ma’lumotlarni neyron tarmoqlari qabul qilishi uchun Word2Vec modeli yordamida raqamli vektorlarga aylantirildi.

3. Taklif etilgan gibrid model arxitekturasi

Tadqiqotda hujumlarni yuqori aniqlikda tahlil qilish uchun CNN (Convolutional Neural Networks) va LSTM (Long Short-Term Memory) neyron tarmoqlaridan tashkil topgan gibrid model ishlab chiqildi.

CNN qatlami: Kirish ma’lumotlaridan eng muhim xususiyatlarni (features) ajratib olish uchun xizmat qiladi.

LSTM qatlami: Ma’lumotlar ketma-ketligidagi vaqtinchalik bog‘liqliklarni (temporal dependencies) taniy oladi, bu esa murakkab va ko‘p bosqichli hujumlarni aniqlash imkonini beradi.

4. Eksperimental sozlamalar

Modelni o‘qitishda quyidagi parametrlar qo‘llanildi:

Aktivatsiya funksiyasi: ReLU (ichki qatlamlar uchun) va Sigmoid (klassifikatsiya uchun).

Optimizator: Adam optimizatori.

Epochs: Model 50 va 200 iteratsiya (epochs) oralig‘ida o‘qitildi.

Ushbu metodologiya nafaqat klassik SQLi va XSS hujumlarini, balki kutilmagan (zero-day) tahdidlarni ham aniqlashga qaratilgan bo‘lib, web-ilovalar xavfsizligini ta’minlashda yuqori samaradorlikni va’da qiladi.

NATIJALAR (RESULTS)

Tadqiqot doirasida olib borilgan tajribalar va tahlillar natijasida veb-ilovalarga qaratilgan SQL inyeksiyasi hamda XSS hujumlarining samaradorligi va ularga qarshi himoya mexanizmlarining ko‘rsatkichlari bo‘yicha quyidagi muhim topilmalar aniqlandi:

1. Hujum turlarining texnik tahlili va samaradorligi

SQL Injection: Hujumchilar ma'lumotlar bazasini manipulyatsiya qilishda turli usullardan foydalanishi tasdiqlandi. Masalan, mantiqiy aylanib o‘tish (boolean-based) usulida login maydoniga OR 1=1 -- kodini kiritish orqali avtorizatsiyadan o‘tish ehtimoli yuqori. Shuningdek, SLEEP() funksiyasi yordamida vaqtga asoslangan (time-based) hujumlar orqali bazadagi ma'lumotlar mavjudligini tekshirish mumkin.

Cross-Site Scripting (XSS): XSS hujumlari orqali foydalanuvchining cookie fayllarini o‘g‘irlash mexanizmi o‘rganildi. Masalan, <script>document.location='http://hacker.site/steal.php?cookie='+document.cookie;</script> kabi zararli kodlar orqali sessiya ma'lumotlarini qo‘lga kiritish mumkinligi amalda ko‘rsatildi.

2. Klassik himoya usullarining ko‘rsatkichlari

Parametrli so‘rovlar (Prepared Statements): Ushbu usul SQL inyeksiyalarini bartaraf etishda eng yuqori samaradorlikni (deyarli 100%) ko‘rsatdi, chunki u kiritilgan ma'lumotlarni kod emas, balki oddiy ma'lumot sifatida qabul qiladi.

Kiritilgan ma'lumotlarni sanitizatsiya qilish: PHP-dagi htmlspecialchars() va filter_var() funksiyalari zararli HTML teglari va SQL kalit so‘zlarini filtrlashda samarali ekanligi, biroq murakkab kodlangan hujumlarda zaifliklar mavjudligi aniqlandi.

3. Deep Learning modelining aniqlik darajasi

Taklif etilgan gibrid CNN va LSTM modeli uchta asosiy dataset bo‘yicha quyidagi rekord darajadagi aniqliklarga erishdi:

SQLi–XSS Payload dataset: Hujumlarni aniqlash aniqligi 99.84% ni tashkil etdi. HTTP CSIC 2010 benchmark dataset: Aniqlik darajasi 99.77% ni tashkil qildi. Testbed dataset: Real sharoitda yaratilgan so‘rovlarda model 99.23% aniqlik ko‘rsatdi. Modelning yo‘qotish (loss) funksiyasi 0.0001 gacha kamayishi uning kiberhujum naqshlarini juda aniq o‘zlashtirganligini ko‘rsatdi.

MUHOKAMA (DISCUSSION)

Tadqiqot natijalari veb-ilovalar xavfsizligida faqatgina bitta himoya qatlamiga tayanish yetarli emasligini ko‘rsatmoqda. Klassik usullarning cheklovlari: Ko‘plab dasturchilar orasida POST so‘rovlari GET so‘rovlaridan xavfsizroq degan noto‘g‘ri tushuncha mavjud, biroq tahlillar POST so‘rovlari ham xuddi GET kabi osongina manipulyatsiya qilinishi mumkinligini isbotladi. Shuningdek, faqatgina mijoz qismida (client-side) ma’lumotlarni tekshirish yetarli emas, chunki hujumchilar cURL yoki boshqa vositalar orqali ushbu bosqichni aylanib o‘tishlari mumkin.

Sanitizatsiya va Validatsiya muvozanati: Ma’lumotlarni sanitizatsiya qilish (zararli belgilarni olib tashlash) va validatsiya qilish (formatni tekshirish) o‘rtasidagi farqni tushunish muhimdir. Tadqiqot shuni ko‘rsatadiki, eng xavfsiz yondashuv – bu ma’lumotni kutilgan formatga mosligini tekshirish va uni sahifaga chiqarishda “escape late” (kechki kodlash) prinsipini qo‘llashdir.

Gibrid AI modelining ustunligi: An’anaviy xavfsizlik tizimlari (masalan, qoidalarga asoslangan WAF) yangi turdagi (zero-day) hujumlarni yoki murakkab yashirilgan (obfuscated) kodlarni o‘tkazib yuborishi mumkin. CNN va LSTM gibrid modelining afzalligi shundaki, CNN matndan muhim xususiyatlarni ajratib oladi, LSTM esa ma’lumotlar ketma-ketligidagi vaqtinchalik bog‘liqliklarni taniy oladi. Bu esa kutilmagan hujum vektori paydo bo‘lganda ham tizimning uni aniqlash imkoniyatini oshiradi.

XULOSA (CONCLUSION)

Veb-ilovalarga qaratilgan SQL Injection va XSS hujumlari kiberxavfsizlik sohasida hali ham eng jiddiy tahdidlar bo‘lib qolmoqda. Tadqiqotimiz shuni ko‘rsatadiki, veb-resurslarni ishonchli himoya qilish uchun quyidagi strategik choralar ko‘rilishi shart:

Dasturlash jarayonida faqat parametrli so‘rovlar (prepared statements) dan foydalanish SQL inyeksiyalariga qarshi eng samarali qalqondir. Barcha foydalanuvchi kirishlari “shubhali” deb hisoblanishi va ko‘p bosqichli validatsiya

hamda sanitizatsiyadan o‘tkazilishi lozim. Cookie fayllari uchun HttpOnly va SameSite atributlarini o‘rnatish XSS orqali sessiyalarni o‘g‘irlash xavfini kamaytiradi. Zamonaviy Deep Learning (CNN-LSTM) modellarini xavfsizlik skanerlari va WAF tizimlariga integratsiya qilish hujumlarni 99% dan yuqori aniqlikda to‘xtatish imkonini beradi.

Xulosa qilib aytganda, xavfsizlik – bu bir marta amalga oshiriladigan ish emas, balki DevSecOps madaniyati asosida doimiy monitoring, audit va yangilanishlarni talab qiluvchi uzluksiz jarayondir.

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ОБ ОДНОЙ ЗАДАЧА ДЛЯ УРАВНЕНИЯ ТРЕТЬЕГО ПОРЯДКА

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Аннотация *Работа посвящена изучению вопросов регулярное и сильное разрешимости задач с условиям типа Бицадзе–Самарского для смешанного парабола–гиперболического уравнения третьего порядка с двумя независимыми переменными.*

Ключевые слова *задачи Коши, параболо-гиперболического уравнения, интегральным уравнением Вольтерра второго рода, пространство С.Л.Соболева со скалярным произведением, сильный решения.*

Abstract: *This paper examines the regular and strong solvability of problems with Bitsadze–Samarskii-type conditions for a third-order mixed parabolic-hyperbolic equation with two independent variables.*

Keywords: *Cauchy problem, parabolic-hyperbolic equation, Volterra integral equation of the second kind, Sobolev space with scalar product, strong solutions.*

Вопросы разрешимости и спектральные свойства локальных и нелокальных задач для смешанного параболо-гиперболического уравнения второго и третьего порядков изучены в [1]-[3], для различных уравнений смешанного типа дробного порядка рассмотрены в [4]-[6].

Рассмотрим смешанного параболо-гиперболического уравнения третьего порядка

$$Lu = f((x,y) \quad (1)$$

где

$$Lu = \frac{\partial}{\partial x}\begin{cases} u_x - u_{yy}, & y > 0 \\ u_{xx} - u_{yy}, & y < 0 \end{cases}$$

Пусть $\Omega \subset R^2$ - конечная область, ограниченная при $y > 0$ отрезками AA_0, A_0B_0, B_0B прямых $x = 0$, $y = 1$, $x = 1$ соответственно, а при $y < 0$ характеристиками AC: $x + y = 0$ и BC: $x - y = 1$, гладкая кривая AD: $y = -\gamma(x)$, $0 \le x \le l$, где $0{,}5 < l < 1$; $\gamma(0) = 0$, $l + \gamma(l) = 1$ расположена внутри характеристического треугольника $0 \le x + y \le x - y \le 1$. Относительно кривой AD всюду в дальнейшем предположим, что $\gamma(x)$ - дважды непрерывно дифференцируемая функция и функции $x - \gamma(x)$ и $x + \gamma(x)$ монотонно возрастают;

$$0 < \gamma'(0) < 1, \quad \gamma(x) > 0, \quad x > 0$$

З а д а ч а Б. Найти решение уравнения (1), удовлетворяющее краевым условиям

$$u\big|_{AA_0 \cup A_0B_0} = 0, \quad (2)$$

$$\left.\frac{\partial u}{\partial n}\right|_{AA_0 \cup AC} = 0, \quad (3)$$

$$[u_x - u_y][\theta_0(t)] + \mu(t)[u_x - u_y][\theta^*(t)] = 0 \quad (4)$$

где n - внутренняя нормаль, $\theta_0(t)$ $(\theta^*(t))$-аффикс точки пересечения характеристики AC (кривой AD) с характеристикой выходящей из точки $(t,0,)$ $0 < t < 1$, $\mu(t)$ - заданная функция.

Через $W_2^1(\Omega)$ обозначим пространство С.Л.Соболева со скалярным произведением $(\cdot,\cdot)_1$, и нормой $\|\cdot\|_1$, $W_2^0(\Omega)\equiv L_2(\Omega)$.

Т е о р е м а 1 . Пусть $\mu(t)\in C^2[0,1]$ и $\mu(t)\neq -1,\ 0\le t\le 1$. Тогда для любой функции $f(x,y)\in C^1(\overline{\Omega}),\ f(A)=0$ существует единственное регулярное решение задачи Б и оно удовлетворяет неравенству

$$\|u\|_1 \le c\|f\|_0 \qquad (5)$$

и представимо в виде

$$u(x,y)=\iint_{\Omega} K(x,y,x_1,y_1)f(x_1,y_1)dx_1dy_1, \qquad (6)$$

где $K(x,y,x_1,y_1)\in L_2(\Omega\times\Omega)$, c – здесь и далее означает положительные, вообще говоря, разные постоянные.

Через W обозначим множество функций из класса

$$u\in C^1(\overline{\Omega}),\ u_{xx},u_{yy}\in C(\overline{\Omega}_0),\ u_{xxx},u_{yyy}\in C(\overline{\Omega}_1)$$

удовлетворяющих краевым условиям (2) – (4).

Функцию $u\in L_2(\Omega)$ назовем *с и л ь н ы м* решением задачи Б если существует последовательность функции $\{u_n\},u_n\in W$, такая, что u_n и Lu_n сходятся в $L_2(\Omega)$ к u и f соответсвенно.

Т е о р е м а 2. Для любой $f(x,y)\in L_2(\Omega)$ существует единственное сильное решение задачи Б. Это решение принадлежит классу $C(\overline{\Omega})\cap W_2^1(\Omega)$, удовлетворяет неравенству (5) и представимо в виде (6).

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TIBBIY KO'RIK JARAYONLARINI AVTOMATLASHTIRILGAN AXBOROT TIZIMI (AAT) ORQALI BOSHQARISHNING INNOVATSION METODIKASI

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Axborot kommunikatsiya texnologiyalari
kafedrasi dotsenti

Annotatsiya: *Ushbu maqolada tibbiy ko'rik jarayonlarini avtomatlashtirilgan axborot tizimi (AAT) orqali boshqarishning innovatsion metodikasi ilmiy asosda tahlil etilgan. Tadqiqotda AATning funksional imkoniyatlari, arxitekturasi va tibbiy muassasalarda joriy etish bosqichlari ko'rib chiqilgan. Natijada, tibbiy xodimlarning ish samaradorligi 40-60% ga, bemorlar kutish vaqti esa 35% ga kamayishi aniqlangan. Metodika O'zbekiston sharoitida sog'liqni saqlash tizimini modernizatsiya qilishda amaliy ahamiyatga ega.*

Kalit so'zlar: *avtomatlashtirilgan axborot tizimi, tibbiy ko'rik, raqamlashtirish, elektron tibbiy yozuv, innovatsion metodika, sog'liqni saqlash, boshqaruv tizimi.*

Abstract: *This article analyzes the innovative methodology for managing medical examination processes through an automated information system (AAT) on a scientific basis. The study examines the functional capabilities, architecture, and stages of implementation of AAT in medical institutions. As a result, it was found that the work efficiency of medical staff is reduced by 40-60%, and the waiting time of patients is reduced by 35%. The methodology is of practical importance in the modernization of the healthcare system in the conditions of Uzbekistan.*

Key words: *automated information system, medical examination, digitization, electronic medical record, innovative methodology, healthcare, management system.*

KIRISH

Zamonaviy sog'liqni saqlash tizimida tibbiy ko'rik jarayonlarini samarali boshqarish dolzarb muammo bo'lib qolmoqda. An'anaviy qog'oz asosidagi hujjat yuritish tizimi bir qator kamchiliklarga ega: ma'lumotlar yo'qolishi xavfi, ish

jarayonlarining sekinligi, noto'g'ri tashxis qo'yish ehtimoli va resurslarning samarasiz sarflanishi. Xalqaro amaliyot shuni ko'rsatmoqdaki, tibbiy muassasalarda avtomatlashtirilgan axborot tizimlarini joriy etish ushbu muammolarni hal etishning eng samarali yo'lidir.

O'zbekiston Respublikasi Prezidentining 2023-yil 1-fevraldagi 'Sog'liqni saqlash tizimini yanada takomillashtirish chora-tadbirlari to'g'risida'gi farmoniga muvofiq, tibbiy muassasalarda raqamli texnologiyalarni keng joriy etish davlat siyosatining ustuvor yo'nalishlaridan biriga aylangan. Bu borada AAT muhim vosita sifatida qaralmoqda.

Tadqiqotning maqsadi: tibbiy ko'rik jarayonlarini AAT orqali boshqarishning innovatsion metodikasini ishlab chiqish va uni amaliyotda joriy etishning asosiy bosqichlarini belgilash.

Tadqiqotning vazifalari: Tibbiy ko'rik jarayonlarini boshqarishning mavjud muammolarini tahlil etish; AATning funksional tuzilmasini va asosiy komponentlarini belgilash; Joriy etishning innovatsion metodikasini ishlab chiqish; Samaradorlik ko'rsatkichlarini baholash va tahlil etish.

ADABIYOTLAR TAHLILI VA METODOLOGIYA

Tibbiy axborot tizimlari sohasida olib borilgan tadqiqotlar shuni ko'rsatadiki (Shortliffe E.H., 2014; Bates D.W., 2019), elektron sog'liqni saqlash yozuvlarini (EHR) joriy etgan muassasalarda bemorlar bilan ishlash sifati sezilarli darajada oshgan. Xususan, AQShda olib borilgan keng ko'lamli tadqiqot natijalariga ko'ra, AAT joriy etilgan klinikalarda tibbiy xatolar soni 55% ga kamaygan.

Yevropa mamlakatlarida (Германия, Нидерландия, Finlyandiya) tibbiy axborotlashtirish sohasida o'tkazilgan empirik tadqiqotlar (van der Meijden M.J., 2003; Boonstra A., 2010) ko'rsatishicha, muvaffaqiyatli joriy etishning asosiy omili texnologiya tanlovidan ko'ra tashkiliy-metodologik yondashuvdir. Shu sababli, ushbu tadqiqotda texnologik va tashkiliy aspektlarning uyg'unligi asosiy metodologik tamoyil sifatida qabul qilingan.

O'zbekistonda tibbiy raqamlashtirish sohasidagi tadqiqotlar (Yusupov R., 2021; Xolmatova D., 2022) hali rivojlanish bosqichida bo'lib, mahalliy sharoitga moslashtirilgan innovatsion metodikalarning ishlanmasi zaruriyatini ko'rsatadi. Tadqiqotda quyidagi metodlar qo'llanilgan: tizimli tahlil, kuzatuv, ekspert baholash, statistik ma'lumotlar tahlili va tajriba-sinov usuli. Tajriba Toshkent shahrining 3 ta tibbiy muassasasida 2022-2024 yillar davomida o'tkazilgan.

AATning FUNKSIONAL TUZILMASI

Tizimning asosiy modullari. Tibbiy ko'rik jarayonlarini boshqarish uchun mo'ljallangan AAT quyidagi asosiy modullardan iborat:

Bemor registratsiyasi va boshqaruv moduli — bemorlarning shaxsiy ma'lumotlari, tibbiy tarixi va ko'rik jadvali.

Elektron tibbiy yozuv (ETY) moduli — shifokorlar xulosalari, tashxislar va dori-darmon buyurtmalari.

Laboratoriya va diagnostika moduli — tahlil natijalari, rentgen va MRT ma'lumotlarini boshqarish.

Jadval va navbat boshqaruvi moduli — onlayn qabul, avtomatik eslatmalar, resurslarni taqsimlash.

Hisobot va analitika moduli — real vaqt rejimida statistika, prognozlash va qaror qabul qilish qo'llab-quvvatlash.

Moliyaviy boshqaruv moduli — to'lovlar, sug'urta va budjet nazorati.

Tizimlararo integratsiya. AAT mustaqil tizim sifatida emas, balki mavjud tibbiy infratuzilma bilan integratsiya qilingan holda ishlaydi. Integratsiya yo'nalishlari:

1-jadval

Integratsiya ob'ekti	Integratsiya turi	Maqsad
MSSB (Milliy sog'liqni saqlash bazasi)	API integratsiya	Ma'lumotlar sinxronizatsiyasi
Farmatsevtika tizimlari	EDI protokol	Retsept va ta'minot nazorati
Sug'urta kompaniyalari	Web-xizmatlar	Avtomatik hisob-kitob
Laboratoriyalar (LIS)	HL7 FHIR standarti	Tahlil natijalari uzatish
PACS (Radiologiya)	DICOM protokol	Tibbiy tasvirlarni boshqarish

Davlat ro'yxatga olish (EGOV)	REST API	Fuqaro ma'lumotlari tekshiruvi

INNOVATSION JORIY ETISH METODIKASI

Metodikaning asosiy tamoyillari. Tadqiqot davomida ishlab chiqilgan innovatsion metodika uchta asosiy tamoyilga asoslanadi: insonmarkazlilik (tibbiy xodimlar va bemorlarning ehtiyojlarini birinchi o'ringa qo'yish), bosqichma-bosqich joriy etish (to'satdan o'tishdan qochib, izchil rivojlantirish) va doimiy takomillashtirish (PDCA sikli asosida tizimni yangilab borish).

Joriy etishning bosqichlari. Taklif etilayotgan metodika 5 ta asosiy bosqichdan iborat:

2-jadval

Bosqich	Nomi	Muddat	Asosiy faoliyat
1	Tayyorlov	1-2 oy	Holat tahlili, ehtiyoj aniqlash, loyiha rejasi
2	Dizayn va sozlash	2-3 oy	Tizim konfiguratsiyasi, mahalliylashtirish, test
3	Pilot joriy etish	3-4 oy	1-2 bo'limda sinov, xatolarni tuzatish
4	To'liq joriy etish	4-6 oy	Barcha bo'limlarda kengaytirish, o'qitish
5	Monitoring va takomillashtirish	Doimiy	KPI kuzatuv, yangilanishlar, qo'llab-quvvatlash

Xodimlarni tayyorlash tizimi. Muvaffaqiyatli joriy etishning eng muhim omili — xodimlarni sifatli tayyorlash. Metodikada 3 darajali o'qitish modeli taklif etiladi:
-Asosiy foydalanuvchi darajasi (barcha xodimlar, 8 soat): tizimga kirish, asosiy funksiyalar, xavfsizlik qoidalari.
-Mutaxassis darajasi (shifokorlar va o'rta tibbiy xodimlar, 24 soat): klinik modullar, ETY yuritish, tashxis protokollari.
-Administrator darajasi (IT xodimlar, 40 soat): tizim boshqaruvi, xavfsizlik sozlamalari, hisobot generatsiyasi.

Ma'lumotlar xavfsizligi va maxfiylik. Tibbiy ma'lumotlar maxfiyligi jihatdan eng yuqori himoya talablariga javob berishi lozim. Metodikada quyidagi xavfsizlik

choralari ko'zda tutilgan: ko'p faktorli autentifikatsiya (MFA), ma'lumotlarni AES-256 algoritmi bilan shifrlash, rolga asoslangan kirish nazorati (RBAC), barcha harakatlarni audit jurnaliga yozib borish va muntazam zaxira nusxalash (backup). Mazkur choralar O'zbekiston Respublikasining 'Shaxsga doir ma'lumotlar to'g'risida'gi Qonuniga hamda GDPR talablariga to'liq mos keladi.

TADQIQOT NATIJALARI VA MUHOKAMA

Miqdoriy ko'rsatkichlar. Toshkent shahrining 3 ta tibbiy muassasasida 24 oy davomida olib borilgan tajriba-sinov natijalari quyida keltirilgan:

3-jadval

Ko'rsatkich	AAT dan oldin	AAT dan keyin	O'zgarish
Bemor qabul qilish vaqti (o'rt.)	47 daqiqa	28 daqiqa	-40.4%
Hujjat yuritish vaqti	18 min/bemor	6 min/bemor	-66.7%
Tibbiy xatolar soni (oyiga)	23 holat	9 holat	-60.9%
Bemor mamnuniyat darajasi	67%	89%	+22 ball
Navbat kutish vaqti	52 daqiqa	34 daqiqa	-34.6%
Ma'lumot topish vaqti	8.4 daqiqa	1.2 daqiqa	-85.7%
Xodimlar ish samaradorligi	Bazaviy	+47%	+47%
Operatsion xarajatlar	Bazaviy	-28%	-28%

Ushbu natijalar xalqaro tadqiqotlar (Buntin M.B., 2011; Kruse C.S., 2016) bilan qiyoslaganda o'xshash yoki undan yuqori ko'rsatkichlarni namoyish etadi. Bu esa taklif etilgan metodikaning mahalliy sharoitga moslashuvchanligi va samaradorligini tasdiqlaydi.

Sifat ko'rsatkichlari. Miqdoriy ko'rsatkichlardan tashqari, muhim sifat o'zgarishlari ham qayd etildi: shifokorlar tashxis qo'yishda elektron ma'lumotnomalardan keng foydalana boshladi; bemorlar o'z tibbiy yozuvlariga

online kirish imkoniyatini yuqori baholadi; ma'muriy yuk kamayishi tufayli tibbiy xodimlar bemorlar bilan to'g'ridan-to'g'ri muloqotga ko'proq vaqt ajo'rata boshladi.

Muammolar va yechimlar. Joriy etish jarayonida bir qator muammolar kuzatildi va ular muvaffaqiyatli hal etildi:

4-jadval

Muammo	Sabab	Qo'llanilgan yechim
Xodimlar qarshiligi	O'zgarishdan qo'rquv	Ishtirokchilik strategiyasi, mentor tizimi
Internet uzilishi	Infratuzilma zaifligi	Oflayn rejim va lokal server
Ma'lumotlar ko'chirish	Eski formatlar	ETL vositalari va manual tekshiruv
Interfeys moslashuvi	Har xil qurilmalar	Responsive dizayn va mobil ilova
Xavfsizlik talablari	Yuqori standartlar	ISO 27001 sertifikatlash jarayoni

XULOSA

Ushbu tadqiqot tibbiy ko'rik jarayonlarini AAT orqali boshqarishning innovatsion metodikasini ishlab chiqish va sinab ko'rishga bag'ishlangan. Tadqiqot natijalari asosida quyidagi xulosalar chiqarildi:

Taklif etilgan 5 bosqichli innovatsion metodika tibbiy muassasalarda AATni muvaffaqiyatli joriy etishni ta'minlaydi va mahalliy sharoitga to'liq moslashtirilgan. AAT joriy etilishi tibbiy xodimlar samaradorligini o'rtacha 47% ga, bemorlar kutish vaqtini esa 35% ga kamaytiradi.

Insonmarkazli yondashuv va bosqichma-bosqich joriy etish tamoyili muvaffaqiyatning kalit omili hisoblanadi.

Ma'lumotlar xavfsizligini ta'minlash va xodimlarni sifatli tayyorlash tizimning barqaror ishlashini kafolatlaydi.

Tadqiqot natijalari O'zbekistondagi barcha darajadagi tibbiy muassasalarda qo'llash uchun tavsiya etiladi.

Kelajak tadqiqotlar uchun sun'iy intellekt va katta ma'lumotlar tahlilini AATga integratsiya qilish, shuningdek, masofaviy tibbiy xizmat ko'rsatish (telemedicine) imkoniyatlarini kengaytirish istiqbollarini o'rganish tavsiya etiladi.

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ФОРМИРОВАНИЕ НРАВСТВЕННОЙ КУЛЬТУРЫ УЧАЩИХСЯ

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Аннотация *В тезисе рассматриваются теоретико-методологические основания формирования нравственной культуры учащихся в условиях современной школы. Целью является выявление педагогических условий и механизмов, обеспечивающих устойчивую интериоризацию нравственных норм. Использованы анализ научных источников, моделирование и интерпретация педагогического опыта. Научная новизна состоит в уточнении структуры нравственной культуры и обосновании системно-деятельностной модели ее формирования.*

Ключевые слова *нравственная культура; ценностные ориентации; воспитательная среда; педагогические условия; личностное развитие; школьное сообщество; рефлексия.*

Аннотация *The thesis explores theoretical and methodological foundations of students' moral culture formation in contemporary schooling. The aim is to identify pedagogical conditions and mechanisms that ensure stable internalization of moral norms. Methods include literature analysis, pedagogical modeling, and interpretation of educational practice. Scientific novelty lies in уточнении structural components of moral culture and substantiation of a systemic activity-based model for its development.*

Keywords *moral culture; value orientations; educational environment; pedagogical conditions; personal development; school community; reflection.*

Аннотация *Ushbu tezisda o'quvchilarda axloqiy madaniyatni shakllantirishning nazariy va metodologik asoslari tahlil qilinadi. Maqsad axloqiy me'yorlarni barqaror ichkilashtirishni ta'minlaydigan pedagogik shartlar va mexanizmlarni aniqlashdir. Tadqiqotda manbalar tahlili, modellashtirish va pedagogik tajribani talqin qilish usullari qo'llanadi. Yangilik axloqiy madaniyat tuzilmasini aniqlashtirish va modelni asoslashdan iborat.*

Kalit so‘zlar *axloqiy madaniyat; qadriyat yo‘nalishlari; tarbiyaviy muhit; pedagogik shartlar; shaxsiy rivojlanish; maktab hamjamiyati; refleksiya.*

Проблема формирования нравственной культуры учащихся сохраняет методологическую актуальность в педагогике, поскольку она относится к сфере устойчивых личностных регуляторов поведения и одновременно проявляется как социально-образовательный результат, поддающийся целенаправленному формированию в процессе обучения и воспитания. В рамках специальности 13.00.01 нравственная культура рассматривается не как сумма декларативных знаний о «хорошем» и «плохом», а как интегральное качество личности, включающее ценностные ориентации, моральные представления, способность к нравственному суждению, привычные формы саморегуляции, опыт ответственного поступка и готовность к диалогу с Другим. Такое понимание позволяет преодолеть распространенную редукцию воспитания к информированию или к контролю дисциплины и переводит акцент на внутренние механизмы интериоризации норм, на связь между ценностью, мотивом и действием, что соответствует культурно-историческому и деятельностному ракурсам анализа личности [2; 3].

Теоретическая рамка исследования опирается на различение «нравственности» как внутреннего измерения мотивации и «морали» как совокупности общественно признанных норм. Для педагогики принципиально важно, чтобы усвоение норм не исчерпывалось внешней конформностью; устойчивый результат достигается тогда, когда учащийся способен обосновывать выбор, видеть последствия поступка, соотносить ситуативные желания с более общими ценностями и принимать ответственность. В этом смысле нравственная культура выступает как система, где когнитивный компонент (знания о нормах и социальных ожиданиях) должен быть сопряжен с ценностно-смысловым (личная значимость норм) и поведенческо-волевым (навык следовать принятому решению). Подобная трехкомпонентная структура методологически продуктивна, поскольку позволяет проектировать

педагогические воздействия не «в целом на личность», а на связки компонентов и их согласование, избегая морализаторства и формализма, часто блокирующих воспитательный эффект.

Анализ исследований показывает, что ключевой трудностью в школьной практике является разрыв между провозглашаемыми ценностями и реальным социальным опытом учащихся. Если школьная среда транслирует требования, не подкрепленные справедливыми правилами, уважительным общением и последовательностью взрослых, учащийся формирует прагматические стратегии адаптации, а не нравственные основания поведения. Следовательно, нравственная культура требует экологичности воспитательной среды, где нормы переживаются как разумные и применимые, а не как инструмент давления. Данная позиция корреспондирует с идеей воспитания как организации деятельности и общения, в которых ценности становятся личностными смыслами [3], а также с современными представлениями о школьном климате как факторе профилактики девиантных проявлений и усиления учебной мотивации [6].

Методологически значимым является принцип единства обучения и воспитания, который в реальной организации образовательного процесса проявляется через насыщение учебных дисциплин этическими смыслами и социально значимыми контекстами без подмены предметного содержания моральными декларациями. В гуманитарных дисциплинах это может реализовываться через анализ нравственных коллизий в текстах, в естественно-научных через обсуждение ответственности в использовании знаний, в математике и информатике через культуру интеллектуальной честности, проверяемость аргументации и уважение к правилам доказательства. Однако межпредметная интеграция должна быть педагогически тактичной: нравственный смысл обнаруживается в логике учебной задачи и в способе взаимодействия, а не навязывается извне. Установлено, что наиболее продуктивны ситуации, когда учащийся

встречается с необходимостью выбора и может обсудить основания решения в рефлексивном диалоге, получая поддержку в формировании морального суждения [1; 4].

Важнейшим условием формирования нравственной культуры выступает субъектная позиция учащегося. Если воспитание строится как одностороннее предъявление требований, то ученик остается объектом воздействия, а внутренняя мотивация не формируется. Напротив, субъектность проявляется в участии в выработке правил класса, в распределении ролей при выполнении общих проектов, в обсуждении конфликтов и поиске справедливых решений. Подчеркнем, что речь идет не о снятии педагогической ответственности, а о педагогически организованной совместности, где взрослый задает рамки безопасности и ценностные ориентиры, но предоставляет пространство для самостоятельных действий и их оценки. Такой подход согласуется с деятельностной трактовкой развития, согласно которой новые личностные качества возникают как результат освоения способов действия и общения в значимых ситуациях [2].

С опорой на обобщение педагогического опыта и анализ литературы предлагается системно-деятельностная модель формирования нравственной культуры учащихся, включающая целевой, содержательный, процессуальный и оценочно-результативный блоки. Целевой блок фиксирует переход от внешнего соблюдения норм к внутренне принятой ответственности; содержательный блок раскрывает ценностные основания школьной жизни (уважение достоинства, справедливость, честность, взаимопомощь) как нормы практики, а не лозунги; процессуальный блок описывает механизмы: нравственно ориентированный диалог, совместную деятельность с общественно полезным результатом, рефлексию поступков и последствий, поддержку эмпатии и навыков ненасильственного разрешения конфликтов; оценочно-результативный блок задает критерии, позволяющие отслеживать динамику без сведения воспитания к формальному «учету мероприятий».

Принципиальным является включение рефлексии как регулярной педагогической процедуры: учащийся учится соотносить свои решения с нормой и последствиями, видеть альтернативы, признавать ошибки и корректировать поведение. Это усиливает волевой компонент нравственной культуры, превращая ценность в практическое правило саморегуляции.

Оценка сформированности нравственной культуры требует методологической осторожности, поскольку прямое измерение ценностей затруднено и может провоцировать социально желаемые ответы. Поэтому обоснованным является использование совокупности косвенных показателей: устойчивость норм в различных ситуациях, способность аргументировать нравственный выбор, качество взаимодействия в группе, готовность к ответственности за общее дело, проявления честности в учебных практиках. Такие показатели должны фиксироваться через наблюдение, анализ продуктов деятельности, педагогические ситуации выбора, интервью и рефлексивные тексты, что повышает валидность выводов. Важно также различать возрастные уровни: для младшего подросткового возраста значима поддержка норм через ролевые модели и эмоционально окрашенный опыт справедливости, для старшего подросткового возраста возрастает роль мировоззренческих оснований, дискуссии и автономии морального суждения [4; 6]. Следовательно, педагогические условия не могут быть универсальными; они нуждаются в адаптации к возрасту, контексту класса и особенностям школьной культуры.

Отдельного анализа требует роль педагога как носителя нравственной культуры и организатора среды. Нравственная позиция учителя проявляется не только в личном примере, но и в профессиональной справедливости: прозрачности требований, уважении к личности ученика, последовательности решений, готовности признавать педагогические ошибки. При нарушении этих принципов воспитательное воздействие становится противоречивым и теряет доверие как необходимое условие интериоризации ценностей. В

исследованиях подчеркивается, что доверие формируется через ежедневные микропрактики общения и совместной деятельности, где ребенок переживает опыт признания и ответственности, а не через эпизодические «воспитательные мероприятия» [5]. В этом контексте классный руководитель и предметники должны действовать согласованно, формируя единую систему норм и ожиданий, иначе ученик сталкивается с множественностью несогласованных правил и выбирает ситуативно выгодные стратегии.

Существенным ресурсом выступает школьное сообщество как пространство социальных практик. Ученическое самоуправление, проектная деятельность, волонтерские и социально полезные инициативы (в рамках образовательных целей и возрастной адекватности) создают ситуации реального морального выбора, где ответственность не симулируется, а переживается. Однако эффективность таких форм зависит от педагогического сопровождения: без рефлексии и анализа мотивов деятельность может остаться внешней активностью. Поэтому в модели акцентируется связка «дело и смысл»: общественно значимый результат должен сопровождаться обсуждением того, какие нормы проявились, какие трудности возникли, как распределялась ответственность и как решались конфликты. Именно эта связка обеспечивает переход от эпизодического опыта к элементам нравственной культуры как устойчивого личностного качества.

Заключение. Формирование нравственной культуры учащихся в современной школе целесообразно понимать как системный педагогический процесс, обеспечивающий согласование знаний о нормах, ценностных смыслов и поведенческой саморегуляции. Обосновано, что устойчивый результат достигается при создании справедливой и доверительной воспитательной среды, при опоре на субъектную позицию учащихся и при включении регулярной рефлексии нравственного выбора в учебную и внеучебную деятельность. Предложенная системно-деятельностная модель позволяет проектировать педагогические условия и критерии оценки

динамики, минимизируя формализм и усиливая связь между ценностью и поступком как ключевым показателем нравственной культуры.

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ЦИФРОВАЯ КОМПЕТЕНТНОСТЬ И ГРАМОТНОСТЬ: СТАНДАРТЫ ДЛЯ РУКОВОДИТЕЛЕЙ И ПРЕПОДАВАТЕЛЕЙ ВЫСШИХ УЧЕБНЫХ ЗАВЕДЕНИЙ

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***Аннотация**. В статье рассматривается различие между цифровой грамотностью и цифровой компетентностью руководителей и преподавателей высших учебных заведений. Обосновано, что цифровая грамотность обеспечивает базовый уровень*

владения технологиями, тогда как цифровая компетентность связана со способностью к управлению цифровыми изменениями и трансформацией образовательной среды. На основе международных рамок (UNESCO ICT-CFT, DigCompEdu) и национальных нормативных документов предложена структура ключевых компетенций и уровни их развития. Представлены индикаторы оценки и инструменты подтверждения компетенций. Сделан вывод о необходимости перехода от инструментального подхода к системному развитию цифровых компетенций в ВУЗе.

***Ключевые слова**: цифровая компетентность, цифровая грамотность, высшее образование, цифровая трансформация, управление образованием, преподаватель, цифровое лидерство, DigCompEdu.*

***Abstract**. The article examines the distinction between digital literacy and digital competence of university leaders and teachers. It is argued that digital literacy provides a basic level of technology use, while digital competence involves the ability to manage digital transformation and integrate technologies into educational and managerial practices. Based on international frameworks (UNESCO ICT-CFT, DigCompEdu) and national regulations, a structured model of key competencies and their levels is proposed. Indicators for assessment and validation tools are presented. The study highlights the need to shift from instrumental use of technologies to a systemic approach to digital competence development in higher education institutions.*

***Keywords:** digital competence, digital literacy, higher education, digital transformation, education management, teacher, digital leadership, DigCompEdu*.

ВВЕДЕНИЕ

Цифровая трансформация высшего образования определяется уровнем подготовки управленческих и педагогических кадров. Цифровая грамотность представляет собой базовый уровень владения технологиями и включает навыки работы с информацией, цифровыми сервисами и образовательными платформами. Она является необходимым условием профессиональной деятельности, но не обеспечивает способности к управлению изменениями. Цифровая компетентность отражает более высокий уровень, связанный с осмысленным применением технологий, принятием решений и интеграцией цифровых решений в образовательную и управленческую практику.

Основная часть. Для системы высшего образования Узбекистана принципиально важно разграничение данных понятий: цифровая грамотность обеспечивает базовую готовность, а цифровая компетентность — развитие и трансформацию образовательной системы (Таблица 1).

Таблица 1. Сравнительная характеристика цифровой грамотности и цифровой компетентности

Критерий сравнения	Цифровая грамотность	Цифровая компетентность
Уровень владения	Базовый	Продвинутый, системный
Основной фокус	Использование цифровых инструментов	Осмысленное применение технологий в профессиональной деятельности
Характер навыков	Операционный (работа с сервисами, платформами)	Стратегический и аналитический
Тип деятельности	Выполнение заданных операций	Принятие решений и управление изменениями
Отношение к технологиям	Технологии как инструменты	Технологии как фактор трансформации процессов
Контекст применения	Повседневная учебная и административная работа	Управление образовательными, научными и управленческими процессами
Учет рисков и этики	Как правило, отсутствует или минимален	Обязательный учет этических, правовых и социальных последствий
Роль в цифровой трансформации	Необходимое условие	Ключевой фактор успешной трансформации
Значение для руководителя	Позволяет работать в цифровой среде	Позволяет формировать и реализовывать цифровую стратегию

Анализ представленных различий показывает, что переход от цифровой грамотности к цифровой компетентности носит не количественный, а качественный характер. Он связан не с расширением набора используемых

инструментов, а с изменением логики профессиональной деятельности. В условиях цифровой трансформации образовательной системы это означает переход от исполнения заданных процедур к управлению образовательными и организационными процессами на основе данных и цифровых решений. Таким образом, цифровая компетентность выступает не продолжением грамотности, а новой управленческой и педагогической парадигмой.

В международной практике требования к цифровой компетентности формируются на основе рамочных моделей. На основе UNESCO ICT-CFT [1] и национальных нормативных документов [2] выделяются ключевые направления компетентности руководителя:

1. Стратегическое управление — интеграция цифровых технологий в развитие университета.
2. Управление данными — использование аналитики для принятия решений.
3. Цифровое лидерство — формирование культуры изменений.
4. Этические и правовые аспекты — обеспечение безопасности и нормативного соответствия.

Представленные направления компетентности отражают переход от административного управления к управлению развитием. Руководитель в цифровой среде выступает не только организатором процессов, но и субъектом изменений, обеспечивающим согласование стратегических целей, технологических решений и кадрового потенциала. Это требует формирования системного видения и способности работать в условиях неопределенности. Пример представлен в таблице 2.

Таблица 2. Индикаторы оценки руководящих кадров ВУЗов

Уровень компетентности	Поведенческий индикатор (Кейс: Работа с HEMIS)
Начальный	Использует бумажные отчеты
Базовый	Просматривает данные в системе
Стратегический	Использует аналитику для принятия решений

Цифровая компетентность преподавателя связана с качеством образовательного процесса и проявляется в способности интегрировать технологии в педагогическую деятельность.

Для ее описания используется уровневый подход на основе DigCompEdu [3].

Таблица 3. Уровни цифровой компетентности преподавателя

Уровень и название	Фокус внимания	Индикаторы (Что делает преподаватель)	Результат для процесса
1. Базовый (Цифровая грамотность)	Использование инструментов	-Уверенная работа с LMS (загрузка ресурсов); -Проведение видеолекций (Zoom); -Использование мессенджеров; -Базовая кибербезопасность.	Замена аналоговых инструментов цифровыми без существенного изменения методики.
2. Продвинутый (Педагогическая интеграция)	Методика и качество	-Смешанное обучение (Blended Learning); -Интерактивное оценивание (Kahoot); -Создание авторского видеоконтента; -Групповая работа в облаке.	Технологии повышают вовлеченность студентов и объективность оценивания.
3. Экспертный (Цифровая трансформация)	Инновации и наставничество	-Проектирование цифровых экосистем; -Аналитика данных для персонализации; -Разработка МООК; -Консультация коллег.	Создание принципиально новых образовательных продуктов и знаний.

Переход между уровнями цифровой компетентности преподавателя связан с изменением роли технологии в образовательном процессе: от вспомогательного инструмента к средству трансформации педагогической

практики. Это предполагает переосмысление методов обучения, форм взаимодействия со студентами и подходов к оцениванию результатов.

Развитие цифровой компетентности должно быть ориентировано на образовательные результаты, а не на количество используемых инструментов. В международной практике рамочные модели применяются как инструменты оценки и развития. В условиях высшего образования Узбекистана важную роль начинают играть гибкие формы подтверждения компетенций, включая цифровые портфолио и микросертификаты.

На уровне университета используются инструменты оценки (самооценка, экспертиза курсов, анализ портфолио), позволяющие связать развитие компетенций с качеством образовательных результатов.

Заключение. Цифровая компетентность руководителей и преподавателей является ключевым фактором развития высшего образования в условиях цифровой трансформации. Ее формирование требует перехода от инструментального использования технологий к их осмысленной интеграции в образовательную и управленческую практику.

Развитие цифровых компетенций должно рассматриваться как непрерывный процесс, включенный в систему повышения квалификации и кадрового развития. Только при таком подходе возможно обеспечить устойчивое развитие университетов и повышение качества образования в цифровой среде.

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INNOVATIVE SOLUTIONS FOR THE USE OF AERATED CONCRETE BLOCKS IN RESIDENTIAL BUILDINGS.

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Annotation: *This dissertation presents the results of theoretical and practical studies of thermal physics in the example of aerated concrete exterior walls in order to increase the performance characteristics and energy efficiency of aerated concrete exterior barrier structures of residential buildings. The study determined the total heat transfer resistance of the aerated concrete exterior wall sample of residential buildings, the thermal conductivity of the wall layers, the heat flux through the wall, the temperature in the wall layers and the heat resistance of the wall for summer and winter. Comparing with the theoretical thermal-physical and practical studies of the wall model, recommendations were developed to increase the thermal protection of the outer walls of buildings built on the basis of modern projects.*

Key words: *residential buildings, heat is transferred, thermal physics, Construction, aerated concrete, Multi-porous, Complete gas block.*

INTRODUCTION

In Uzbekistan, in order to save energy reserves of natural fuel, increasing the thermal protection of exterior walls of buildings, the construction of energy-efficient buildings using non-traditional, renewable energy sources is one of the topical issues. As a result of the research it is necessary to give practical recommendations on thermophysical improvement of external walls consisting of small multi-hollow gas concrete blocks in civil and industrial buildings, previously not studied for the conditions of Uzbekistan, and increase their energy efficiency. Therefore, in the laboratory of the department "Design of buildings and structures" SamSACU and in cooperation with LLC "AGROMIR BUILDINGS" in Qorasuv massive of Samarkand prepared small gas concrete blocks with many cavities, the outer wall of them is set model, conducted theoretical studies and practical experiments in terms of thermal physics. In a small block were carried out thermophysical theoretical studies of the number, size, shape and location of holes. External barriers increase the energy efficiency of structures if small blocks with several or more layers of free air, such as lightweight concrete, ceramic bricks and aerated concrete, are used as external barriers. The smaller the size of the air layers in a small block and the greater the number of these layers, the better its thermal properties. Because the amount of heat from the empty layers of air passes not only through thermal conductivity, but also through radiation and convection. In addition, in the case of small voids in the material, the heat transfer coefficient of air is small. For the thermal and physical substantiation of this theory, we have developed several types of calculation schemes for shallow block aerated concrete with 12, 18 and 36 air layers. We recommend the size of aerated concrete blocks 600x300x300 mm and 600x300x250 mm (Fig. 1), and this block is made from local materials. Thermal physical properties of such blocks, including heat transfer resistance and thermal conductivity coefficient, for the conditions of Uzbekistan and thermal justification

have not been studied. In addition, it has not been studied whether the heat transfer resistance and heat transfer coefficients of the outer wall reconstructed from these blocks with thermal insulation installed on the outer surface depend on the number of these empty small cavities. These structures consist of heterogeneous materials arranged perpendicularly or parallel to the direction of heat flow. Thermal calculation of heterogeneous structures is determined in the following order: We partition the structure into separate layers by cutting it with a plane parallel to the direction of the heat flux (Fig. 1). The average heat transfer resistance of this structure is determined by the following formula (1).

$$R_{II} = \frac{F_I + F_{II} + F_{III} + \dots}{\frac{F_I}{R_I} + \frac{F_{II}}{R_{II}} + \frac{F_{III}}{R_{III}} + \dots} \qquad (1)$$

Here R_I, R_{II}, R_{III} are the average heat transfer resistance of the given structure. F_I, F_{II}, F_{III} are the surfaces of individual layers.

The average heat transfer coefficient for heterogeneous parts of a small block is determined by the following formula (2):

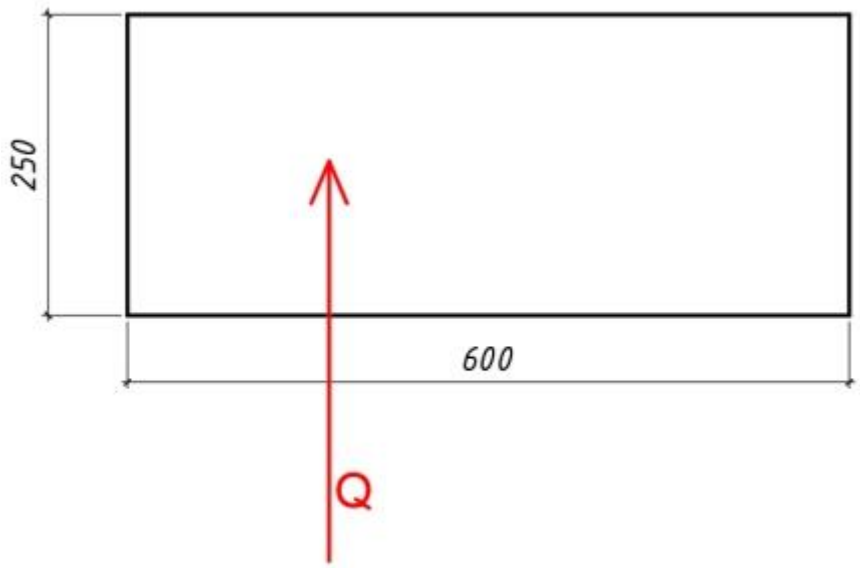
$$\lambda_{\ddot{y}p} = \frac{\lambda_I \times F_I + \lambda_{II} \times F_{II} + \lambda_{III} \times F_{III}}{F_I + F_{II} + F_{III}} \qquad (2)$$

Here λ_I, λ_{II}, λ_{III}..... are the thermal conductivity of the materials of which individual layers are composed; F_I, F_{II}, F_{III} are the surfaces of individual layers.

If an exterior wall made of a small multi-cavity block is cut by planes parallel and perpendicular to the heat flow, and thermophysical calculations are performed, the calculations become more complicated by increasing the planes. Therefore, for practical calculations, it is possible to determine the average heat transfer coefficient

of a single multi-cavity subblock, and to determine the thermal transfer resistance of a single exterior wall consisting of this subblock [1,2] .

To determine the heat transfer resistance and heat transfer coefficients of small blocks of multi-cellular aerated concrete, we first perform the thermophysical calculation of the exterior wall of a 16-story apartment building under construction in the Qorasuv massive.



The calculation scheme of the complete aerated concrete is shown in Figure1.

$Density;\ \gamma_o = 600\frac{kg}{m^3}$, $heat\ transfer\ coefficient\ ;\ \lambda = 0.22\ Vt/m^oC$,

Dimensions 600x300x250mm

Figure 1. Diagram of a complete aerated concrete block.

Calculate the heat transfer resistance:

$$R_\tau = \frac{\delta}{\lambda} = \frac{0.25}{0.33} = 0{,}757\ m^2\,^oC/Vt$$

Determine the total heat transfer resistance:

$R_u = R_i + R + R_t = 0{,}115 + 0{,}757 + 0{,}039 + 0{,}028 + 0{,}043 = 0{,}982\ м^2\,^oC/Вт$

On the outer surface of the wall is laid a thermal insulation layer, consisting of monolithic gas block, rigid mineral wool boards with synthetic and bituminous binder. We determine the total thermal resistance of the outer wall of this house under construction in Qorasuv:

$R_u = R_i + R + R_t = 0{,}115 + 0{,}757 + 0{,}039 + 0{,}892 + 0{,}043 = 1{,}846$ $m^2 \cdot °C/Vt$

Thus, for the second and third levels of thermal protection of residential buildings over 3 floors, listed in QMQ 2.01.04-18, the thermal resistance of the outer walls is 2,2 and 2,6 (⟦ m⟧^(2 o) C)/Vt. As can be seen from the above calculations, the thermal protection of the buildings under construction is insufficient and does not meet the requirements of QMQ.

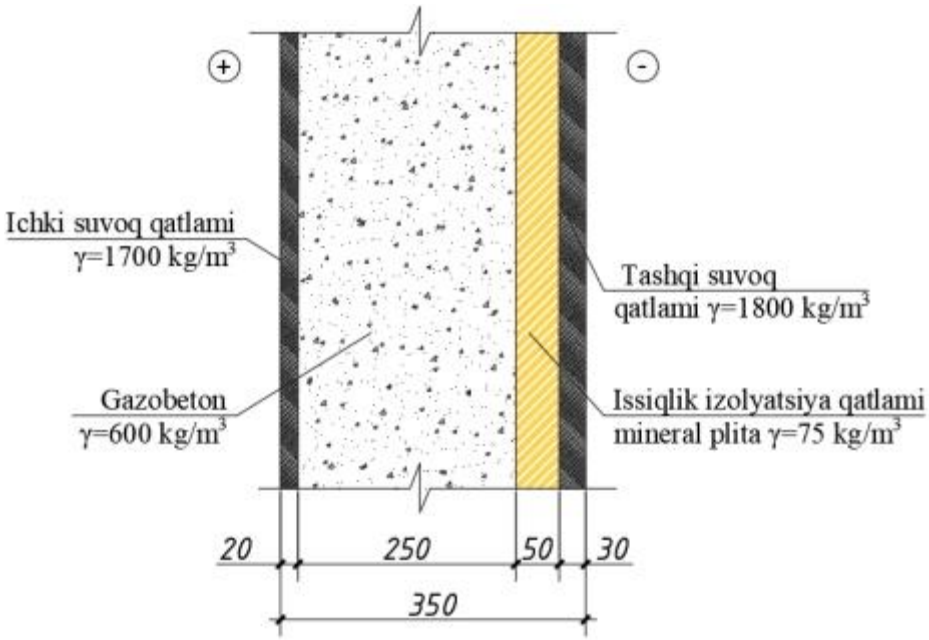


Figure 2. A thermal insulation layer is placed on the outside of the continuous aerated concrete wall.

Therefore, to improve the energy efficiency of residential buildings under construction, we have developed schemes of blocks consisting of small aerated concrete blocks at the expense of thermal and physical improvement of their outer walls. Their calculation scheme consists of heterogeneous aerated concrete blocks

with 12, 18 and 36 holes. The calculation diagrams are shown in Figs. 3 and 4 below. Thermal calculation of a small aerated concrete block with twelve holes.

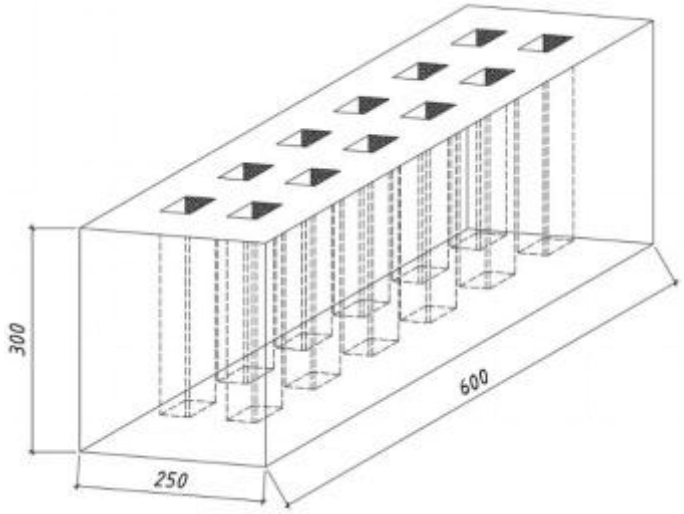


Figure 3. Scheme of making a block of fine aerated concrete with twelve holes.

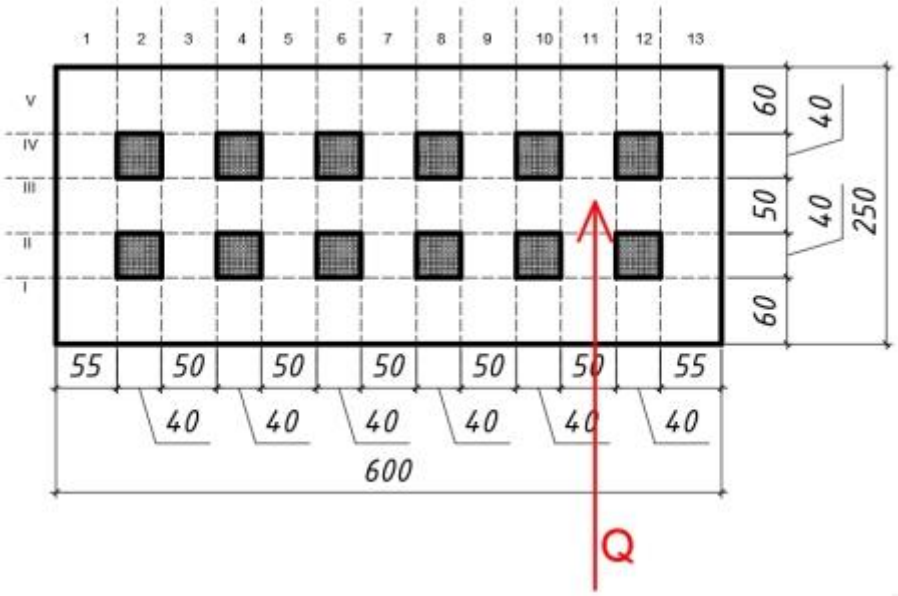


Figure 4. Calculation diagram of a small aerated concrete block with twelve holes.

1.We divide the small block into separate parts cutting it along the plane parallel to the heat flow.

The thickness of the holes is 40 mm. Two edges 55mmx2=110mm. Square of gas concrete 50mmx5=120 mm. L=240+110+250 = 600 mm.

Part I $R_I = \frac{0.250}{0.22} = 1{,}136 \frac{m^2\,^oC}{Vt}$, $F_I = 0{,}055\ m^2$

Part II consists of aerated concrete and 2 layers of free air.

$$R_{II} = \frac{0.22}{0.22} + 0.14x2 = 1.28\ м^2\,^oC/Vt\ ,\quad F_2 = 0{,}04\ m^2$$

Part III $R_{III} = \frac{0.25}{0.22} = 1{,}136 m^2\,^oC/Vt$, $F_3 = 0{,}05\ m^2$

The rest of the gas block consists of the same structure.

The heat transfer resistance is determined by the following formula:

$$R_{II} = \frac{0{,}055 + 0{,}04 + 0{,}05}{\frac{0{,}055}{1{,}136} + \frac{0{,}04}{1{,}28} + \frac{0{,}05}{1{,}136}} = \frac{0{,}145}{0{,}048 + 0{,}031 + 0{,}044} = 1{,}179\ m^2\,^oC/Vt$$

Divide the block into 1, 2, 3, 4 and 5 layers, cutting it with a plane perpendicular to the direction of heat flow. Determine the heat transfer resistance of layers 1, 3, 5:

$$R = \frac{0.06}{0.22} x2 + \frac{0,05}{0,22} = 0,545 + 0,227 = 0,772\ м^2\,°C/Vt$$

$$\lambda = \frac{\delta}{R} = \frac{0.04}{0.15} = 0.266\ Vt$$

The 2nd and 4th layers consist of aerated concrete and layers of free air. Therefore, the average heat transfer coefficient for this layer is determined by the following formula:

$$\lambda_{o'rt} = \frac{0.22x0,055 + 0.28x0,04 + 0,22x0,05}{0,145} = \frac{0,0443}{0,145} = 0,305\ Vt$$

In that case

$$R = \frac{0.25}{0.305} = 0,819\ м^2\,°C/Vt$$

$$R_{\perp} = 0,772 + 0,819 = 1,591\ м^2\,°C/Vt$$

$$R = \frac{R_{II} + 2R_{\perp}}{3} = \frac{1,179 + 2x1,591}{3} = \frac{4,362}{3} = 1,454\ m^2\,°C/Vt$$

Determine the total heat transfer resistance of the outer wall of cellular aerated concrete:

$R_u = R_i + R + R_t = 0,115 + 0,028 + 1,454 + 0,039 + 0,043 = 1,679$

$m^2\,°C/Vt$

From the thermophysical calculations it is found that the thermal resistance of the outer walls for the second and third level of thermal protection for residential buildings with more than 3 floors specified in QMQ2.01.04-18 is 2.2 and 2.6 (m^2 ^0C)/W. As can be seen from the above calculations, the thermal protection of this wall is not sufficient and does not meet the requirements of QMQ. Therefore, on the outer surface of the wall, consisting of 12-grain gas blocks, we lay a thermal insulation layer of solid mineral boards with synthetic and bituminous binder. Its calculation scheme is shown in Figure 5 below.

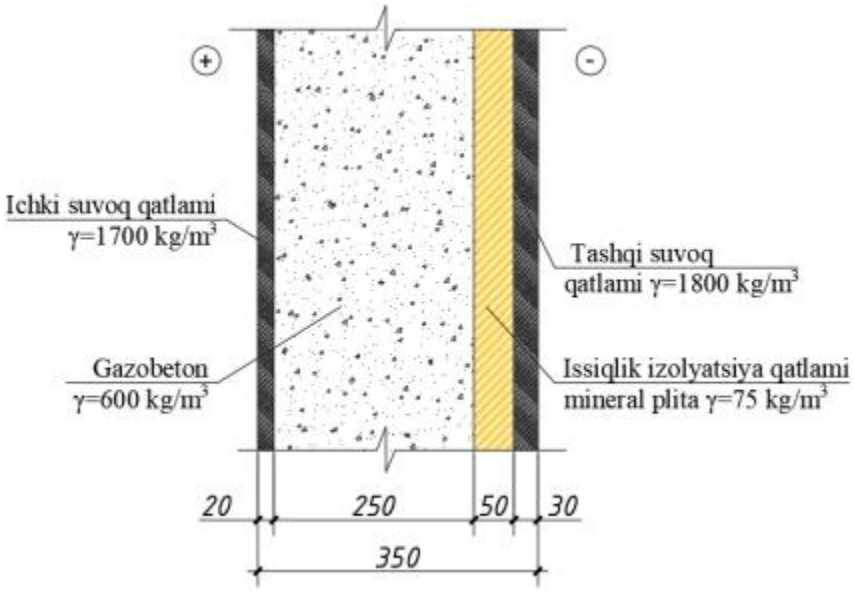


Figure 5. Averaged calculation diagram of the synthetic bituminous binder thermal insulation layer from the exterior surface of the wall consisting of 12cavity gas blocks.

We determine the total heat transfer resistance of the outer wall of this building:

$$R_u = R_i + R_1 + \ldots + R_n + R_t = R_i + \frac{\delta_1}{\lambda_1} + \frac{\delta_2}{\lambda_2} + \ldots + \frac{\delta_n}{\lambda_n} + R_t$$

$$R_u = 0{,}115 + 0{,}039 + 1{,}454 + 0{,}892 + 0{,}039 + 0{,}043 = 2{,}581 = 2{,}6 \quad m^2\,^oC/Vt$$

From the thermophysical calculations it was found that the thermal resistance of the outer walls for the second and third levels of thermal protection for residential buildings with more than 3 floors, listed in QMQ2.01.04-18, is 2.2 and 2.6. (m^2 ^0C)/W. As can be seen from the above calculations, the thermal protection of this wall is sufficient and meets the requirements of the QMQ.

But in order to verify whether the above theoretical studies are close to the truth, it is necessary to conduct thermal-physical practical research on the mentioned samples of walls under laboratory conditions.

As a result of the research theoretically developed a structural solution for the design of exterior walls of aerated concrete blocks for residential buildings, previously not studied for the conditions of Uzbekistan. The results of theoretical research should be based on the results of practical thermophysical research. For this reason, the professor of department "Design of buildings and constructions" SamSACU, candidate of technical sciences, under the leadership of Shukurov, the wall blocks consisting of aerated concrete were tested in the laboratory of the department. The blocks, consisting of gas concrete blocks with a density of 800-1000 kg/m3 and size 600x300x250 mm, were installed in a microcamera in the laboratory SamSACU of the department "Design of buildings and structures. Thermal sensors were installed between the layers of blocks. The size of the sample installed on the walls of the gas concrete blocks is 600x1200 mm. and conducted experiments on a sample of exterior walls made of gas concrete blocks with a density of 800-1000 kg/m3. The experiments were conducted in accordance with the requirements of “Uzstandard” agency 809-97 "Determination of thermal resistance of enclosing structures" and GOST 10-2-81 "Methods of testing the insulating properties and air permeability of enclosing structures in buildings" (1.3.4.)

Two types of barrier structures, with the same temperature and humidity conditions in the room from the inside are selected for testing.

To measure the density of heat flux passing through the enclosing structure, we used means of measuring heat fluxes ITP-11 according to GOST 25380 [3].

As the primary transducers for measuring temperature are used thermoelectric transducers (thermometers) according to GOST 3044, consisting of chromel, copper and wire according to GOST 1790. DC potentiometers or millivoltmeters, which can provide an error of measurement of not more than ±0,002 Mb, are used as secondary measuring devices, working with heat exchangers and thermometers. To determine the moisture content of the materials of the enclosing structures, the measuring instruments specified in GOST 24816 are used.

Thermophysical practical classes were held in the laboratory building of the SamSACU Department of Buildings and Structures. In May 2023, a sample of aerated concrete blocks was installed in the microclimatic chamber of this building. Thermophysical practical experiments on the sample built-in wall were conducted from May 25 to 29, 2023. As a result of the experiments on the main thermophysical indicators were determined:

1. Temperature in the layers of walls made of aerated concrete blocks; 2. Temperature in the room where the experiment is conducted; 3. Temperature of the outside air; 4. Heat flow (amount) through the sample wall; 5. Heat transfer coefficient of the materials of the layers that make up the exterior wall.

According to the parameters obtained from practical experiments, thermophysical calculations were carried out in the following order:

The heat transfer resistance of the barrier structure was calculated by the following formula:

$$R = R_B + R_K + R_H = \frac{t_B + \tau_H}{q_\Phi} + \frac{\tau_K + \tau_H}{q_\Phi} + \frac{\tau_H + t_H}{q_\Phi} \qquad (3)$$

where $R_в$ and $R_н$ n are the heat transfer resistance of the internal and external surfaces of the barrier structure respectively, ($м^{2°}C$)/ Vt;

$R_к$ - is the thermal resistance of one type of zone of the barrier structure,

$t_в$ and $t_{н-}$ are the values of measurements of internal and external air temperature respectively for the calculation period, ^{0}C;

τ_B va τ_H - are the values of measurements of internal and external surfaces for the accounting period, ^{0}C;

$q_{ф-}$ is the average real heat flux density for the accounting period, , Vt/$м^2$;

The thermal resistance of individual layers of the barrier structure is determined by the following formula;

$$R_{c\Delta} = \frac{\Delta\tau}{q_ф} \qquad (4)$$

$\Delta\tau$ here - temperature difference at the boundaries of the layers, ^{0}C;

To compare the actual values of the thermal conductivity of the materials used in the structure with the calculated values, the thermal conductivity of the layer material is determined by the following formula.

$$\lambda = \frac{\delta}{R_{c\Delta}} \qquad (5)$$

δ here - layer thickness, m.

The results of temperature measurements in the layers of the wall sample (for the winter period) are presented in Appendix 1. Using this appendix, we determine the thermal resistance of the individual layers of the wall sample using the formula given above:

$$R_{И} = \frac{t_{H} - \tau_{H}}{q_{ф}} = \frac{21{,}53 - 20{,}09}{5{,}93} = 0{,}243 \quad (м^{2°}C)/\text{Vt};$$

$$R_1 = \frac{0{,}34}{5{,}93} = 0{,}057 \quad (м^{2°}C)/\text{Vt}; \qquad R_2 = \frac{0{,}56}{5{,}93} = 0{,}094 \quad (м^{2°}C)/\text{Vt};$$

$$R_3 = \frac{2{,}9}{5{,}93} = 0{,}489 \quad (м^{2°}C)/\text{Vt}; \qquad R_4 = \frac{1{,}57}{5{,}93} = 0{,}265 \quad (м^{2°}C)/\text{Vt};$$

$$R_5 = \frac{8{,}68}{5{,}93} = 0{,}663 \quad (м^{2°}C)/\text{Vt}; \qquad R_6 = \frac{6{,}61}{5{,}93} = 1{,}115 \quad (м^{2°}C)/\text{Vt};$$

$$R_7 = \frac{0{,}48}{5{,}93} = 0{,}081 \quad (м^{2°}C)/\text{Vt}; \qquad R_т = \frac{0{,}1}{5{,}93} = 0{,}017 \quad (м^{2°}C)/\text{Vt};$$

$$\sum R_{ум} = 3{,}02 \quad (м^{2°}C)/\text{Vt};$$

Thermal - the relative error of heat transfer resistance, determined as a result of physical experiments, compared with the calculated heat transfer resistance did not exceed 8 % with probability of reliability.

As a result of the experiment, we determine the thermal conductivity coefficients of the materials of the structural layer:

$$R_И = \frac{t_H - \tau_H}{q_ф} = \frac{21{,}53 - 20{,}09}{5{,}93} = 0{,}243 \quad (м^{2°}C)/\text{Vt};$$

$$R_1 = \frac{0{,}34}{5{,}93} = 0{,}057 \quad (м^{2°}C)/\text{Vt}; \qquad R_2 = \frac{0{,}56}{5{,}93} = 0{,}094 \quad (м^{2°}C)/\text{Vt};$$

$$R_3 = \frac{2{,}9}{5{,}93} = 0{,}489 \quad (м^{2°}C)/\text{Vt}; \qquad R_4 = \frac{1{,}57}{5{,}93} = 0{,}265 \quad (м^{2°}C)/\text{Vt};$$

$$R_5 = \frac{8{,}68}{5{,}93} = 0{,}663 \quad (м^{2°}C)/\text{Vt}; \qquad R_6 = \frac{6{,}61}{5{,}93} = 1{,}115 \quad (м^{2°}C)/\text{Vt};$$

$$R_7 = \frac{0{,}48}{5{,}93} = 0{,}081 \quad (м^{2°}C)/\text{Vt}; \qquad R_т = \frac{0{,}1}{5{,}93} = 0{,}017 \quad (м^{2°}C)/\text{Vt};$$

$$\sum R_{ум} = 3{,}02 \quad (м^{2°}C)/\text{Vt};$$

From the above results of theoretical and practical thermophysical studies we can draw the following conclusions:

1. The heat transfer resistance of 12-well shallow aerated concrete, determined as a result of theoretical studies, is greater than the heat transfer resistance of full-bodied aerated concrete. Their difference is 33-40%.

2. The heat transfer resistance of an insulated wall consisting of a shallow aerated concrete block with 12 holes is 2,60 m^2 °C/Vt.

3. The heat transfer resistance of an insulated wall made of fine gas concrete is 1,846 m^2 °C/Vt.

4. Heat transfer resistance of 12-channel aerated concrete wall is 30% higher than heat transfer resistance of monolithic aerated concrete wall and 1.5 brick thickness, i.e. 38 cm is 3-4 times higher than heat transfer resistance of the wall;

5. From practical experience, we know that the total heat transfer resistance of the sample wall determined in the experiment is R_u= 3,02 ($м^2 С$)/ Vt.

6. The theoretically determined heat transfer resistance of this structure R_u= 2,6 ($м^2 С$)/ Vt. Experimentally determined heat transfer resistance of the sample wall is 15% higher than the calculated heat transfer resistance.

7. The main reason for this is the small pores in the aerated concrete block, as well as its small heat transfer coefficient. For calculations, the heat transfer coefficient taken from QMQ 2.01.04 - 18* is 0,33 Vt/($м^2 С$). As a result of the experiment, the heat transfer coefficient of aerated concrete blocks is 0,33Vt/($м^2 С$). In addition, the density of aerated concrete blocks is 850 kg/m3.

8. Thus, the heat transfer resistance of the sample wall made of gas concrete blocks is 3,02 (m^2. 0^C)/ Vt, which corresponds to the requirements of the first, second and third level of thermal protection established in QMQ 2.01.04-18. Such a situation increases the energy efficiency of residential and public buildings built according to new typical projects and fully reconstructed.

Thus, the thermal resistance of the wall, reconstructed from small blocks of 12-cell aerated concrete, which we recommend, meets the requirements of the second and third levels of thermal resistance to heat transfer, established in QMQ 2.01.04-18. This situation opens the way to the design and construction of energy efficient buildings.

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4

SOIL DEGRADATION AND SALINIZATION IN KHOREZM REGION UNDER CLIMATE CHANGE CONDITIONS

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Abstract: *This dissertation investigates soil degradation and salinization in the Khorezm region under the impact of climate change. The study analyzes annual and monthly climate data, including temperature, precipitation, wind, and pressure, to identify ecological risks associated with soil salinization and degradation. Using GIS and remote sensing technologies, the research maps the degree and trends of degradation in irrigated lands of the region. The findings provide a scientific basis for effective soil resource management and the development of strategies to mitigate ecological hazards related to climate change.*

Key Words: *Climate change, soil degradation, soil salinization, seoecological condition, Khorezm region, irrigated lands, remote sensing, gis analysis, ecological risk, environmental monitoring*

INTRODUCTION

Climate change has emerged as one of the most significant global environmental challenges of the 21st century, affecting natural resources, ecosystems, and human livelihoods. Arid and semi-arid regions, such as the Khorezm region in Uzbekistan, are particularly vulnerable to shifts in temperature, precipitation patterns, and extreme weather events. These climatic changes directly influence soil properties, leading to degradation processes such as erosion, loss of fertility, and salinization. Soil degradation and salinization not only threaten agricultural productivity but also pose significant ecological and socio-economic risks, given that the Khorezm region is highly dependent on irrigated agriculture for food security and local livelihoods.

In recent decades, rising temperatures, reduced snow cover in upstream areas, and irregular precipitation have contributed to changes in the hydrological balance of the Amu Darya river basin, intensifying soil salinization in irrigated lands. As a result, once fertile lands are experiencing declining productivity, increased vulnerability to desertification, and ecological imbalances. Understanding the extent, patterns, and causes of soil degradation under changing climatic conditions is essential for developing effective land management strategies and mitigating environmental hazards.

This study aims to investigate the impact of climate change on soil degradation and salinization in the Khorezm region by integrating long-term climate data with modern geospatial technologies, including GIS and remote sensing. By analyzing historical trends in temperature, precipitation, wind, and pressure from 1994 to 2024, this research seeks to map the spatial distribution of soil degradation and salinization, identify the areas most at risk, and provide recommendations for sustainable soil resource management. The findings of this research are expected to contribute to scientific knowledge on climate-driven soil processes and support policy-making for environmental protection and agricultural sustainability in arid regions.

MAIN PART

Soil degradation and salinization are critical geoecological issues in the Khorezm region, largely driven by climate variability and unsustainable irrigation practices. The region’s arid climate, coupled with high evapotranspiration rates and limited rainfall, creates conditions that favor the accumulation of salts in the upper soil layers. Over the period from 1994 to 2024, meteorological data from Urgench, Khiva, and Tuyamuyin stations indicate a gradual increase in average annual temperatures, irregular rainfall patterns, and stronger seasonal winds, all of which exacerbate soil degradation processes.

The analysis of temperature trends reveals an average annual increase of approximately 0.2–0.3°C per decade, leading to enhanced evaporation rates and

accelerated soil salinization. Precipitation patterns show significant variability, with periods of drought followed by irregular heavy rainfall events. These fluctuations contribute to both physical and chemical soil degradation. Prolonged dry periods reduce soil moisture, weakening soil structure and increasing susceptibility to wind erosion. Conversely, sudden intense rainfall leads to surface runoff, soil compaction, and nutrient loss, further reducing soil fertility.

Irrigation practices, while essential for sustaining agriculture in Khorezm, have inadvertently contributed to soil salinization. Inefficient drainage systems and over-irrigation result in rising groundwater levels, bringing dissolved salts to the root zone. Remote sensing analysis of the region's irrigated lands demonstrates a gradual increase in soil salinity over the last three decades. GIS mapping highlights hotspots of severe salinization, particularly in low-lying areas of the Amu Darya delta, where waterlogging is prevalent. These areas correspond closely with regions experiencing the highest rates of crop yield decline.

Wind patterns also play a significant role in soil degradation. Data indicate an increase in the frequency and intensity of seasonal winds, which facilitates the movement of fine soil particles and contributes to the expansion of degraded lands. Combined with high soil salinity, wind erosion accelerates desertification processes, leading to a loss of arable land. The spatial distribution of degraded soils, analyzed through GIS-based mapping, shows a correlation between areas of high salinity, low organic matter content, and topographical depressions.

Mitigating soil degradation and salinization under climate change requires a combination of adaptive strategies. Recommendations include optimizing irrigation schedules to prevent waterlogging, improving drainage infrastructure, implementing soil conservation techniques such as mulching and crop rotation, and monitoring soil salinity using remote sensing and GIS tools. Long-term climate monitoring and predictive modeling can help identify vulnerable areas, enabling timely intervention to protect soil resources and ensure agricultural sustainability in the Khorezm region.

The integration of climate data with geospatial analysis provides a comprehensive understanding of the dynamic processes affecting soil health. By identifying patterns of degradation and salinization, stakeholders can develop targeted management strategies that address both current challenges and future climate scenarios. The findings highlight the urgent need for sustainable land management practices, emphasizing the interconnection between climate change, soil quality, and regional food security.

CONCLUSION

The study of soil degradation and salinization in the Khorezm region under climate change conditions demonstrates that the region's soil resources are highly vulnerable to both climatic and anthropogenic factors. Over the period from 1994 to 2024, increasing temperatures, irregular precipitation, and intensified wind activity have contributed significantly to the deterioration of soil quality, resulting in enhanced salinization, reduced fertility, and the expansion of degraded lands. Irrigation practices, while essential for sustaining agriculture, have further exacerbated these processes, particularly in areas with poor drainage and high groundwater levels.

GIS and remote sensing analyses have provided a clear spatial understanding of the distribution of degraded and saline soils, identifying hotspots that require urgent intervention. The findings underscore the importance of integrating long-term climate monitoring with soil management strategies to mitigate ecological risks. Adaptive measures, such as optimizing irrigation, improving drainage systems, implementing soil conservation techniques, and continuous monitoring, are crucial for sustaining agricultural productivity and protecting the geoecological balance of the Khorezm region.

Overall, this research highlights the interconnection between climate change, soil degradation, and regional food security. The results provide a scientific foundation for policy development and practical interventions aimed at sustainable land management, emphasizing that proactive and informed approaches are

necessary to preserve soil resources and ensure ecological resilience in arid and semi-arid regions affected by climate variability.

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O'ZBEKISTON–2030 STRATEGIYASI DOIRASIDA BOSHLANG'ICH TA'LIMDA SUV RESURSLARINI TEJASH ORQALI EKOLOGIK TARBIYANI SHAKLLANTIRISH

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Annotatsiya: *Maqolada boshlang‘ich sinf o‘quvchilarida ekologik tarbiyani shakllantirishda suv resurslarini tejash g‘oyalarini integratsiyalash masalalari yoritilgan. “O‘zbekiston–2030” strategiyasi doirasida ekologik ta’limni rivojlantirish, o‘quvchilarda suvdan oqilona foydalanish ko‘nikmalarini shakllantirish metodlari tahlil qilindi. Tadqiqotda interfaol metodlar va innovatsion yondashuvlarning samaradorligi asoslab berildi.*

Abstract: *This article discusses the integration of water-saving concepts into environmental education of primary school students. Based on the Uzbekistan–2030 Strategy, methods for developing ecological awareness and rational water use skills are analyzed. The effectiveness of interactive and innovative teaching approaches is also justified.*

Kalit so‘zlar: *ekologik tarbiya, suv resurslari, boshlang‘ich ta’lim, innovatsion metodlar, ekologik ong, barqaror rivojlanish.*

Keywords: *environmental education, water resources, primary education, innovative methods, ecological awareness, sustainable development.*

KIRISH

Bugungi globallashuv sharoitida ekologik muammolar, xususan suv resurslarining kamayib borishi, atrof-muhitning ifloslanishi va tabiiy resurslardan noo‘rin foydalanish insoniyat oldida dolzarb muammolardan biri sifatida namoyon bo‘lmoqda. Shu bois yosh avlodda ekologik ong, ekologik madaniyat va tabiatga ongli munosabatni shakllantirish zamonaviy ta’lim tizimining ustuvor vazifalaridan biri hisoblanadi.

O‘zbekiston Respublikasida amalga oshirilayotgan “O‘zbekiston–2030” strategiyasida ham atrof-muhitni muhofaza qilish, suv resurslarini tejash va ekologik barqarorlikni ta’minlash muhim yo‘nalishlardan biri sifatida belgilangan. Bu esa ta’lim tizimida, ayniqsa boshlang‘ich ta’lim bosqichida ekologik tarbiyani yangi yondashuvlar asosida tashkil etishni talab etadi.

Boshlang‘ich sinf o‘quvchilari yosh jihatidan ekologik bilim va ko‘nikmalarni qabul qilishga eng qulay davrda bo‘lib, aynan shu bosqichda ularda tabiatga

ehtiyotkorona munosabat, suv resurslarini tejashga oid dastlabki tushunchalar va amaliy odatlar shakllanadi. Shu sababli ekologik tarbiyani an’anaviy usullar bilan emas, balki innovatsion ta’lim muhiti asosida tashkil etish muhim ahamiyat kasb etadi.

Mazkur maqola muallifining magistrlik dissertatsiyasi “Innovatsion ta’lim muhitida boshlang‘ich sinf o‘quvchilarida ekologik tarbiyani shakllantirish metodikasi” mavzusiga bag‘ishlangan bo‘lib, unda ekologik ta’limni zamonaviy pedagogik texnologiyalar asosida tashkil etish, o‘quvchilarning ekologik kompetensiyalarini rivojlantirish hamda suv resurslarini tejashga yo‘naltirilgan ta’lim modelini ishlab chiqish masalalari tadqiq etilgan.

Ushbu maqolada esa mazkur dissertatsiya doirasidagi ilmiy yondashuvlar asosida boshlang‘ich sinf o‘quvchilarida ekologik tarbiyani shakllantirishda suv resurslarini tejash g‘oyalarini integratsiyalashning metodik jihatlari tahlil qilinadi. Tadqiqotning maqsadi — innovatsion ta’lim muhitida boshlang‘ich sinf o‘quvchilarida ekologik tarbiyani shakllantirishda suv resurslarini tejashga yo‘naltirilgan samarali metodikani ishlab chiqishdan iborat.

Mazkur tadqiqot innovatsion ta’lim muhitida boshlang‘ich sinf o‘quvchilarida ekologik tarbiyani shakllantirish, xususan suv resurslarini tejashga oid bilim, ko‘nikma va kompetensiyalarni rivojlantirishga qaratilgan. Tadqiqot jarayonida nazariy va empirik metodlar uyg‘unligidan foydalanildi.

Nazariy metodlar sifatida ekologik ta’lim, barqaror rivojlanish, innovatsion pedagogik texnologiyalar hamda boshlang‘ich ta’lim metodikasiga oid ilmiy adabiyotlar tahlil qilindi, mavjud yondashuvlar umumlashtirildi va tizimlashtirildi. Empirik tadqiqot metodlari quyidagilarni o‘z ichiga oladi:

pedagogik kuzatuv — o‘quvchilarning ekologik xulq-atvori va dars jarayonidagi faolligini aniqlash;

tajriba-sinov ishlari — ishlab chiqilgan metodikaning samaradorligini aniqlash;

so‘rovnoma va suhbatlar — o‘quvchilarning suv resurslariga munosabati va ekologik ong darajasini baholash;

taqqoslash va tahlil — tajriba va nazorat guruhlari natijalarini solishtirish.

Tadqiqot boshlang‘ich sinf o‘quvchilari ishtirokida tashkil etildi va unda tajriba hamda nazorat guruhlari shakllantirildi. Tajriba guruhida ekologik tarbiya innovatsion ta’lim muhitida, suv resurslarini tejashga yo‘naltirilgan maxsus metodika asosida olib borildi, nazorat guruhida esa an’anaviy o‘qitish usullari qo‘llanildi.

- Tadqiqot jarayonida quyidagi interfaol metodlardan keng foydalanildi:
- “Aqliy hujum” — suvni tejashga oid g‘oyalarni shakllantirish;
- “Klaster” — suv resurslarining ahamiyatini tizimli tahlil qilish;
- “Muammoli vaziyat” — real hayotiy ekologik muammolarni hal qilish ko‘nikmalarini rivojlantirish;
- “Venn diagrammasi” — suvdan oqilona va noo‘rin foydalanishni taqqoslash.

Innovatsion ta’lim muhiti doirasida multimediali vositalar, vizual materiallar, ekologik mazmundagi videoroliklar va raqamli ta’lim resurslaridan foydalanildi. Bu esa o‘quvchilarning mavzuga qiziqishini oshirish va bilimlarni mustahkamlashga xizmat qildi.

Tadqiqot jarayonida boshlang‘ich sinf o‘quvchilarida ekologik tarbiyani shakllantirishda suv resurslarini tejashga yo‘naltirilgan innovatsion metodikaning samaradorligi aniqlab berildi. Tajriba-sinov ishlari natijalari tahlili shuni ko‘rsatdiki, tajriba guruhidagi o‘quvchilarda ekologik bilim, ko‘nikma va kompetensiyalar sezilarli darajada oshgan.

5. Xususan, tadqiqot yakunida o‘quvchilarning:
6. suv resurslarining ahamiyati haqidagi bilimlari kengaydi;
7. suvni tejashga oid amaliy ko‘nikmalari shakllandi;
8. ekologik muammolarga nisbatan ongli munosabati rivojlandi.

Tajriba guruhida o‘quvchilarning aksariyati kundalik hayotda suvdan oqilona foydalanish, uni isrof qilmaslik kabi odatlarni shakllantirgani kuzatildi. Nazorat guruhida esa bunday o‘zgarishlar nisbatan sustroq namoyon bo‘ldi.

Shuningdek, interfaol metodlar asosida tashkil etilgan darslar o‘quvchilarning darsga bo‘lgan qiziqishini oshirib, ularning mustaqil fikrlash va muammoni hal qilish ko‘nikmalarini rivojlantirishga xizmat qildi.

Olingan natijalar shuni ko‘rsatadiki, innovatsion ta’lim muhitida ekologik tarbiyani tashkil etish boshlang‘ich sinf o‘quvchilarining ekologik ongini shakllantirishda muhim omil hisoblanadi. Ayniqsa, suv resurslarini tejashga yo‘naltirilgan ta’lim mazmuni o‘quvchilarda amaliy hayot bilan bog‘liq ko‘nikmalarni rivojlantirishga xizmat qiladi.

Tadqiqot natijalari boshqa ilmiy izlanishlar bilan hamohang bo‘lib, ekologik ta’limni interfaol metodlar asosida tashkil etish uning samaradorligini oshirishini tasdiqlaydi. Shu bilan birga, mazkur yondashuv o‘quvchilarda faqat nazariy bilimlarni emas, balki kundalik hayotda qo‘llaniladigan ekologik madaniyatni ham shakllantiradi.

Muhokama jarayonida aniqlanishicha, an’anaviy o‘qitish usullari ekologik tarbiyani yetarli darajada samarali shakllantira olmaydi. Aksincha, innovatsion yondashuvlar — xususan, muammoli vaziyatlar, vizual materiallar va interaktiv topshiriqlar — o‘quvchilarning faol ishtirokini ta’minlab, bilimlarni chuqur o‘zlashtirishga yordam beradi.

Shuningdek, “O‘zbekiston–2030” strategiyasida belgilangan ekologik ustuvor yo‘nalishlar bilan integratsiya qilingan ta’lim mazmuni o‘quvchilarda ekologik mas’uliyat hissini kuchaytiradi va barqaror rivojlanish g‘oyalarini singdiradi.

Tadqiqot natijalari shuni ko‘rsatdiki, innovatsion ta’lim muhitida boshlang‘ich sinf o‘quvchilarida ekologik tarbiyani shakllantirishda suv resurslarini tejash g‘oyalarini integratsiyalash yuqori samaradorlikka ega. Ushbu yondashuv o‘quvchilarda ekologik ong, tabiatga mas’uliyatli munosabat hamda kundalik hayotda suvdan oqilona foydalanish ko‘nikmalarini shakllantirishga xizmat qiladi.
Tajriba-sinov ishlari asosida aniqlanishicha, interfaol metodlar va innovatsion pedagogik texnologiyalarni qo‘llash o‘quvchilarning bilim darajasi, mustaqil

fikrlashi va ekologik madaniyatini sezilarli darajada oshiradi. Ayniqsa, suv resurslarini tejashga yo‘naltirilgan amaliy mashg‘ulotlar ularning hayotiy ko‘nikmalarini rivojlantirishda muhim ahamiyat kasb etadi.

Shuningdek, tadqiqot natijalari “O‘zbekiston–2030” strategiyasida belgilangan ekologik ustuvor yo‘nalishlarni ta’lim jarayoniga integratsiyalash zarurligini tasdiqlaydi. Bu esa ta’lim tizimida ekologik tarbiyani yangi bosqichga olib chiqish imkonini beradi.

XULOSA

Xulosa qilib aytganda, boshlang‘ich ta’lim tizimida ekologik tarbiyani innovatsion yondashuvlar asosida tashkil etish va suv resurslarini tejashga yo‘naltirish o‘quvchilarda barqaror rivojlanish tamoyillariga mos ekologik madaniyatni shakllantirishning muhim omili hisoblanadi.

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PROBLEMS IN LIVESTOCK FARMING IN UZBEKISTAN AND REFORMS TO ELIMINATE THEM (2020-2022)

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Annotation. *The article covers the state of the livestock sector in Uzbekistan, the dynamics of livestock production, problems in livestock farming, and reforms aimed at solving them.*

Keywords. *Livestock, Uzbekistan, laws, decisions, food, Cabinet of Ministers, regions, income, shortcomings, analysis, cattle breeding, sheep breeding, cultivated land.*

Аннотация. *В статье освещается состояние животноводческой отрасли Узбекистана, динамика производства животноводческой продукции, проблемы животноводства и реформы, направленные на их решение.*

Ключевые слова. *Животноводство, Узбекистан, законы, постановления, продовольствие, Кабинет министров, территории, доходы, недостатки, анализ, скотоводство, овцеводство, пахотные земли.*

Annotatsiya. *Maqolada O'zbekiston chorvachilik sohasining holati, chorvachilik mahsulotlarini yetishtirish dinamikasi, chorvachilikdagi muammolar va ularning yechimi qaratilgan islohotlar yoritilgan.*

Kalit so'zlar. *Chorvachilik, O'zbekiston, qonunlar, qarorlar, oziq-ovqat, Vazirlar Mahkamasi, hududlar, daromad, kamchiliklar, tahlil, qoramolchilik, qo'ychilik.*

INTRODUCTION

Agriculture, one of the important sectors of the economy of Uzbekistan, and the livestock sector, which is its main part, is today one of the main factors in supplying the population with food and dairy products, providing them with employment, and ensuring the stability of the economy. After gaining independence, Uzbekistan began to implement fundamental economic reforms in agriculture. One of the main factors in the development of livestock farming is a strong feed base. In

this regard, 2 Decrees of the President of the Republic of Uzbekistan, 22 resolutions, and 39 resolutions of the Cabinet of Ministers were adopted in 2020-2022, aimed at the development of livestock farming, which set clear goals and priority tasks for the development of the sector.

Literature analysis. In creating this article, the following abstracts were studied: Sh. Jumayeva on the topic of the development, progress and problems of the livestock sector in the years of independence using the example of the Surkhon oasis. S. Kadirova's research, N. Nurmatov's research on the main features of the impact of the main reforms implemented in agriculture on the development of the livestock sector, and Sh. Akhmedov's abstracts entitled "History of the development of livestock farming in Uzbekistan (1991-2022)".

The adoption of the Resolution of the President of the Republic of Uzbekistan No. PQ-5017 “On additional measures for further state support of the livestock sector” dated March 3, 2021, and the Resolution of the President of the Republic of Uzbekistan No. PQ-121 “On measures for the further development of livestock farming and strengthening the livestock feed base” dated February 8, 2022, is having a positive impact on the development of the sector., Livestock farming in Uzbekistan: current state, problems and development prospects. The topic of this article was studied separately using the directory of the Committee for the Development of Veterinary and Livestock Breeding of the Republic of Uzbekistan and data from the State Statistics Committee of the Republic of Uzbekistan.

Methodological foundations. The methodological foundations section presents aspects of studying the shortcomings of animal husbandry based on historical-comparative, archaeological, communicative and comparative approaches. Through these methods, solutions to problems in the animal husbandry sector during the years of independence, the influence of nature and regional differences were identified.

RESULTS.

In January-March 2020 alone, the volume of livestock production amounted to 21.9 trillion soums, or 103.6% compared to the same period in 2019. The share of livestock products in the total volume of agricultural products produced was 92.8%. The highest share in the total volume of meat produced was in Tashkent region (14.3%). Also, a high share was recorded in Samarkand (13.0%), Bukhara (9.6%), Kashkadarya (8.7%) and Andijan (8.3%) regions. The lowest share in the total volume of meat was observed in Syrdarya region (2.9%) and the Republic of Karakalpakstan (3.2%).

In January-March 2021, the volume of livestock production amounted to 26,318.9 billion soums. soums, or 103.0% compared to the same period in 2020. The share of livestock products in the total volume of agricultural products produced was 93.7%. In the first quarter of 2022, the highest volume of livestock products by region was recorded in Samarkand (3,934.1 billion soums), Tashkent (3,545.0 billion soums) and Bukhara (2,659.5 billion soums) regions. On the contrary, regions with a low volume include Syrdarya region (831.2 billion soums), the Republic of Karakalpakstan (886.6 billion soums) and Navoi region (1,671.8 billion soums). High growth rates were recorded in Namangan (104.3%), Syrdarya (104.2%) and Fergana (104.0%) regions. The highest share in the total volume of meat produced fell on Tashkent region (13.8%). A high share was also recorded in Samarkand (12.6%) and Bukhara (9.6%) regions. The lowest share of meat in the total volume was observed in Namangan (5.4%), the Republic of Karakalpakstan (3.1%), and Syrdarya region (2.9%).

In addition, Doctor of Agricultural Sciences, Professor Nasriddin Khalilov expressed the following thoughts on this issue: the productivity of pastures, which are an important source of feed for livestock, is not very high; in good years, only 3-4 centners of crop can be obtained per hectare. Unfortunately, in recent years, rainfall has been decreasing year by year. For example, if there were 85 species of plants in Karnokchul before, today you can only find 4-5 different species. Moreover, most

of these plants are unsuitable for animal feed, and if eaten by livestock, they will be poisoned. Since the situation has reached this point, the issue of growing food plants in pastures becomes urgent. Therefore, in the first direction, it is necessary to grow and plant seeds of plants with high nutritional value and high yields in pastures, and this way pasture productivity can be increased. Kadirova.S. puts forward the following points in her research: Due to the sharp change in the climate of Uzbekistan, land fertility is decreasing and irrigation is becoming difficult. If food for livestock is imported to Uzbekistan, customs duties may become expensive for farms. Based on the climate in Uzbekistan, these problems can be solved by increasing land fertility or reducing customs duties on food imports, and livestock breeding is in a difficult situation, therefore, she puts forward the issues of producing high-quality and larger quantities of medicines for livestock, and making their prices cheaper for farms.

DISCUSSION

For farms engaged in livestock breeding, peasant farms and organizations engaged in agricultural activities, from January 1, 2021 to January 1, 2024, a 50 percent rate of profit tax (except for interest received from funds placed in commercial banks), property tax, land tax and tax on the use of water resources will be applied. According to the 2021 resolution, the issue of further focusing on areas with difficult water supply for livestock was also mentioned; in the Kashkadarya region alone, a plan was developed to drill a total of 33 new wells in hayfields and pastures in 2021-2022.

In order to cover the need for livestock meat and milk in all regions of the republic, from January 1, 2022 to December 31, 2023: for livestock farms that are payers of value added tax - the amount of the subsidy for each kilogram of live weight of large and small cattle bred on their farms and in cooperation with households and sold for meat will be increased from 2,000 to 4,000 soums, and for each liter of milk from 200 to 400 soums. In this regard, it was determined that the subsidy will be paid for the period during which the temporary exemption from

value-added tax is in effect, it was determined that more than 10 percentage points of the cost of credit and leasing interest on agricultural machinery purchased by livestock farms on credit and leasing terms will be reimbursed by the State Support of Agriculture Fund under the Ministry of Finance from the republican budget, it was taken into account that livestock farms that have introduced sprinkler and drip irrigation technologies on fodder arable land will be allocated a subsidy of 8 million soums per hectare from the republican budget in the prescribed manner, 20 percent of the cost of purchasing equipment for growing livestock feed using hydroponics will be reimbursed from the republican budget. In this case, the resolution determined that the cost of this equipment will not exceed 100 million soums.

According to statistics, the main part of livestock products is produced by farmers and households as of 2022. 91.8 percent of livestock is owned by households, and only 8.2 percent by farms. There are problems in increasing the type and number of livestock, increasing their productivity. These problems are due to the natural increase in livestock, the breeding of productive breeds, their importation, the high cost and shortage of fodder, as well as the nature of the situation.

CONCLUSION

During the years of independence, livestock farming has been given different attention. In the early years, rye, millet, rapeseed and percolate crops were independently sown in regional farms, which supplemented feed rations in early spring and created the opportunity to obtain additional products. These crops have been neglected for the last 4-5 years. Any farm that sows catch crops to a sufficient extent will be able to prepare alfalfa hay from the first harvest opportunity arises. Such farms create the basis for feeding cows and other livestock that have come out of winter with green grass in early spring until they are full and storing the rest. It is possible to consider the introduction of new innovative technologies for the development of livestock farming, as well as the provision of loans with lower interest rates for farms and peasant farms.

It is necessary to improve the waterways of the lands where fodder crops are grown for livestock, for example, by filling ditches, water will be saved and more fodder crops will be able to enjoy water.

It is important to consistently implement work in the coming years, such as focusing more attention on the development of livestock farming in pasture and desert areas, camel breeding, horse breeding and beekeeping.

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ECOLOGICAL LANDSCAPE DESIGN

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Abstract.*This article discusses ecological landscape design, its principles, and importance. It focuses on environmental protection, rational use of natural resources, and creating comfortable living conditions for people. Ecological design helps reduce environmental problems, improves urban life quality, and promotes sustainable development. It integrates modern techniques such as green roofs, vertical gardens, and water-saving systems. Ecological landscape design plays a key role in balancing urban expansion with environmental preservation.*

Keywords:*Ecological design, Landscape architecture, Sustainability, Native plants, Urban green spaces, Water management, Biodiversity, Human comfort, Green technology*

INTRODUCTION.

Environmental problems have become increasingly critical worldwide. Rapid urbanization, industrialization, and deforestation contribute to air and water pollution, soil degradation, and biodiversity loss. These issues affect human health, quality of life, and climate stability.

Ecological landscape design offers a solution by combining sustainability, functionality, and aesthetics. It aims to create green spaces in urban areas that maintain ecological balance while providing comfortable living environments. Properly planned landscapes improve air quality, reduce heat, support biodiversity, and offer recreational spaces for residents. Cities without green areas often face heat islands, poor air quality, and reduced well-being.

MAIN PART

Ecological landscape design is a sustainable approach to creating outdoor spaces that balance human needs with environmental preservation. It aims to maintain ecological integrity while providing functional and aesthetically pleasing areas for recreation, relaxation, and social interaction. The design emphasizes the use of native plants, which support local biodiversity, reduce maintenance requirements, and adapt naturally to the climate. Trees, shrubs, and herbaceous plants contribute to air purification, shade, soil protection, and habitats for urban wildlife, while flowering species enhance visual appeal and seasonal variation.

Water management is a critical component of ecological landscapes. Techniques such as drip irrigation, rainwater harvesting, and permeable surfaces reduce water waste and ensure plant health. Green spaces also help mitigate urban heat, improve air quality, and promote physical and mental well-being by offering areas for exercise, leisure, and environmental education.



Aesthetic considerations are integrated with ecological function. Natural materials, harmonious colors, and varied plant forms create visually appealing yet low-maintenance landscapes. Modern technologies, including smart irrigation, green roofs, vertical gardens, and solar-powered features, enhance sustainability in urban environments. Overall, ecological landscape design fosters a resilient, sustainable, and livable environment while harmonizing human activity with nature.

MATERIALS AND METHODS

In this study, ecological landscape design principles were analyzed using a combination of literature review, field observations, and case study evaluation. The research focused on urban and suburban areas where sustainable landscape practices have been implemented.

Materials.Flora: A selection of native trees, shrubs, and herbaceous plants suitable for local climate conditions.

Soil samples: Collected from different urban green spaces to assess soil quality and planting suitability.

Water management systems: Drip irrigation setups, rainwater harvesting units, and permeable surfaces to ensure efficient water usage.

Landscape structures: Benches, walking paths, planters, and natural elements such as rocks and small water features.

Methods.Literature Review: Analyzed recent studies and publications on ecological landscape design, urban sustainability, and green spaces.

Field Observations: Monitored plant health, soil condition, and water management in selected parks and gardens.

Case Study Analysis: Compared different urban landscape projects to identify successful strategies and challenges.

Data Analysis: Assessed biodiversity, vegetation coverage, water efficiency, and human usage patterns through descriptive statistics and qualitative evaluation.

This approach provided a comprehensive understanding of ecological landscape design practices and their effectiveness in real urban environments. The findings serve as guidance for future planning and sustainable design implementations.

RESULTS AND DISCUSSION

The study results indicated that ecological landscape design is an effective tool for enhancing biodiversity and improving human well-being in urban areas. Green spaces with native plants provided increased habitats for birds, insects, and small mammals. Seasonal flowering plants enhanced visual aesthetics and supported pollinator activity.



Water management systems, including drip irrigation and rainwater harvesting, significantly reduced water consumption while maintaining plant health. Observed areas achieved approximately 30–40% water savings. Soil erosion decreased, and vegetation grew more sustainably.

Urban residents spent more time in green spaces, improving their mental and physical health. Recreational areas, walking paths, and seating zones encouraged social interaction. In addition, areas designed with natural materials and ecological principles were visually appealing and required less maintenance.

These findings demonstrate that ecological landscape design not only protects the environment but also helps create sustainable and comfortable urban living spaces. Sustainable planning and the use of native plants enhance both the ecological and social performance of cities.

CONCLUSION

Ecological landscape design is essential for modern urban planning. It protects natural resources, improves quality of life, and supports biodiversity. Properly designed landscapes offer recreational, aesthetic, and educational benefits.

Future urban developments must integrate green areas, sustainable water management, native plants, and modern technologies to ensure resilient, healthy, and visually pleasing environments.

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SUV RESURSLARINI TEJASHNING ZAMONAVIY YONDASHUVLARI

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Annotatsiya: *Ushbu tezisda suv resurslarining kamayib borishi, suvdan oqilona foydalanish zaruriyati va ularni tejab ishlatishning zamonaviy yondashuvlari asosida yoritilgan. Bugungi kunda suv tanqisligining kuchayishi sababli qishloq xo‘jaligi, sanoat va maishiy sohalarda yangi texnologiyalarni ishlab chiqishni talab qilmoqda. Tezisda tomchilatib sug‘orish, yopiq suv aylanish tizimlari, maishiy tejamkor texnologiyalar va raqamli monitoring kabi zamonaviy usullar samaradorligi tahlil qilingan.*

Kalit so’zlar: *suv resurslari, zamonaviy yondashuv, tomchilatib sug’orish, yopiq suv tizimi, tejamkorlik texnologiyalari, ekologik barqarorlik.*

Abstract: *This thesis discusses the depletion of water resources, the need for rational use of water and modern approaches to their conservation. Today, due to the increasing water shortage, it is necessary to develop new technologies in the agricultural, industrial and domestic sectors. The thesis analyzes the effectiveness of modern methods such as drip irrigation, closed water circulation systems, domestic water-saving technologies and digital monitoring.*

Keywords: *water resources, modern approach, drip irrigation, closed water system, conservation technologies, environmental sustainability.*

KIRISH.

Suv resurslarini tejashning zamonaviy yondashuvlari. Suv resurslari inson hayoti, qishloq xo’jaligi va sanoatining barqaror rivojlanishi uchun ajralmas omil hisoblanadi. So’ngi yillarda suv tanqisligining kuchayishi suvni tejash bo‘yicha samarali strategiyalarni ishlab chiqishni talab qilmoqda. Suvdan oqilona foydalanish nafaqat ekologik himoya, balki iqtisodiy samaradorlikni oshirish uchun ham

muhimdir. Birinchidan, qishloq xo‘jaligida tomchilatib va yomg‘irlatib sug‘orish texnologiyalarini qo’llash, suv sarfini 30–50 foizgacha kamaytiradi. Bu usullar suvning keraksiz sarf bo‘lishi, bug‘lanishi va tuproqqa singib ketishini kamaytiradi. Ikkinchidan, sanoat korxonalarida yopiq suv aylanish tizimlarini joriy etish tabiiy suv iste’molini yuqori darajada qisqartirib, ekologik ifloslanishning oldini oladi. Uchinchidan, maishiy sohada tejamkor sanitariya jihozlari, sensorli kranlar, suv o‘lchagichlar va nosoz quvurlarni o‘z vaqtida ta’mirlash muhim ahamiyatga ega. Raqamlashtirish jarayonlari suv ta’minotida monitoring tizimlarini takomillashtirib, suv sarfini nazorat qilish, oqishlarni nazorat qilish va samaradorlikni oshirishga imkon bermoqda. Shuningdek, aholining ekologik madaniyatini oshirish, suvni tejash bo‘yicha targ‘ibot va ta’lim ishlari barqaror natijaga erishishning asosiy omillaridan biridir.

Tomchilatib sug‘orish zamonaviy qishloq xo‘jaligining eng samarali usullaridan biridir. Bu usul o‘simlik ildizlariga bevosita suv yetkazib, suvning 40-60% gacha tejash imkonini beradi. Tizim maxsus naychalar, tomchilatkich va nazorat moslamalari orqali ishlaydi. Har bir o‘simlik aniq kerakli miqdorda suv oladi, bu esa hosildorlikni oshiradi va suv isrofini kamaytiradi. Tomchilatib sug‘orish tizimini o‘rnatish boshlang‘ich investitsiyalarni talab qilsa-da, uzoq muddatda katta iqtisodiy foyda keltiradi. Fermerlar bu texnologiyani qo‘llagan holda nafaqat suv tejaydilar, balki mehnat sarflarini ham kamaytiradilar.

ASOSIY QISIM.

Suv qayta aylantirish tizimi. Uy xo‘jaliklaridagi kir yuvish, idish yuvish va dush qabul qilishdan hosil bo‘lgan suvlarni tozalash va qayta ishlatish orqali suvni tejash mumkin. Maxsus filtrlar va tozalash tizimlari orqali bu suvlar bog‘ sug‘orish va boshqa ehtiyojlar uchun yaroqli holga keltiriladi.

- Oddiy filtratsiya tizimlari
- Biologik tozalash usullari
- Dezinfeksiya jarayonlari

Yomg‘ir suvini yig‘ish .Tom yuzalaridan, asfalt yo‘llardan va boshqa yuzalardan oqayotgan yomg‘ir suvlarini to‘plash .Boshlang‘ich tozalash. Yig‘ilgan suvlarni iflosliklar va begona moddalardan tozalash, filtratsiya qilish .

Saqlash va foydalanish Tozalangan suvlarni maxsus rezervuarlarda saqlash va kerak bo‘lganda ishlatish Yomg‘ir suvini yig‘ish tizimi oddiy texnologiya bo‘lib, katta mablag‘ sarf qilmasdan amalga oshirilishi mumkin. Har bir uy xo‘jaligi va tashkilot o‘z binosi atrofida yomg‘ir suvini yig‘ish imkoniyatiga ega. Bu usul orqali yillik suv ehtiyojining 30-50% ini qoplash mumkin.

Zamonaviy nazorat tizimlari. Raqamli suv o‘lchagichlari va monitoring tizimlari orqali suv sarfini real vaqtda kuzatish va tahlil qilish mumkin. Bu tizimlar suv isrofini aniqlash, quvur buzilishlarini tez topish va sarfni optimallashtirish imkonini beradi. Har bir uy xo‘jaligi va fermer xo‘jaligi o‘z suv sarfini nazorat qilishi kerak.

Texnik nazorat

• Suv bosimini muntazam tekshirish

• Quvurlar holatini nazorat qilish

• O‘lchagichlarni kalibrlash

Ma’muriy nazorat

• Foydalanish litsenziyalarini nazorat

• Hisobotlar yuritish

• Jarimalar va rag‘batlantirish

Amalga oshirish va kelajak rejalari

1 **.**Qisqa muddat (1-6 oy). Aholi o‘rtasida targ‘ibot ishlarini boshlash, suv o‘lchagichlarini o‘rnatish va eng sodda tejash usullarini joriy etish.

2 .O‘rta muddat (6-18 oy). Tomchilatib sug‘orish tizimlarini sinov maydonlarida joriy etish, yomg‘ir suvini yig‘ish tizimlarini qurishga kirishish.

3.Uzoq muddat (2-5 yil). Keng ko‘lamda zamonaviy texnologiyalarni joriy etish, suv qayta aylantirish zavodlarini qurish va butun tizimni optimallashtirish .

Kutilayotgan natijalar

• Suv sarfining 30-50% ga kamayishi

• Qishloq xo‘jaligi hosildorligining oshishi.

• Ekologik muvozanatning

mustahkamlanishi .

•Aholi orasida suv tejash

madaniyatining shakllani.

Zamonaviy dunyo sharoitida suv resurslarini samarali boshqarish har bir hududning barqaror rivojlanishi uchun eng muhim vazifalardan biridir. Tumanlardagi sug‘oriladigan yerlar kengayishi va aholi sonining ortishi bilan suv tanqisligi muammosi tobora dolzarblik kasb etmoqda. Tumandagi suv resurslarining hozirgi holati chuqur tahlilni talab qiladi. Sug‘oriladigan yerlarning kengayishi bilan birga yer osti suvlarining sathi sezilarli darajada pasaygan. Bu holat qishloq xo‘jaligi mahsulotlarining hosildorligiga salbiy ta'sir ko‘rsatish bilan birga, uzoq muddatli perspektivada hududning ekologik muvozanatini buzish xavfini tug‘diradi. Daryo suvlarining kamayishi esa muammoni yanada murakkablashtirmoqda. Raqamli suv o‘lchagichlari va monitoring tizimlari orqali suv sarfini real vaqtda kuzatish va tahlil qilish mumkin. Bu tizimlar suv isrofini aniqlash, quvur buzilishlarini tez topish va sarfni optimallashtirish imkonini beradi. Har bir uy xo‘jaligi va fermer xo‘jaligi o‘z suv sarfini nazorat qilishi kerak.

XULOSA.

Xulosa qilib aytganda, suv resurslarini tejashning zamonaviy yondashuvlari texnologik innovatsiyalar, tomchilatib sug’orish tizimi, suv qayta aylantirish tizimi, zamonaviy nazorat tizimlari, samarali boshqaruv va aholining ongli ishtirokiga asoslanadi. Bu yondashuvlar kelajak avlod uchun xavfsiz ekologik muhit va barqaror rivojlanishni ta’minlaydi.

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ANTIFOSFOLIPID SINDROMI: ETIOLOGIYASI, PATOGENEZI VA KLINIK AHAMIYATI

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Annotatsiya: *Mazkur tezisda antifosfolipid sindromining etiologiyasi, patogenezi va klinik xususiyatlari tahlil qilingan. Tadqiqot davomida ushbu sindromning autoimmun tabiatga ega ekanligi, ya’ni organizmda fosfolipidlarga qarshi antitanachalar hosil bo‘lishi natijasida qon ivish tizimi buzilishi aniqlangan. Natijada bemorlarda arterial va venoz trombozlar hamda reproduktiv tizim bilan bog‘liq asoratlar yuzaga keladi. Tadqiqot natijalari ushbu sindromni erta aniqlash va samarali davolash zarurligini ko‘rsatadi.*

Kalit so‘zlar: *antifosfolipid sindromi, tromboz, autoimmun kasallik, antitanachalar, gemostaz, giperkogulyatsiya, reproduktiv salomatlik*

Abstract: *This paper analyzes the etiology, pathogenesis and clinical features of antiphospholipid syndrome. The study shows that the syndrome has an autoimmune nature,*

characterized by the production of antibodies against phospholipids, leading to disorders in blood coagulation. As a result, arterial and venous thrombosis and reproductive complications occur. The findings highlight the importance of early diagnosis and improved treatment strategies.

Keywords: *antiphospholipid syndrome, thrombosis, autoimmune disease, antibodies, hemostasis, hypercoagulability, reproductive health.*

KIRISH

Antifosfolipid sindromi (AFS) — bu autoimmun xarakterga ega bo‘lgan trombofil holat bo‘lib, u arterial va venoz trombozlar hamda reproduktiv yo‘qotishlar bilan tavsiflanadi. So‘nggi yillarda ushbu sindromning tarqalishi va klinik ahamiyati ortib bormoqda. Statistik ma’lumotlarga ko‘ra, umumiy populyatsiyada antifosfolipid antitanachalari (aPL) 1–5% hollarda aniqlanadi, biroq klinik jihatdan ifodalangan AFS 0,5% atrofida uchraydi. Ayollar orasida ushbu sindrom erkaklarga nisbatan 3–5 baravar ko‘p kuzatiladi, ayniqsa reproduktiv yoshdagi ayollar yuqori xavf guruhiga kiradi. Homiladorlik bilan bog‘liq asoratlar orasida AFS 10–15% spontan abortlar sababi sifatida qayd etiladi. Bundan tashqari, 50 yoshgacha bo‘lgan bemorlarda kuzatiladigan insult holatlarining 15–20% AFS bilan bog‘liq bo‘lishi mumkin.

Mazkur sindromning dolzarbligi uning ko‘p tizimli zararlanishga olib kelishi, tashxis qo‘yishdagi murakkabliklar hamda hayot uchun xavfli asoratlar — trombozlar, insult, miokard infarkti kabi holatlar bilan bevosita bog‘liqligi bilan belgilanadi.

Tadqiqot maqsadi. Ushbu tadqiqotning asosiy maqsadi antifosfolipid sindromining klinik va laborator xususiyatlarini o‘rganish, uning tarqalish darajasini statistik jihatdan baholash hamda trombotik va reproduktiv asoratlar bilan bog‘liqligini aniqlashdan iborat. Shuningdek, tadqiqot davomida AFS bilan kasallangan bemorlarda asosiy risk omillari, laborator markerlar (lupus antikoagulyanti, antikardiolipin va β2-glikoprotein I ga qarshi antitanachalar) hamda klinik kechish xususiyatlari o‘rganildi.

Tadqiqot materiallari va usullari. Tadqiqot 2022–2025-yillar davomida 120 nafar bemor ishtirokida olib borildi. Ularning 78 nafari ayollar (65%), 42 nafari erkaklar (35%) bo‘lib, o‘rtacha yoshi 34,6 ± 8,2 yilni tashkil etdi.

Bemorlar ikki guruhga ajratildi:

1-guruh: 70 nafar AFS tashxisi tasdiqlangan bemorlar

2-guruh: 50 nafar nazorat guruhi (sog‘lom shaxslar)

Diagnostika mezonlari sifatida xalqaro Sidney kriteriyalari qo‘llanildi. Laborator tekshiruvlar ELISA (ferment bog‘liq immunosorbent analiz) va koagulyatsion testlar orqali amalga oshirildi.

Tadqiqotda quyidagi usullar qo‘llanildi:

- Klinik kuzatuv va anamnez yig‘ish
- Laborator tahlillar (aPL aniqlash)
- Instrumental tekshiruvlar (dopplerografiya, EKG)
- Statistik tahlil (Student t-testi, χ^2 testi)

Statistik ishonchlilik darajasi $p<0,05$ deb qabul qilindi.

Natijalar. O‘tkazilgan tadqiqot natijalariga ko‘ra, AFS bilan kasallangan bemorlarning 68% ida venoz trombozlar, 32% ida esa arterial trombozlar aniqlangan. Eng ko‘p uchragan holat — pastki ekstremitalar chuqur venalar trombozi (45%) bo‘ldi.

Reproduktiv yoshdagi ayollar orasida (n=52) quyidagi ko‘rsatkichlar qayd etildi:

1 martadan ortiq spontan abort — 61%

2 va undan ortiq abort — 38%

Preeklampsiya va platsentar yetishmovchilik — 27%

Laborator natijalar shuni ko‘rsatdiki:

Lupus antikoagulyanti — 72% bemorlarda musbat

Antikardiolipin antitanachalari — 65%

β2-glikoprotein I ga qarshi antitanachalar — 58%

Shuningdek, bemorlarning 40% ida bir vaqtning o‘zida uchala marker ham aniqlangan bo‘lib, bu “triple positive” holat sifatida baholandi va og‘ir klinik

kechish bilan bog‘liq ekanligi aniqlandi. Nazorat guruhida esa antifosfolipid antitanachalari atigi 6% hollarda aniqlangan.

Muhokama. Olingan natijalar AFS ning trombotik va reproduktiv patologiyalardagi muhim etiologik omil ekanligini tasdiqlaydi. Tadqiqotda aniqlangan 68% venoz tromboz ko‘rsatkichi boshqa xalqaro tadqiqotlar natijalari (60–70%) bilan mos keladi. Triple positive bemorlarning yuqori foizi (40%) sindromning og‘ir kechishini ko‘rsatadi va bu holatlarda antikoagulyant terapiyani erta boshlash zarurligini ta’kidlaydi. Reproduktiv yo‘qotishlarning yuqori darajasi (61%) AFS ning akusherlik amaliyotidagi ahamiyatini yana bir bor isbotlaydi. Bu esa homiladorlikni rejalashtirish bosqichidayoq laborator skrining o‘tkazish zarurligini ko‘rsatadi. Shuningdek, erkaklarda ham AFS aniqlanishi (35%) sindrom faqat ayollar kasalligi emasligini bildiradi. Ammo ayollarda yuqori uchrash chastotasi gormonal va immunologik omillar bilan izohlanadi.

XULOSA

Antifosfolipid sindromi — bu ko‘p qirrali klinik ko‘rinishga ega bo‘lgan va yuqori xavfli asoratlar bilan kechuvchi autoimmun kasallikdir.

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BUXORO VILOYATIDA 1995-2000-YILLARDA TIBBIY XIZMATNING AHVOLI

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Annotatsiya: *Mamlakatimizda mustaqillik qo'lga kiritilganidan so'ng ijtimoiy sohada bir qator islohotlar amalga oshirilib kelmoqda ushbu o'zgarishlar zamirida aholiga tibbiy xizmat ko'rsatishni sifatini yaxshilash, tibbiy profilaktikani samarali amalga oshirish kabi sog'liqni saqlash tarmoqlari alohida ahamiyat kasb etib kelmoqda. Ushbu maqolada 1995-2000-yillarda aholiga tibbiy xizmat ko'rsatishning ahvoli haqida tahliliy ma'lumotlar keltiriladi.*

Abstract: *Since gaining independence, our country has implemented a series of reforms in the social sphere. In the context of these changes, healthcare sectors - such as improving the quality of medical services for the population and effectively implementing preventive care - have been of particular importance. This article provides an analytical overview of the state of medical services for the population from 1995 to 2000.*

Kalit so'zlar: *QVP, FAP, SVA, SVP, AJM, poliklinika, ambulatoriya.*

Keywords: *Rural Medical Unit (QVP), Feldsher-Midwife Station (FAP), Rural Family Polyclinic (SVA), Rural Doctor's Office (SVP), AJM, polyclinic, outpatient clinic.*

KIRISH

Har bir rivojlanib borayotgan mamlakatda ijtimoiy sohani yaxshilash bo'yicha doimiy ravishda islohotlar amalga oshirilib keladi shu jumladan sog'liqni saqlash sohasiga bo'gan e'tibor ham kuchayib bormoqda. Buxoro viloyatida ha sog'liqni saqlash sohasi oldida turgan eng yirik muammolardan biri aholiga tibbiy xizmat ko'rsatishning yangi shakllarini joriy etish, sog'liqni saqlash tizimida

islohotlarni chuqurlashtirish, uning strukturasi qayta ko‘rib chiqish —muhim vazifalaridan biri hisoblanadi. 1995-yilga qadar ambulatoriyalar, poliklinikalar qoshida kunduzgi stasionarlar tashkil etilishi, yangi shakldagi davolash maskanlarida 55 mingdan ortiq kishi salomatligini tiklash imkonini bergan. Bu esa stasionarlarda davolangan bemorlarning 30 foizini tashkil etgan. Shu yo‘l bilan 73 million so‘m mablag‘ tejab qolingan. Amalga oshirilgan bir qator tadbirlar natijasida 1994-yilga nisbatan onalar va bolalar o‘limi ancha kamaygan. Biroq, viloyat tibbiyot maskanlarining, ayniqsa qishloq joylaridagi sog‘liqni saqlash muassasalarining moddiy-texnika bazasi talab darajasida bo’lmagan. 124 ta qishloq vrachlik ambulatoriyalaridan atigi 18 tasi tipovoy binolarda joylashgan. 388 ta feldsher-akusherlik punktlaridan 148 tasi gazlashtirilgan, 32 tasi markazlashgan suv ta’minotiga ega bo’lgan. Shuningdek, bularning 30 tasida telefon, 66 tasida radiotochkalari o‘rnatilmagan. Bemorlar uchun namunali tibbiyot xizmati ko‘rsatish ham talab darajasida bo’lmagan. Qishloq vrachlik ambulatoriyalari, feldsher-akusherlik punktlarini toza ichimlik suvi bilan ta’minlash masalalariga yetarli darajada e’tibor berilmagan. 1995-yil viloyatda 400 o‘rinli kasalxonalar 380 qatnovga mo‘ljallangan poliklinikalar qurilgan. 122 kilometr uzunlikda ichimlik suv quvurlari yotqizilgan. Vobkentda 120 o‘rinli kasalxona, Buxoro shaxrida 200 o‘rinli onkologiya dispanseri kurilib, foydalanishga topshirilgan. 1995-yil viloyat bo’yicha smenada 250 kishi qatnovchi poliklinikalar ham qurib bitkazilgan.

Kasaba uyushmalari, bolalar va “Sog‘lom avlod uchun” viloyat jamg‘armalari yetim-esirlar, kam ta’minlangan va ko‘p bolali oilalarning farzandlarini, balog‘atga yetmagan yoshlar ishi bilan shug‘ullanuvchi inspeksiyalar hisobida bo‘lgan o‘smirlarni bepul sog‘lomlashtirish uchun mablag‘ ajratib, katta yordam berdilar. Ko‘rilgan ushbu chora-tadbirlar o‘z ijobiy natijalarini berdi. Yozgi mavsum davomida Buxoro viloyatida 14 ta shahar tashqarisidagi, 7 ta sanatoriya tarzidagi, 2 ta sport sog‘lomlashtirish va 103 ta kunduzgi oromgohlar ish olib bordi. Ularda 30033 nafar bolalar va o‘smirlar dam olib, o‘z sog‘liklarini mustahkamladilar. Viloyat hokimligi va kasaba uyushmalari viloyat kengashi rayosatining ko‘rsatmasi

100,1 foizga bajarilib, bolalar umumiy sonining 22,5 foizi oromgohlarda hordiq chiqarishi ta’minlandi. O‘zbekiston kasaba uyushmalari Federatsiyasi Kengashi va O‘zbekiston Respublikasi Vazirlar Mahkamasi tomonidan belgilangan topshiriqlar 2,2 martaga oshirib bajarildi. Ushbu maqsadlarga 14,7 mln. so‘m, jumladan, davlat ijtimoiy sug‘urta mablag‘lari hisobidan 5,9 mln. so‘mdan ko‘proq, kolxozchilarning markazlashgan ijtimoiy sug‘urta fondi hisobidan esa sal kam 4,5 mln. so‘m sarflandi.

Shu bilan birga bu sohadagi muammo va kamchiliklarning mavjudligi yanada chuqurroq islohotlarni amalga oshirishni taqozo etadi. Qishloqlar aholisiga bor yo’g’i 399 ta feldsherlik-akusherlik punktlari xizmat ko‘rsatib, ulardan faqat 80 tasi zamonaviy, qolgan 319 tasi moslashtirilgan binolarda joylashgan. Qishloq vrachlik punktlardan 147 tasi qayta qurishga, 133 tasi almashtirishga, 33 tasi qo‘shimcha bino qurilishiga muhtoj bo’lib qolgan. 104 tasini esa butunlay buzib yangilash zarur bo’lgan. Faqatgina 197 ta punktda telefon-aloqa tarmog‘i mavjud bo’lgan. Viloyat bo‘yicha qishloq joylarda joylashgan ijtimoiy soha tarmoqlari muassasalari ahvoli ko‘rib chiqib 2 yil ichida ularning ahvolini tubdan yaxshilash bo‘yicha maxsus dastur tuzish ustida ish olib borgan. Unga ko‘ra, viloyatda 2001 yilga qadar feldsherlik-akusherlik punktlari soni 255 taga, hokimlik ambulatoriyalarining bir smenada qabul o‘rinlari 610 taga, qishloq uchastka kasalxonalari o‘rinlari soni 125 taga yetkazilishi reja qilingan.

Buxoro viloyat faollarining 1996-yil 31-may yig’ilishi bayonnomasiga ko’ra yilda viloyati bo‘yicha 124 ta FAP va 49 ta SVAlar yangidan SVPlarga aylantirildi va 50 ta yangi SVP qurilishi reja qilingan.

1996–2000 yillarda 50 ta qishloq davolash punktlari, 1996-yilda shaharlarda 5 ta, 1997-yilda qishloqlarda 10 ta yangi davolash punktlari qurilib foydalanishga topshirilishi natijasida aholining ambulatoriya-poliklinika muassasalari bilan ta’minlanganligi bir smenada 6,99 qatnashdan 7,26 gacha, 1997-yilda esa bu ko‘rsatkich 7,26 dan 7,89 gacha yetishi prognoz qilingan.

Patalogik va skrining profilaktikasi yaxshilanganligi sababli 1996-yil yakuni bo‘yicha bolalar o‘limi har 1000 ta tirik tug‘ilgan bolaga nisbatan 18,6 gacha (respublikadagi eng past ko‘rsatkich) tushirishga erishildi. 2000-yilgacha bo‘lgan muddatda ushbu ko‘rsatkichni 15–16 gacha, tug‘ilishni 19–20 taga, tabiiy o‘sishni 13–14 taga yetkazish rejalashtirilgan. Qishloq joylarida tibbiy xizmatni yaxshilash islohotlarning aholining eng quyi qatlamigacha yetib borishi uchun barcha chora-tadbirlar ishlab chiqilgan bo’lib, shu yilning o’zida G’ijduvon tuman Qaraxoni qishlog‘ida yangi ambulatoriya binosini ishga tushirildi. Unda 20 o‘rinli statsionar joylar bemorlarni qabul qilishga tayyorlab qo’yilgan.

Vazirlar Mahkamasining 1996-yil 21-maydagi 182-sonli “O‘zbekiston Respublikasi qishloqlarini ijtimoiy infratuzilmasini 2000-yilgacha bo‘lgan davrda rivojlantirish dasturi” qabul qilingan bo’lib. Bu dastur bo‘yicha qishloqlardagi bemorlar feldsherlarga emas, vrachlarga murojaat etadilar, malakali tibbiy yordam oladilar. Feldsher-akusherlik punktlari o‘rniga aholisi 1500 dan ko‘p bo‘lgan joylarda QVP/SVPlar faoliyat ko‘rsatadi. QVPlar vodoprovod suvi, gaz, radio, telefon va zamonaviy asbob-uskunalar bilan ta’minlanadi. QVPlarni tashkil etish rejasi bo‘yicha Buxoro viloyati Respublikada birinchi o‘rinda turadi. 1996 yilda 24 ta QVA va 60 ta FAP QVPga aylantirildi. Vobkent tumanida esa 1 ta QVA va FAP QVPga aylantirildi.

Respublikada amalga oshirilayotgan iqtisodiy islohotlardan to‘g‘ri xulosa chiqargan tibbiyot xodimlari o‘z ishlarida keskin o‘zgarishlar kiritdilar. Kasalxonalarda o‘z funksiyasini bajarmayotgan o‘rinlar qisqartirildi, ularning o‘rniga yangi davolash uslublari — kunduzgi va uy shifoxonalari ochildi. Masalan, 1996-yil Vobkent tumanida 10 loyihali 30 o‘rinli kichik shifoxona (AJM ambulatoriya jarrohlik markazi) faoliyat yo’lga qo’yilib. Shuningdek, 37 o‘rinli uy shifoxonasi ham ishga tushirildi.

Yangi uslubdagi muassasalarda davolangan bemorlar soni kasalxonada davolanganlarga nisbatan sezilarli darajada oshib borib, 1994-yilda 28 % ni, 1995-

yilda 35 % ni, 1996-yilning dastlabki 6 oyida esa 45 % ni tashkil etdi. Bunday davolash uslubi davlatimiz uchun ancha arzon tushmoqda.

Viloyat hokimligi va kasaba uyushmalari viloyat Kengashining rayosati 1997-yilda bolalar va o‘smirlarni sog‘lomlashtirish hamda ularning yozgi dam olishini tashkil etish bo‘yicha muayyan ishlarni amalga oshirdilar. Viloyatdagi oromgohlarda jami bo‘lib 28093 nafar bolalar va o‘smirlar sog‘lomlashtirildi.

1997-yilda bolalar va o‘smirlarni sog‘lomlashtirishni tashkil etishda bir qator kamchiliklarga yo‘l qo‘yildi. Buxoro shahri, Vobkent, Romitan, Olot, Buxoro tumanlarida sog‘lomlashtirish oromgohlarini ta’mirlash, ichimlik suvi, dori-darmon, malakali tibbiyot xodimlari bilan ta’minlash ishlari vaqtida hal etilmadi. 1997-yilning yoz mavsumida viloyat bo‘yicha 127 ta oromgoh ish olib bordi. Shulardan 13 tasi shahar tashqarisida, 7 tasi sanatoriya maqomidagi, 2 tasi sport-sog‘lomlashtirish va 106 tasi kunduzgi maktab oldi oromgohlari faoliyat ko‘rsatdi. Qishloq xo’jaligida ishlovchilarning 17050 nafaridan 14975 nafari dispanserizatsiyadan o’tkazildi, shulardan 3136 nafari kasal ekanligi ma’lum bo’lgan. Ulardan 2751 nafari ambulatoriya va 466 nafari stansionarda davolangan, 23 kishi ishga yaroqsiz deb topilgan. 1997-yilda nogironlardan 186 nafari dam olish sihatgohiga yo’llanma bilan yuborilgan. 2520 nafar viloyat ishlovchilari sanatoriya va 4080 nafari profilaktoriylarda o’z salomatligini mustahkamladi. 1997-yilda 29034 nafar bolalarning oromgohlarida dam olishdi. 63012,0 ming so’mlik kerakli dori-darmonlar va 45869,6 ming so’mlik tibbiy asbob-uskunalar viloyatga olib kelingan.

1998-yilda 120 o‘ringa mo‘ljallangan kasalxona hamda bir smenada 600 qatnovga poliklinika qurilishi ko‘zda tutilgan. Viloyatda tibbiyot xizmatining eng tejamkor va foydali bo‘lgan yangi turlarini rivojlantirish yuqori sur’atlar bilan tadbiq qilinib, 1997 yilda har 10 ming aholiga 53 ta o‘rin to‘g‘ri kelgan bo‘lsa, 1998 yilda har 10 ming kishiga 40 ta o‘rin to‘g‘ri kelishi ko‘zda tutilgan. 1997-yil 6 oy davomida uyda tug‘ilish holatlari soni 39 tani tashkil etgan bo‘lsa, 1998-yil 6 oy davomida 10 tug‘ilish uyda sodir bo‘lgan. 1997-yil 6 oy davomida 1 yoshgacha

bo‘lgan bolalar o‘limi 27 tani tashkil etib (har ming tug‘uruqqa 13,3 promille), 1998-yil 6 oy davomida 33 ta qayd etildi (bu esa har mingta tirik tug‘ilgan chaqaloqqa 16,6 promilleni tashkil qiladi). Onalik va bolalikni muhofaza qilish hamda aholiga tibbiy xizmatni yanada yaxshilash maqsadida shahar hokimligi va mahalla fuqarolar yig‘inlari, sog‘liqni saqlash bo‘limi hamkorligida 1, 3, 4-sonli poliklinikalar qaramog‘ida mahallalarda hokimlik bo‘limlari ochish uchun joylar ajratilib, ta’mirlash ishlari olib borildi.

Viloyat miqyosida 12 ta yangi qishloq hokimlik maskanlari qurilib foydalanishga topshirildi, ular 95 foiz tibbiy jihozlar bilan ta’minlandi. Bu maqsadlarga 13,4 mln so‘mlik mablag‘ sarflandi.

Viloyat sog‘liqni saqlash boshqarmasining ayrim muassasalarida Vazirlar Mahkamasining 1997-yil 2-dekabrdagi 532-sonli qarorining 4-ilovasida belgilangan “Ambulatoriyada davolashda dori-darmonlar bepul beriladigan kasalliklar va shaxslar ro‘yxati” talablari buzilgan. Masalan: Qorovulbovor tumanida 2-guruh nogironiga 635 so‘mlik dorilar bepul berilgan. Peshku tumanida 2-guruh nogironiga 704 so‘mlik dorilar bepul berilgan. Qorovulbozor tuman markaziy poliklinikasi shifokori E. Abdullayeva tomonidan astma kasali bilan og‘rigan bemorga 2160 so‘mlik dorilar bepul berilgan. Shuningdek, Peshku tumanidagi Turon jamoa xo‘jaligida istiqomat qiluvchi Ulug‘ Vatan urushi qatnashchisiga 1163 so‘mlik dorilar uchun retsept berilgan, ammo tekshiruvda uning kasallik kartasida shifokorga murojaat qilmaganligi aniqlangan. O‘rganish davomida aniqlangan xato va kamchiliklar bo‘yicha ko‘rilgan choralar natijasida 9 nafar rahbar egallab turgan lavozimidan ozod etilgan. 9 nafar xodimga “hayfsan” berilgan. 12 nafar xodimga oylik maoshining 20% miqdorida jarima solingan.

1999-yilda viloyatimiz aholisiga 85 tadan ziyod tez tibbiy yordam mashinalari xizmat ko‘rsatgan. Bu esa tez yordam mashinalariga bo‘lgan ehtiyojning 68 foizini tashkil qilgan, xolos. Tez yordam avtomashinalarini zamonaviy tibbiy asbob-uskunalar bilan ta’minlanishi talab darajasidan past bo‘lib, bu muammolarni yechish maqsadida sog‘liqni saqlash boshqarmasi tomonidan ayrim ishlar olib borilgan.

Viloyat tibbiyot sohasida islohotlarni tezlashtirish va uni bozor iqtisodiyoti sharoitiga moslashtirish, arzon tibbiyot uskunalarini topish uchun ishlar amalga oshirilgan. Davolash-muhofazalash muassasalarini mablag‘ bilan ta’minlashning yangi yo‘llari joriy qilingan. Viloyatda xususiylashtirish, nodavlat tizimini rivojlantirish va xususiy vrachlik faoliyatini takomillashtirishga katta e’tibor qaratilgan. Nodavlat tibbiyot muassasalari soni 97 taga yetkazildi. Shundan 55 tasi davlat tasarrufidan chiqarilgan bo‘lib, 27 tasi yangidan tashkil qilingan. Viloyatda 7 ta xususiy shifoxona mavjud bo‘lib, ularda 215 o‘rin faoliyat ko‘rsatgan. Yakka tartibda ishlovchi vrachlarning soni 428 taga yetdi. Agar 1998 yilning olti oyida budjetdan tashqari 48 mln. so‘mlik pullik xizmat ko‘rsatilgan bo‘lsa, 1999-yilning shu davriga kelib 64,5 mln. so‘mlik pullik xizmat ko‘rsatildi. Bu esa sog‘liqni saqlash sohasiga ajratilgan umumiy budjetning 5,8 foizini tashkil qiladi.

Tibbiyot sohasida olib borilayotgan ishlar natijasida aholi orasida ko‘pgina yuqumli kasalliklarning kamayishi kuzatildi. Masalan, virusli gepatitning 1998-yilning 6 oyiga nisbatan 1999-yilning 6 oyida 2,3 martaga, o‘tkir ichak infeksiyasining 14 foizga, brutsellez kasalligining esa 72 foizga kamayishi kuzatildi. Mavjud imkoniyatlardan foydalanish natijasida FAP, SVA va uchastka xonalari bazasida 224 ta qishloq vrachlik maskanlari tashkil qilinib, jami 261 ta maskanlar Viloyat aholisini 780 mingga yaqin birinchi yordam vrach tomonidan xizmat ko‘rsatish imkoniyati yaratilgan. 1996–1998 yillar davomida Romitan tumanida diagnostika markazi, Qorako‘l tumanida kunduzgi shifoxona bilan ko‘p tarmoqli poliklinika, Buxoro shahrida 380 qatnovga ega bo‘lgan bolalar poliklinikasi, 120 o‘rinli viloyat kardiologiya dispanseri va Vobkent tumanida 120 o‘rinli ayollarni sog‘lomlashtirish markazi ishga tushirildi. Shu bilan bir qatorda Kogon shahrida ko‘p tarmoqli poliklinika, Qorovulbozor tumanida 60 o‘rinli markaziy kasalxona, Jondor tumanida 40 o‘rinli tug‘ruq kompleksi va Buxoro shahrida 100 o‘rinli tug‘ruqxona hamda 380 qatnovga mo‘ljallangan sog‘lomlashtirish markazlarining qurilishi davom etmoqda.

2000-yilda Buxoro shahar kasalxonasi negizida “Respublika tez yordam ilmiy markazi” Buxoro viloyat filiali, Buxoro, Jondor va Romitan tumanlarida tibbiy shoshilinch tez yordam markazlari tashkil qilinib, foydalanishga topshirildi. 34 ta shahar va qishloq davolash-profilaktika muassasalari bepul tibbiy xizmat ko‘rsatish tizimida qoldirildi. 49 ta xususiy ambulatoriya-poliklinikalar tashkil etildi, 463 nafar vrachlar maxsus ruxsatnoma asosida faoliyat ko‘rsatgan.

Amalga oshirilgan islohotlar natijasida aholiga tibbiy xizmatni ko’rsatish 70 foizga yaxshilangan. Bolalar o’rasida o’lim holati esa 30-40 foizga kamayganligini ko’rishimiz mumkin. Shuningdek malakali tibiiy xodimlar bilan ta’minlanish darajasi ham past bo’lgan. Tibbiyot sohasini kadrlar bilan ta’minlash uzluksiz maqsadida viloyat hududidagi tibbiyot texnikumlari kasb-hunar kollejlariga aylantirilgan.

DEVELOPMENT OF DENTAL CARIES, THE ROLE OF ORAL MICROFLORA AND MODERN PREVENTIVE METHODS

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Abstract: *Dental caries is one of the most widespread non-communicable diseases worldwide, and the oral microbiota and its balance (homeostasis) play a crucial role in its development. This article provides an in-depth analysis of the microbiological basis of caries pathogenesis, particularly focusing on cariogenic bacteria such as Streptococcus mutans,*

Lactobacillus, and others, as well as the process of biofilm formation. Based on the ecological plaque hypothesis, the study examines how dysbiosis accelerates the demineralization process.
In addition, modern preventive methods of caries are discussed, including fluoride-based agents, silver diamine fluoride, nanotechnology (nano-hydroxyapatite), probiotics, and sugar substitutes such as xylitol, with their mechanisms of action explained based on scientific evidence.
The article highlights the advantages of preventive approaches aimed at early detection of caries, maintaining microbial balance, and promoting tissue regeneration, rather than relying solely on traditional operative treatment methods. It also outlines future strategies in dentistry.

Keywords: *caries, oral microflora, Streptococcus mutans, biofilm, dysbiosis, remineralization, silver diamine fluoride, nano-hydroxyapatite, probiotics, ecological plaque hypothesis*

INTRODUCTION

According to the World Health Organization (WHO), dental caries is one of the most common non-communicable diseases affecting humanity. Approximately 90% of the world's population experiences caries and its complications at some point in their lives.

Although dental caries has been a major human health issue for centuries, only in recent decades have its true microbiological and biochemical causes been fully understood. Previously, caries was considered a simple condition caused mainly by sugar consumption and poor oral hygiene. However, modern science now recognizes caries as a complex ecological disease.

This disease is directly associated with an imbalance in the oral microbiota, known as dysbiosis. The oral cavity hosts one of the largest and most diverse microbiomes in the human body, consisting of more than 700 species of bacteria, as well as fungi, viruses, and protozoa. Under normal conditions, these microorganisms are beneficial to human health: they aid in digestion, stimulate the immune system, and prevent the growth of pathogenic organisms.

However, various external and internal factors—such as a carbohydrate-rich diet, reduced saliva flow, and weakened immunity—can disrupt this symbiotic

balance. As a result, cariogenic bacteria become dominant and begin to damage tooth enamel.

The aim of this scientific article is to provide a detailed analysis of the role of oral microflora in the development of dental caries, to examine molecular-level interactions between bacteria and the human body, and to highlight modern, evidence-based preventive approaches that can replace traditional treatment methods.

Modern dentistry is shifting from surgical interventions (drilling and filling) toward prevention, early detection, and the natural or artificial restoration of tooth tissues (remineralization). The article further discusses the role and importance of microbiota modulation, probiotic therapy, nanotechnology, and advanced chemical agents in caries prevention based on international scientific research.

MAIN PART

1. Anatomical and physiological characteristics of the oral microbiome

The oral cavity is a unique ecosystem characterized by stable temperature, moisture, pH levels, and a c This ecosystem includes several distinct ecological niches: the tooth surface, the rough dorsal surface of the tongue, the mucosal surfaces of the cheeks and palate, and the subgingival space. Each niche possesses its own unique microflora. For instance, the hard surface of teeth provides an ideal environment for adhesion-based bacteria, whereas the spaces between the papillae of the tongue create favorable conditions for anaerobic microorganisms.

The human oral microbiome begins to develop from the earliest days of life. Immediately after birth, various microorganisms are transferred into the infant’s oral cavity from the mother and the surrounding environment. During the first months, Streptococcus salivarius predominates. With the eruption of primary teeth, new ecological niches are formed, allowing colonization by bacteria adapted to tooth surfaces, such as Streptococcus sanguinis and Streptococcus mutans.

The oral microbiome continues to change throughout life depending on age, dietary habits, general health status, and antibiotic use. In a healthy oral cavity,

commensal microorganisms maintain a mutually beneficial relationship with host cells. They act as a barrier against external pathogens, help maintain acid–base balance, and contribute to systemic blood pressure regulation by converting nitrates into nitrites.onstant supply of nutrients.

2. Dental Biofilm (Plaque) and Its Formation Mechanisms

The direct cause of dental caries is a complex biological structure formed on the tooth surface known as a biofilm, commonly referred to in dentistry as dental plaque. A biofilm is not merely a collection of bacteria; rather, it is a highly organized microbial community embedded in an extracellular polymeric substance (EPS) matrix, enabling communication and exchange of nutrients and signals.

Biofilm formation occurs in four main stages. In the first stage, a thin, acellular pellicle layer composed of salivary proteins and glycoproteins forms on the tooth surface. Although the pellicle has protective properties, it also serves as a receptor for bacterial adhesion.

In the second stage, early colonizers—primarily Streptococcus species (S. sanguinis, S. oralis, S. mitis) and Actinomyces species—attach to the pellicle. This process is mediated by Van der Waals forces and specific protein–receptor interactions.

In the third stage, these initial bacteria modify the local environment by secreting various substances, thereby creating favorable conditions for secondary colonizers. During this phase, bacteria such as Fusobacterium nucleatum act as a “bridge,” linking early and late colonizers.

The fourth stage is biofilm maturation, during which bacteria form a complex three-dimensional structure and synthesize extracellular polysaccharides (glucans and fructans). This matrix protects the microbial community from mechanical removal, salivary flow, and the effects of antibiotics. It is within this mature biofilm that cariogenic processes begin.

3. Cariogenic Microorganisms and Their Virulence Factors

Several specific bacterial species play a key role in the development of dental caries, among which Streptococcus mutans is the most significant. This organism possesses three major virulence factors that distinguish it from commensal bacteria.

The first is acid production (acidogenicity). S. mutans rapidly metabolizes simple carbohydrates—especially sucrose, glucose, and fructose—through glycolysis, producing large amounts of lactic acid.

The second is acid tolerance (aciduricity). When the pH within the biofilm drops to acidic levels, many beneficial bacteria are inhibited or destroyed. However, S. mutans can survive and continue to proliferate in such conditions by maintaining intracellular pH homeostasis through proton pumps (F-ATPase) located in its cell membrane.

The third virulence factor is the production of glucosyltransferase (GTF) enzymes. These enzymes break down sucrose and synthesize water-insoluble glucans, which form the structural foundation of the biofilm, making it dense and sticky.

In addition to Streptococcus mutans, Lactobacillus species also play an active role in caries development. Although lactobacilli do not initiate the initial demineralization, they are crucial in deepening the carious lesion and invading the dentin layer once a cavity has formed. These bacteria are highly adapted to acidic environments.

Recent studies using DNA sequencing have shown that caries pathogenesis involves not only these two bacterial species but also Scardovia wiggsiae, Bifidobacterium, Actinomyces, and Veillonella species. This evidence demonstrates that dental caries is not caused by a single bacterium, but rather by a complex microbial community, confirming its nature as a polymicrobial disease.

4. Caries Pathogenesis: Dysbiosis and the Ecological Plaque Hypothesis

Several theories have been proposed to explain the mechanism of caries development. In the early years, the Specific Plaque Hypothesis dominated, suggesting that caries is caused exclusively by S. mutans. Later, the Nonspecific

Plaque Hypothesis proposed that caries could result from acid production by any bacteria.

Currently, the most widely accepted and evidence-based explanation is the Ecological Plaque Hypothesis, proposed by Philip Marsh. According to this theory, caries develops as a result of a shift in the ecological balance within the dental biofilm. In a healthy oral cavity, there is a balance between beneficial (alkaline-loving) and harmful (acid-loving) bacteria.

When a person frequently consumes sugary foods, bacteria within the biofilm metabolize carbohydrates and produce acids, causing the pH to drop sharply. If sugar consumption is infrequent, salivary buffers neutralize the acid, and the pH returns to neutral. However, frequent and excessive intake of carbohydrates prevents the saliva from restoring pH effectively. As a result, the biofilm remains acidic for prolonged periods, creating an environment favorable for acid-tolerant (aciduric) and acid-producing (acidogenic) bacteria, particularly S. mutans and Lactobacilli.

Under these conditions, cariogenic bacteria proliferate rapidly and outcompete beneficial species. This pathogenic shift in the microbiota is known as dysbiosis. Dysbiosis leads to a high concentration of acids on the tooth surface, causing calcium and phosphate ions to leach from enamel. This process, called demineralization, marks the initial stage of caries.

5. The Role of Saliva and the Demineralization–Remineralization Dynamic

Caries is not merely a process of enamel destruction; it represents a dynamic balance between demineralization (loss of minerals) and remineralization (restoration of minerals). Saliva plays a critical role in maintaining this balance.
Mechanically, saliva helps wash away food debris and free-floating bacteria from the oral cavity. More importantly, its buffering systems—including bicarbonate, phosphate, and proteins such as carbonic anhydrase and histatins—neutralize acids. This process can be illustrated using the Stephan curve. Following carbohydrate intake, the pH of the biofilm drops sharply within 2–3 minutes. If the pH falls below

5.5 (the critical pH for enamel), hydroxyapatite crystals begin to dissolve, initiating demineralization. Approximately 20–30 minutes later, the buffering action of saliva restores the pH above 5.5, halting demineralization and allowing remineralization to occur.

At this stage, calcium and phosphate ions in saliva are redeposited into the tooth enamel, restoring the crystal lattice. This process is known as remineralization. If a person consumes sugary foods only during main meals, remineralization can fully compensate for demineralization, preventing the development of caries.

However, frequent consumption of sweetened tea, candy, or carbonated beverages causes the pH to remain below 5.5 for prolonged periods. In this situation, remineralization is insufficient, and enamel gradually erodes, eventually forming macroscopic carious cavities.

Additionally, saliva contains antibacterial enzymes such as lysozyme, lactoferrin, lactoperoxidase, and secretory IgA immunoglobulins, which directly inhibit the growth of pathogenic bacteria. Reduced salivary flow (xerostomia)—observed in patients undergoing radiation therapy, those with diabetes or Sjögren's syndrome, or taking certain medications—leads to rapid and aggressive caries development, highlighting the critical protective role of saliva.

6. Modern Preventive Methods of Caries: Fluorides and Chemical Agents

Modern dentistry offers numerous preventive strategies to stop caries early or at the initial (white spot) stage. Among these, the most effective and scientifically validated method is the use of fluorides. Fluoride acts against caries through three main mechanisms:

1. Formation of fluorapatite: Fluoride ions combine with calcium and phosphate in saliva and biofilm to form fluorapatite ($Ca_{10}(PO_4)_6F_2$) crystals on the enamel surface. Fluorapatite is more resistant to acid than hydroxyapatite, with a critical pH for dissolution of 4.5. Teeth coated with fluorapatite maintain their integrity even in highly acidic conditions.

2. Enhanced remineralization: Fluoride accelerates the redeposition of calcium and phosphate lost during demineralization, promoting faster remineralization of enamel.

3. Inhibition of bacterial metabolism: Fluoride enters bacterial cells as hydrogen fluoride (HF), acidifies the intracellular environment, and inhibits enolase, a key enzyme in glycolysis. As a result, bacterial acid production and proliferation are significantly reduced.

Fluoride can be delivered via toothpastes, varnishes, gels, mouth rinses, and fluoridated water.

Another Innovative chemical preventive agent is Silver Diamine Fluoride (SDF). SDF contains silver (antimicrobial), fluoride (remineralization), and ammonia (stabilizer). When applied to a carious lesion, silver ions disrupt bacterial cell walls, inhibit enzymes, and halt bacterial DNA replication. Silver also stabilizes collagen in affected dentin and prevents its degradation by matrix metalloproteinases (MMPs). Fluoride promotes tissue remineralization. SDF is especially revolutionary in pediatric dentistry, for individuals with disabilities, and in settings where conventional restorative care is limited, as it allows non-invasive arrest of caries.

7. Sugar Substitutes: Role of Xylitol and Erythritol

Dietary control is crucial in caries prevention. Replacing sucrose with alternative sweeteners is an effective strategy. Among these, xylitol is particularly effective. Xylitol is a five-carbon sugar alcohol with a unique anticaries effect. Streptococcus mutans mistakenly metabolizes xylitol as if it were sugar, taking it up into the cell and converting it into xylitol-5-phosphate. However, the bacterium cannot process xylitol in glycolysis, so it gains no energy, reducing its growth and acid production.

Accumulated xylitol-5-phosphate inside bacterial cells exerts a toxic effect, disrupting bacterial metabolism. To survive, the bacterium expends energy to expel this compound, creating a “futile cycle”, which ultimately leads to bacterial starvation or growth arrest. Xylitol is commonly used in chewing gums, candies, and

toothpastes. Regular consumption of xylitol also reduces the amount of sticky polysaccharides in the biofilm, making dental plaque softer and easier to remove.

Recent studies indicate that another sugar alcohol, erythritol, may be even more effective than xylitol due to its smaller molecular size, which allows it to penetrate bacterial biofilms more easily.

8. Modulation of Oral Microflora: Probiotics, Prebiotics, and Synbiotics

Based on the modern ecological hypothesis, the focus of caries management is shifting from complete eradication of pathogens to modulation of the oral microbiome towards a healthy state. In this context, probiotics have been extensively studied. Probiotics are live microorganisms that, when administered in sufficient quantities, confer health benefits to the host.

For the oral cavity, commonly used probiotics include strains of Lactobacillus (L. rhamnosus GG, L. reuteri), Bifidobacterium, and specially developed Streptococcus species (e.g., S. dentisani, S. salivarius K12, M18). Probiotics prevent caries through several mechanisms:

They compete with S. mutans for adhesion sites and nutrients on the tooth surface and within biofilms (competitive inhibition).

Some probiotics produce bacteriocins (proteins that kill other bacteria) and hydrogen peroxide, reducing the number of cariogenic bacteria.

Arginolytic probiotics, such as S. sanguinis and S. gordonii, metabolize arginine in the diet to release ammonia, which is strongly alkaline, neutralizing the acidic environment in biofilms and providing a protective effect against caries.

Prebiotics are non-digestible nutrients that selectively stimulate the growth and activity of beneficial oral bacteria. Arginine and urea are considered effective oral prebiotics. Studies show that toothpastes containing 1.5% arginine significantly reduce caries risk compared to standard fluoride toothpastes.

The combination of probiotics and prebiotics is known as synbiotics, which is expected to become one of the most powerful tools for caries prevention in the future.

9. Nanotechnology and Biomimetic Remineralization

In recent years, the application of nanotechnology in dentistry has opened new avenues for caries prevention and treatment. Due to the limitations of fluoride and potential side effects (e.g., fluorosis from excessive intake), alternative agents are being explored. One of the most promising is nano-hydroxyapatite (nHAp).

Tooth enamel naturally consists of hydroxyapatite crystals measuring 20–40 nanometers. Laboratory-synthesized nano-hydroxyapatite particles closely mimic these natural crystals in size and structure, exhibiting biomimetic properties. They can penetrate microscopic enamel fissures and demineralized areas, mechanically filling defects and forming a new enamel layer.

Unlike fluoride, nHAp does not require calcium and phosphate in saliva because it already contains these minerals. Studies show that nHAp-containing toothpastes are as effective as fluoride toothpastes in reducing tooth sensitivity and remineralizing early-stage caries (white spot lesions), and in some cases, they demonstrate superior results.

Other nanomaterials, such as silver nanoparticles (AgNPs), zinc oxide nanoparticles (ZnO NPs), and chitosan-based nanocomposites, are increasingly incorporated into toothpastes, dental restoratives, and adhesive systems due to their strong antibacterial properties. They inhibit biofilm formation and significantly reduce bacterial adhesion to surfaces.

10. Future Perspectives: Vaccines and Photodynamic Therapy

The idea of generating immunity against caries—i.e., developing a vaccine—has attracted scientific interest for decades. Caries vaccines primarily target the virulence factors of Streptococcus mutans (GTF enzymes, adhesion proteins such as AgI/II). The goal is to stimulate the production of secretory IgA antibodies in the oral mucosa, blocking bacterial adhesion to teeth and acid production.

While animal studies have been promising, a fully safe and effective vaccine for humans has not yet been clinically implemented. Challenges include the complexity of the oral microbiome and the similarity of S. mutans proteins to human

cardiac muscle proteins (risk of cross-reactivity). Research on subunit and DNA vaccines is ongoing.

Another innovative approach is Antimicrobial Photodynamic Therapy (aPDT). In this method, a photosensitive compound (e.g., tolonium chloride or methylene blue) is applied to the tooth surface and activated by light of a specific wavelength (laser or LED). Upon activation, the photosensitizer generates reactive oxygen species (ROS). These free radicals selectively kill stained bacteria such as S. mutans and disrupt their biofilm. This method is a local, non-toxic, and antibiotic-free antibacterial therapy that does not induce resistance. Photodynamic therapy has demonstrated particular efficacy in deep caries and root canal decontamination.

CONCLUSION

In summary, dental caries is not merely the destruction of tooth tissue but a condition resulting from complex ecological and biochemical disruptions between the host and its oral microbiome. A thorough understanding of the microbiota, carbohydrate metabolism, and salivary protective functions allows the development of revolutionary strategies for prevention and management.

Over the past decade, scientific understanding of dental caries and its pathogenesis has evolved significantly. It is now clear that caries arises not solely from the presence of specific pathogens but from dysbiosis in the oral microbiome—an imbalance in ecological equilibrium. Cariogenic bacteria such as Streptococcus mutans and Lactobacilli produce an acidic environment in the presence of carbohydrate-rich diets, triggering demineralization.

Importantly, at the early stages of the disease, proper interventions can reverse this process through remineralization, which is a major achievement of modern dentistry. Traditional “drill-and-fill” approaches are gradually being replaced by minimally invasive, conservative, and preventive strategies.

Fluoride compounds, silver diamine fluoride (SDF), sugar alcohols (xylitol, erythritol), and more recently, biomimetic agents such as nano-hydroxyapatite have

demonstrated high effectiveness in restoring tooth tissues and reducing bacterial activity.

In the future, probiotics, prebiotics, and modulators such as arginine are expected to serve as the primary and natural shield against caries by maintaining a healthy oral microbiome. From a practical standpoint, public health recommendations should emphasize reducing sugar consumption, promoting oral hygiene, and supporting preventive strategies to preserve oral health at the population level.

In addition to improving hygienic skills, it is advisable for clinicians to implement personalized preventive programs that take into account each patient's microbiome status and salivary characteristics. The widespread clinical adoption of innovative nanotechnologies and microbiome management strategies may, in the near future, help reduce dental caries from a global health problem to a manageable

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EARLY DETECTION AND TREATMENT EFFECTIVENESS OF DENTAL CARIES IN PRIMARY TEETH IN CHILDREN

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Annotation: *This article is devoted to a comprehensive scientific analysis of modern methods for the early detection of dental caries in primary teeth in children (Early Childhood Caries – ECC) and the effectiveness of treatment approaches. Dental caries in primary teeth is one of the most widespread chronic diseases among children worldwide, and its complications negatively affect a child's overall health, physical growth, nutrition, and psychological well-being. The article thoroughly examines the anatomical and histological characteristics of primary teeth, as well as microbiological, nutritional, and socio-economic risk factors involved in the pathogenesis of the disease. The effectiveness of traditional visual-tactile diagnostics is compared with the ICDAS system and advanced technological methods (DIAGNOdent, QLF, FOTI). In addition, modern treatment protocols such as non-surgical remineralization therapy (fluoride varnishes, silver diamine fluoride) and minimally invasive approaches (ART method, Hall technique) are presented. The clinical and economic advantages of early detection and preventive measures are substantiated.*

Keywords: *Primary teeth caries, Early Childhood Caries, ICDAS system, Remineralization, Silver diamine fluoride, Minimally invasive treatment, Atraumatic restorative treatment, Pediatric dentistry, Oral microbiome, Prevention, Hall technique, Fluoride-containing agents*

INTRODUCTION

The issue of dental caries in primary teeth among children remains one of the most pressing and widespread medical and social problems in modern dentistry and general pediatrics. According to data from the World Health Organization (WHO), 60–90% of preschool children worldwide suffer from various degrees of primary tooth caries. The concept of Early Childhood Caries (ECC) is characterized by its rapid clinical progression, simultaneous involvement of multiple teeth, and the potential to lead to serious complications within a short period of time.

For many years, there has been a completely incorrect and harmful belief in society—and sometimes even among healthcare professionals—that “primary teeth will fall out anyway, so they do not need treatment.” However, evidence-based medicine has clearly demonstrated that primary teeth are not merely temporary structures; they perform vital functions such as ensuring proper chewing, supporting digestive processes, contributing to correct speech development, guiding proportional growth of the jaw and facial bones, and maintaining space for permanent teeth.

Pain caused by caries and its complications disrupts a child’s eating habits, leading to deficiencies in proteins, vitamins, and micronutrients, which in turn may result in delays in physical and cognitive development. Furthermore, visible aesthetic defects in teeth can negatively affect a child’s psychological state, leading to decreased self-confidence and feelings of social isolation.

The main objective of this article is to conduct an in-depth analysis of the mechanisms of caries development in primary teeth, to study early diagnostic methods that allow the disease to be halted without surgical intervention, and to evaluate the clinical effectiveness of modern minimally invasive treatment

technologies. The article also emphasizes the importance of transitioning from the traditional “drill and fill” model to a “medical management” model aimed at addressing the root causes of the disease, supported by scientific evidence.

MAIN PART

1. anatomical and histological features of primary teeth

Primary teeth differ significantly from permanent teeth in their structure, shape, and histological characteristics, and these differences are among the main factors determining their higher susceptibility to caries. Firstly, the enamel layer of primary teeth is thinner compared to that of permanent teeth have a structure that is almost twice as thin compared to permanent teeth, with an average thickness of only 0.5 to 1.0 millimeters. The orientation of enamel prisms is also unique, as they are arranged at an angle relative to the surface, which facilitates easier enamel breakdown under the influence of acids.

In addition, the enamel of primary teeth contains a lower amount of mineral substances (particularly calcium and phosphorus) compared to permanent teeth, while the content of organic components and water is higher. Hydroxyapatite crystals are smaller in size and spaced further apart, allowing microbial acids to penetrate the tooth tissue more quickly and easily.

Regarding the dentin layer, in primary teeth the dentinal tubules are shorter than in permanent teeth, but their diameter is significantly wider. This anatomical feature means that once the carious process passes the enamel–dentin junction, pathogenic bacteria and their toxins can rapidly move through the wide dentinal tubules directly toward the pulp chamber.

Therefore, even superficially appearing caries in primary teeth has a very high risk of progressing within a short period to deep caries and even pulpitis. Another important aspect is the relatively large size of the pulp chamber in primary teeth and the close proximity of its horns to the enamel–dentin junction. This anatomical positioning requires extreme caution from the dentist during treatment, as even minor mechanical impact may expose the pulp and trigger inflammation.

2. etiology and pathogenesis of early childhood caries

Early Childhood Caries (ECC) is a polyetiological, or multifactorial, chronic disease, the development of which requires the simultaneous action of three main factors over a certain period: a susceptible tooth surface, the presence of cariogenic microflora, and a source of fermentable carbohydrates.

Modern microbiological studies show that Streptococcus mutans and Streptococcus sobrinus are the primary pathogenic agents responsible for caries. These bacteria produce specific enzymes (glucosyltransferases) that convert sucrose into insoluble extracellular polysaccharides—glucans and fructans. These polysaccharides enable bacteria to firmly adhere to the tooth surface and form a protective biofilm (dental plaque).

Cariogenic bacteria are often transmitted to a child's oral cavity from the mother or other caregivers through vertical transmission (such as licking a pacifier, sharing utensils, or kissing). The earlier the child becomes colonized by these bacteria (the so-called "window of infectivity"), the higher the risk of caries development.

Within dental plaque, bacteria metabolize easily fermentable carbohydrates (such as sugar, fructose, and glucose) introduced with food, producing organic acids (mainly lactic acid) as byproducts. When the acidity of the oral environment drops below pH 5.5 (and for primary teeth, even around 6.2), demineralization begins—calcium and phosphate ions leach out of the enamel into saliva.

If the buffering capacity of saliva is sufficient and carbohydrate intake is not frequent, the pH level gradually returns to normal, allowing remineralization (the return of minerals to the enamel) to occur. However, frequent and prolonged consumption of sugary foods in children leads to demineralization outweighing remineralization, ultimately resulting in the formation of carious lesions.

3. dietary, behavioral, and socio-economic risk factors

Dietary habits play a crucial role in the pathogenesis of dental caries in primary teeth among children. In particular, nighttime feeding with artificial

formulas, sweetened milk, or fruit putting a child to sleep with a bottle filled with juice is a harmful habit that can lead to serious consequences, and this condition is medically referred to as “baby bottle caries.” During sleep, the activity of the salivary glands significantly decreases, leading to reduced saliva flow and a diminished ability to wash the teeth and neutralize (buffer) acids.

As a result, the sweet liquid from the bottle accumulates, especially around the upper front teeth, and serves as a continuous source of nutrition for bacteria throughout the night. This leads to rapid superficial demineralization and destruction of the upper teeth, often presenting as circumferential (ring-shaped) caries.

Although breast milk itself does not have strong cariogenic properties, frequent nighttime breastfeeding combined with other solid foods and carbohydrates has also been proven to increase the risk of caries.

In addition to nutrition, socio-economic factors play a dominant role in the spread of the disease. Low family income, limited access to healthy foods, the level of parental education, and especially poor awareness of oral health directly contribute to higher rates of Early Childhood Caries (ECC). In rural areas, the lack of clean and fluoridated drinking water further aggravates the situation as a regional risk factor.

Since children are unable to maintain proper oral hygiene independently, constant parental supervision and assistance are required. Failure to use fluoride toothpaste or irregular oral hygiene practices creates favorable conditions for disease progression.

4. modern methods for early detection of caries

Detecting caries before clinical cavitation occurs—at the stage of initial demineralization (macula alba, or white spot lesion)—is the most critical factor determining treatment success.

The visual-tactile method remains the foundation of caries diagnosis; however, the traditional use of a sharp dental probe is now considered outdated and potentially harmful. It has been proven that the sharp tip of a probe can mechanically

damage and even penetrate the weakened, demineralized enamel surface, artificially facilitating deeper microbial invasion.

For this reason, the internationally recognized ICDAS (International Caries Detection and Assessment System) is being widely implemented worldwide. This system evaluates caries based on careful cleaning of the teeth and drying with air under proper lighting, using codes from 0 to 6:

Code 0 – Completely healthy tooth surface

Code 1 – First visual change in enamel visible only after prolonged air drying (faint white spot)

Code 2 – Clearly visible white or brown spot even without drying

Code 3 – Localized enamel breakdown without visible dentin

Code 4 – Underlying dark shadow of dentin visible through enamel

Code 5 – Distinct cavity with visible dentin

Code 6 – Extensive and deep cavity involving more than half of the tooth surface

The ICDAS system allows precise identification of the disease stage and makes it possible to completely reverse early lesions (codes 1 and 2) through remineralization without using a dental drill.

This visual assessment should be complemented by digital radiography (bitewing projection) for detecting hidden caries on proximal (interdental) surfaces. Digital radiography not only determines the depth of the lesion but also measures the distance to the pulp horn, while reducing radiation exposure by 80–90% compared to conventional film radiography.

5. instrumental and technological diagnostic modalities

In cases where the capabilities of visual diagnostics are limited—especially when objectively assessing initial changes in deep fissures (pits) on chewing surfaces or on adjacent tooth surfaces—dentistry high-tech instrumental methods have been introduced into dental practice. One of them is the diagnodent device, which is based on the principle of laser fluorescence. The device directs a red laser beam with a specific wavelength (655 nm) onto the tooth surface. Healthy enamel reflects the

light uniformly, whereas metabolites produced by bacteria involved in the caries process (particularly porphyrins) absorb the light and emit fluorescence in the infrared spectrum.

The device captures this reflected signal and displays numerical values ranging from 0 to 99 on the screen. Higher readings indicate a greater degree of demineralization and bacterial involvement.

Another modern method is QLF (Quantitative Light-induced Fluorescence). This system projects blue light onto the tooth surface, where healthy enamel fluoresces green, while carious or demineralized areas appear as dark spots due to loss of fluorescence. A computer program precisely calculates the percentage of fluorescence loss. This method is particularly valuable for dynamically monitoring the effectiveness of treatment (for example, assessing enamel remineralization after fluoride therapy).

The FOTI (Fiber-Optic Transillumination) technology involves transmitting a strong light beam through the tooth crown using fiber optics. Healthy enamel transmits light effectively, whereas porous, damaged tissue scatters light and appears as dark areas similar to those seen on radiographs. FOTI is especially useful in young children as a completely safe and effective alternative for detecting interproximal caries without radiation exposure.

6. shift in treatment paradigm: transition to the medical model

Historically, the treatment of caries in dentistry was understood primarily as a surgical procedure—removing damaged tissue using a dental drill and filling the resulting cavity with synthetic materials (“drill and fill”). However, this approach addresses only the consequences of the disease and does not treat its underlying microbiological causes.

Today, the “Medical Model of Caries Management” has become dominant in global dentistry. This model focuses on stopping the disease without surgical intervention by targeting its biochemical mechanisms.

Within this approach, key priorities include individual caries risk assessment (Caries Risk Assessment – CAMBRA system), reduction of bacterial load, improvement of saliva quality, and remineralization of hard dental tissues.

In young children, traditional operative treatment requires local anesthesia (injections) and the use of rotary instruments, which may cause significant psychological trauma and lead to lifelong dental fear (dentophobia). Therefore, non-invasive (no removal of tooth tissue) and minimally invasive (careful removal of only affected areas) methods have become the standard in managing caries in primary teeth.

7. remineralization therapy and non-invasive treatment methods

Fluoride-based preparations have the strongest evidence base for reversing and arresting early-stage caries (ICDAS codes 1 and 2). In clinical practice, dental varnishes containing 5% sodium fluoride (NaF) are widely used as the most effective and safe preventive measure.

When applied to the tooth surface, fluoride varnish hardens under the influence of saliva and remains on the surface for an extended period, gradually releasing fluoride ions. These ions react with calcium and phosphate in the enamel to form fluorapatite crystals, which are significantly more resistant to acid than hydroxyapatite. 4.5 pH the critical pH is reduced, which significantly increases the enamel's resistance to acidic attacks. In addition, fluoride penetrates the bacterial cell membrane, inhibits the enzyme enolase, and directly suppresses acid production. In recent years, another agent that has revolutionized pediatric dentistry worldwide is Silver Diamine Fluoride (SDF). This colorless liquid, typically used in a 38% concentration, is capable of arresting not only early-stage caries but also deep cavitated lesions without the use of a dental drill.

Its mechanism of action is dual: silver ions provide a strong antibacterial effect by disrupting bacterial cell walls, coagulating their DNA and proteins, and inhibiting their proliferation. Silver ions also protect dentin collagen fibers from degradation. Fluoride ions, in turn, promote remineralization.

The application of SDF is extremely simple: the liquid is applied to the carious lesion using a microbrush and then dried. The only aesthetic drawback is that the treated carious area turns dark black. Therefore, when applying it to anterior teeth, it is essential to inform parents in advance and obtain their written consent.

Another promising non-invasive agent is the Casein Phosphopeptide–Amorphous Calcium Phosphate (CPP-ACP) complex. This bioactive material, derived from casein protein in cow's milk, creates a supersaturated environment of bioavailable calcium and phosphate ions on the tooth surface and within dental plaque. As a result, the porous, demineralized enamel is naturally restored through remineralization.

8. minimally invasive operative treatment techniques

If a carious cavity is large and leads to food impaction, restoration with filling material becomes necessary. In such cases, the Atraumatic Restorative Treatment (ART) method—recommended by the World Health Organization—has proven to be highly effective.

The essence of the ART technique is that decayed tissue is removed using only hand instruments (excavators), without the use of rotary drills, local anesthesia, or water cooling. The cleaned cavity is then filled with a high-viscosity glass ionomer cement (GIC).

This method is well tolerated by children, does not cause pain or fear, and is especially suitable for use in rural areas or school settings where specialized dental equipment may not be available. GIC chemically bonds to tooth tissues and continuously releases fluoride ions over time, helping prevent secondary caries around the restoration.

Another innovative minimally invasive approach is the Hall Technique, developed by Scottish dentist Norna Hall. This method has revolutionized the treatment of deep caries in primary molars.

In the Hall Technique, the carious lesion is not removed, the tooth is not prepared, and no injections are administered. Instead, a preformed stainless steel

crown (SSC) of appropriate size is cemented over the affected tooth using glass ionomer cement. The entire procedure takes only a few minutes.

The crown hermetically seals the tooth from the oral environment. Bacteria trapped within the carious lesion are cut off from external carbohydrate sources, deprived of nutrients, and consequently their acid production stops, effectively arresting the caries process.

Long-term randomized clinical studies have shown that treatment using the Hall Technique treated primary teeth maintained their vitality significantly longer compared to those treated with conventional operative methods, and the risk of complications was reduced to a minimal level.

9. conventional treatment and modern restorative materials

In cases where high aesthetic and functional demands are required, and when clinical conditions permit, conventional operative approaches are still used in modern modified forms.

Materials selected for restoring primary teeth must possess specific properties, including resistance to moisture (since children have increased salivation and isolation is difficult), rapid setting time, and strong adhesion to tooth tissues.

As mentioned earlier, glass ionomer cements (GIC) are the materials of first choice for primary teeth. Their polyacrylic acid component chemically bonds with calcium ions in the tooth, forming a strong adhesion. Today, resin-modified glass ionomer cements (RMGIC), which are light-cured hybrid materials, provide both strength and satisfactory aesthetic results.

Compomers are hybrids of composite resins and glass ionomers. They harden mainly through light polymerization, offer excellent aesthetics and sufficient mechanical strength, and are widely used for restoring both anterior and posterior primary teeth. Their fluoride-releasing properties and natural color harmony make them especially popular in pediatric dentistry.

In large carious cavities—particularly when three or more surfaces of a tooth are affected—the risk of restoration failure (fracture or loss) is significantly

increased. In such cases, the most reliable approach is to restore the tooth using preformed stainless steel crowns or, when aesthetics are important, zirconia crowns. These crowns fully restore the anatomical shape of the primary tooth, distribute masticatory forces properly, and provide reliable protection until the natural exfoliation of the tooth.

10. treatment of deep caries and pulpal diseases

If the carious process reaches the pulp (nerve) chamber, endodontic intervention becomes necessary. In children, the most commonly used standard procedure for inflamed pulp in primary teeth is pulpotomy (partial pulp removal).

In this procedure, the infected coronal pulp is removed, while the healthy radicular pulp tissue inside the root canals is preserved.

In the past, formocresol (a toxic and potentially carcinogenic substance) was widely used to devitalize the remaining pulp tissue. However, modern dentistry has replaced it with safer alternatives such as ferric sulfate and highly bioactive materials like MTA (Mineral Trioxide Aggregate) and Biodentine.

These bioactive materials not only preserve the vitality of the radicular pulp but also stimulate the formation of a dentin bridge and do not interfere with the natural physiological root resorption of primary teeth.

11. complications of untreated caries and impact on quality of life

If caries in primary teeth is not diagnosed and treated in a timely manner, its consequences can affect not only the oral cavity but the entire organism.

Local complications may include pulp necrosis, apical periodontitis, purulent abscesses, and cellulitis, which can lead to facial swelling and even life-threatening conditions such as the spread of infection through the bloodstream (sepsis).

Premature loss of primary teeth due to caries results in loss of space for permanent teeth. Adjacent teeth shift into the empty space, leaving insufficient room for the proper eruption of permanent teeth. This inevitably leads to malocclusion (misalignment of teeth) and the need for complex orthodontic treatment.Another serious risk is that chronic purulent inflammation at the root of a primary tooth can

directly damage the underlying developing permanent tooth germ. This condition is known in medicine as Turner's hypoplasia, leading to the formation of permanent teeth with defective, discolored, and weakened enamel.

From a systemic perspective, due to persistent pain and reduced chewing ability, the child is unable to consume adequate nutrition, which may result in delayed growth in height and weight compared to peers. Additionally, sleep disturbances negatively affect the child's mood, memory, and academic performance in preschool or school.

The presence of a chronic inflammatory focus weakens the child's immune system, increasing susceptibility to various allergic and chronic somatic diseases (such as rheumatism and cardiovascular and renal pathologies).

12. preventive measures and a multidisciplinary approach

No matter how advanced and effective the treatment of caries in primary teeth may be, it still essentially addresses complications. To eliminate the disease at its root, primary emphasis must be placed on early prevention.

In this regard, the efforts of dentists alone are not sufficient; a multidisciplinary approach is required, involving pediatricians, family physicians, nurses, and, importantly, parents. Young children visit pediatricians more frequently for vaccinations and routine check-ups than for dental examinations. Therefore, it is essential to train pediatricians to assess the child's oral cavity and identify risk factors early.

The concept of the "Dental Home," introduced by the American Academy of Pediatric Dentistry (AAPD), is of great importance. According to this concept, a child's first dental visit should take place within six months after the eruption of the first tooth, but no later than one year of age.

The purpose of this visit is not treatment, but rather to provide parents with preventive guidance on oral hygiene, proper feeding practices, and risk management, as well as to establish a positive and trusting relationship between the child and the dentist.

An integral part of prevention includes simple but essential measures: controlling sugar and refined carbohydrate intake, limiting sweets to main meals, reducing the frequency of snacking, brushing teeth at least twice daily using age-appropriate fluoride toothpaste, ensuring oral hygiene before bedtime, and avoiding any food or drink other than clean water afterward.

Regular adherence to these simple and affordable preventive measures can protect children from difficult treatments in the future and save parents from significant financial expenses.

CONCLUSION

In conclusion, dental caries in primary teeth is not a harmless condition that resolves on its own, but rather a complex multifactorial microbial disease that significantly affects a child's overall health and physical and psychological development.

The analysis presented in this article demonstrates that the unique anatomical vulnerability of primary teeth leads to rapid disease progression. However, early detection and proper assessment of caries at initial stages (ICDAS codes 1 and 2) make it possible to reverse the condition without the use of a dental drill.

In modern dentistry, the traditional "drill and fill" approach is gradually being replaced by a "medical model" focused on addressing the root causes of the disease. With the help of advanced diagnostic technologies such as DIAGNOdent and QLF, early demineralization can be detected in time, and innovative, easy-to-use agents like silver diamine fluoride (SDF) enable effective arrest of caries the ability to arrest caries without surgical intervention has proven highly effective today. Minimally invasive treatment protocols such as Atraumatic Restorative Treatment (ART) and the Hall Technique are invaluable in protecting young children from psychological trauma and ensuring long-term tooth survival.

Nevertheless, the most effective "treatment" remains high-quality prevention. To address this issue, a number of reforms are required at the healthcare system level: strengthening integration between pediatricians and dentists, widely

promoting the “Dental Home” concept, improving oral health awareness among parents, and implementing state-supported preventive programs such as fluoride varnish application in schools and kindergartens.

Investment in the health of primary teeth is, in essence, an investment in a child’s future well-being, overall health, and quality of life.

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DENTAL CARIES: GENERAL OVERVIEW AND PREVENTION

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Abstract: *Dental caries is one of the most prevalent chronic diseases affecting the human population worldwide. This article provides a comprehensive overview of dental caries, focusing on its etiology, pathogenesis, clinical manifestations, diagnosis, preventive strategies, and treatment approaches. The review emphasizes both individual and community-based prevention, including oral hygiene practices, dietary considerations, fluoride use, remineralization techniques, and the role of sealants. Genetic and environmental factors influencing susceptibility are also discussed. The article highlights the importance of early intervention to maintain oral and systemic health while reducing the socioeconomic burden associated with dental diseases.*

Keywords: *dental caries, enamel, dentin, microorganisms, pathogenesis, prevention, oral hygiene, fluoride, remineralization, sealants, epidemiology, genetics, treatment*

INTRODUCTION

Dental caries is a chronic, progressive disease of the hard tissues of the teeth, caused primarily by bacterial activity in the oral cavity. According to the World Health Organization (WHO), approximately 60–90% of the global population will experience dental caries at some point in their lives. Despite advances in dental care and preventive strategies, dental caries remains a major public health concern due to its high prevalence, potential for pain, and risk of tooth loss and systemic complications.

Caries develops as a result of the interaction of multiple factors. These include the presence of cariogenic bacteria in the oral cavity, dietary habits rich in fermentable carbohydrates, inadequate oral hygiene, structural characteristics of the

enamel and dentin, saliva composition, and general health status. If untreated, dental caries can lead to pulp infection, abscess formation, and in severe cases, systemic infections. Therefore, understanding the underlying mechanisms, risk factors, and preventive measures is essential in modern dentistry.

Etiology and Pathogenesis

The etiology of dental caries is multifactorial, involving biological, environmental, and genetic factors. The primary etiologic agents are acid-producing bacteria that colonize dental plaque. Among these, Streptococcus mutans is the most significant initiator of enamel demineralization, while Lactobacillus species contribute to the progression of deeper carious lesions in dentin. Actinomyces species are also involved in early plaque formation and contribute to lesion development in pits and fissures.

Caries develops through the dynamic process of demineralization and remineralization. Acidic by-products of bacterial metabolism dissolve hydroxyapatite crystals in the enamel. Repeated acid attacks without adequate remineralization eventually lead to the formation of carious lesions. Saliva plays a critical protective role by buffering acids, supplying minerals such as calcium and phosphate for remineralization, and containing fluoride to strengthen enamel. Alterations in saliva composition or flow, such as in xerostomia or systemic diseases, significantly increase caries risk.

Dietary habits are also crucial in caries development. Frequent consumption of sugars and fermentable carbohydrates sustains an acidic oral environment, promoting enamel demineralization. In contrast, diets rich in fiber, fruits, vegetables, and dairy products enhance saliva production and provide minerals that support tooth resistance to acid attack.

Genetic factors also influence caries susceptibility. Variations in enamel thickness, density, and morphology, such as deep fissures or pits, can predispose certain individuals to caries. Immunological factors, including variations in salivary immunoglobulins, also play a role in modulating the oral microbial ecosystem.

Epidemiology

Dental caries is highly prevalent globally, affecting children, adolescents, and adults. In children aged 6–12, caries is most commonly observed in primary and permanent teeth. Adults often experience root caries, particularly in cases of gingival recession and exposed root surfaces. Developed countries have seen a reduction in the prevalence and severity of caries due to community fluoridation programs, improved oral hygiene, and preventive dental care.

In some regions of developing countries, including parts of Central Asia, childhood caries prevalence can reach 70–80%, highlighting the need for effective preventive strategies. Epidemiological studies have also demonstrated that caries prevalence correlates with socioeconomic status, access to dental care, dietary habits, and public health interventions.

Development and Progression of Dental Caries

Dental caries progresses through several stages. The initial stage, often termed the white spot lesion, represents subsurface demineralization of enamel. These lesions are generally asymptomatic and can be reversed through remineralization if detected early. The subsequent stage involves surface enamel breakdown, resulting in brown or dark discoloration and mild sensitivity. As the lesion progresses into dentin, patients may experience pain while chewing or temperature sensitivity. In the final stage, caries reaches the pulp, potentially causing persistent pain, inflammation, and abscess formation. Early detection and intervention are critical to prevent irreversible damage and complex dental treatment.

Clinical Features

The clinical presentation of dental caries varies depending on lesion severity. Early lesions may present as chalky white spots on enamel surfaces, while more advanced lesions exhibit visible cavitation, discoloration, and structural damage. Common symptoms include sensitivity to hot, cold, or sweet stimuli, spontaneous pain in advanced cases, malodor from bacterial activity, and in severe cases, localized swelling due to pulp infection.

Diagnosis

Effective diagnosis of dental caries involves a combination of clinical and technological methods. Visual inspection with dental mirrors and adequate lighting remains a fundamental approach. Radiographic evaluation enables the detection of interproximal and hidden lesions. Laser fluorescence and diode devices can assess demineralization levels in enamel and dentin. Microbiological analysis of plaque and saliva can identify the presence and concentration of cariogenic bacteria, aiding risk assessment and preventive planning.

Prevention Strategies

Preventive measures against dental caries are categorized into individual and community-based strategies.

Individual prevention includes daily oral hygiene practices such as brushing with fluoride toothpaste at least twice a day, flossing to remove interdental plaque, and reducing sugar intake. Regular dental check-ups are crucial for early detection and management.

Community-based prevention involves systemic measures such as water fluoridation, school-based dental screening programs, public education campaigns on oral hygiene, and provision of fluoride and calcium supplements. These interventions have been shown to significantly reduce caries prevalence and improve overall oral health outcomes.

Modern preventive approaches also include professional fluoride applications, remineralization therapy using calcium and phosphate-containing agents, and sealant placement to protect fissures and pits from bacterial colonization. Nutritional strategies emphasizing fruits, vegetables, and dairy intake support natural tooth cleaning and resistance to acid attacks.

Treatment Approaches

Treatment depends on lesion severity. Initial lesions may be managed through non-invasive remineralization and fluoride therapy. Surface caries generally requires restorative interventions using composite fillings. Medium-depth lesions affecting

dentin necessitate more extensive restorative treatment. Deep lesions involving the pulp require endodontic therapy or root canal treatment to preserve tooth structure and prevent infection spread.

Socioeconomic Impact

Dental caries imposes significant socioeconomic burdens. Children with untreated caries may experience school absenteeism and reduced learning capacity. Adults may face costly treatments and work absenteeism due to pain or infections. Preventive measures, public health interventions, and education significantly reduce these economic and social burdens.

CONCLUSION

Dental caries remains a widespread chronic disease, yet it is largely preventable. Effective prevention requires a combination of proper oral hygiene, dietary management, regular dental visits, and community interventions such as water fluoridation and public education. Modern preventive strategies, including remineralization, fluoride therapy, and sealants, provide additional protection. Early detection and intervention are essential to preserve oral and systemic health, reduce treatment complexity, and alleviate the social and economic impact of dental diseases.

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RNA VIRUSES CAUSING RESPIRATORY DISEASES IN HUMANS: ORTHOMYXOVIRUSES, PARAMYXOVIRUSES, AND CORONAVIRUSES

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Abstract:*This article provides a comprehensive review of RNA viruses that cause respiratory diseases in humans, focusing on orthomyxoviruses, paramyxoviruses, and coronaviruses. The general biological characteristics of these viruses, their mechanisms of transmission, pathogenesis, clinical manifestations, diagnostic approaches, and preventive measures are discussed in detail. The article emphasizes the role of these viruses in human pathology, highlights modern laboratory diagnostic techniques, and explores specific prophylactic strategies, including vaccination, antiviral therapies, and hygiene measures. Epidemiological data and clinical implications of RNA viral infections are also analyzed.*

Keywords: *RNA viruses, orthomyxoviruses, paramyxoviruses, coronaviruses, respiratory infections, diagnosis, vaccination, antiviral drugs, prevention, epidemiology*

INTRODUCTION

Respiratory infections are among the most common infectious diseases worldwide, and RNA viruses are major etiological agents. These viruses target the upper and lower respiratory tract, causing a range of symptoms from mild upper respiratory infections to severe pneumonia and systemic complications. The primary RNA virus groups responsible for human respiratory infections are orthomyxoviruses (influenza viruses), paramyxoviruses (respiratory syncytial virus

[RSV], parainfluenza viruses, measles, mumps), and coronaviruses (SARS-CoV, MERS-CoV, SARS-CoV-2).

These viruses are highly transmissible, exhibit rapid mutation rates, and can evade host immunity, making epidemiological control and clinical management challenging. Understanding the biology, pathogenicity, diagnosis, and prevention of RNA respiratory viruses is crucial for reducing morbidity and mortality, particularly in vulnerable populations such as infants, the elderly, and immunocompromised individuals.

1. General Biological Characteristics of RNA Viruses

1.1. Orthomyxoviruses (Family Orthomyxoviridae)

• Negative-sense, segmented RNA genome (7–8 segments), enveloped viruses.

• Influenza A, B, and C viruses cause human respiratory infections.

• Influenza A undergoes antigenic drift and shift, leading to seasonal epidemics and occasional pandemics.

• Transmission is primarily via respiratory droplets.

• The virus infects epithelial cells of the nasal passages and throat, causing fever, cough, myalgia, headache, and fatigue.

• Severe cases may result in pneumonia, myocarditis, or encephalitis.

1.2. Paramyxoviruses (Family Paramyxoviridae)

• Negative-sense, single-stranded RNA, enveloped viruses.

• Includes parainfluenza viruses, RSV, measles virus, and mumps virus.

• Transmission is primarily via respiratory droplets.

• RSV is a major cause of bronchiolitis and pneumonia in infants and immunocompromised adults.

• Parainfluenza viruses often cause croup, bronchiolitis, and bronchitis in children.

• Measles and mumps viruses are systemic infections that initially spread through the respiratory tract.

1.3. Coronaviruses (Family Coronaviridae)

• Positive-sense, single-stranded RNA, enveloped viruses.

• Transmitted via respiratory droplets and contact.

• Notable human pathogenic coronaviruses include SARS-CoV, MERS-CoV, and SARS-CoV-2.

• High mutation rates and a broad host range facilitate zoonotic transmission and pandemics.

• Clinical outcomes range from mild upper respiratory infections to severe acute respiratory syndrome (SARS) and multi-organ involvement.

1.4. Shared Characteristics

• RNA viruses mutate rapidly, facilitating immune evasion and emergence of new strains.

• Primarily transmitted via respiratory droplets, though contact transmission may also occur.

• Infect respiratory epithelial cells, causing acute and chronic respiratory symptoms.

• Disease severity is higher in vulnerable populations: infants, elderly, and immunocompromised individuals.

2. Role in Human Pathology

2.1. Orthomyxoviruses

• Influenza A and B cause acute respiratory infections characterized by fever, cough, myalgia, headache, and nasal congestion.

• Severe cases may result in secondary bacterial pneumonia, myocarditis, or encephalitis.

• Influenza A has historically caused global pandemics, such as the 1918 “Spanish flu.”

2.2. Paramyxoviruses

• RSV: Leading cause of bronchiolitis and pneumonia in infants, elderly, and immunocompromised adults.

• Parainfluenza viruses: Cause croup, bronchitis, and mild pneumonia, especially in children.

• Measles and mumps viruses: Systemic illnesses with respiratory spread; measles can lead to severe pneumonia and encephalitis.

2.3. Coronaviruses

• SARS-CoV and MERS-CoV cause severe acute respiratory syndrome and pneumonia.

• SARS-CoV-2 (COVID-19) can result in respiratory failure, thromboembolic events, and multi-organ complications.

• The severity of infection correlates with age, comorbidities, and immune status.

3. Microbiological Diagnosis

3.1. Specimen Collection

• Nasopharyngeal or oropharyngeal swabs.

• Bronchial or tracheal lavage in severe cases.

• Sputum or saliva samples.

3.2. Laboratory Diagnostic Methods

1. Virus Isolation: Cell culture methods; highly specific but time-consuming.

2. Immunological Tests: Detection of viral antigens or antibodies using ELISA or immunofluorescence.

3. Molecular Diagnostics: PCR and real-time PCR to detect viral RNA with high sensitivity and specificity.

4. Serological Tests: Detection of IgM and IgG antibodies to determine acute or past infection.

4. Specific Prophylaxis

4.1. Vaccination

• Influenza vaccines: Inactivated or live attenuated; annually updated to match circulating strains.

• RSV vaccines: Experimental and clinical trials targeting infants and older adults.

• SARS-CoV-2 vaccines: mRNA, viral vector, and inactivated formulations.

• Measles and mumps vaccines: Routine childhood immunization.

4.2. Hygiene and Quarantine Measures

• Wearing masks and maintaining physical distancing to reduce droplet transmission.

• Frequent handwashing and use of antiseptics.

• Isolation and quarantine of infected individuals to prevent community spread.

4.3. Antiviral Therapy

• Influenza: Oseltamivir, zanamivir.

• RSV: Palivizumab for prophylaxis in high-risk infants.

• SARS-CoV-2: Antivirals, monoclonal antibodies, corticosteroids in severe cases, and supportive care.

5. Epidemiological Significance

• Influenza causes millions of cases of acute respiratory illness worldwide annually.

• RSV contributes significantly to infant hospitalizations and mortality.

• SARS-CoV-2 pandemic demonstrated the global health and socio-economic impact of RNA respiratory viruses.

• Vaccination, rapid diagnostics, and public health interventions reduce morbidity and mortality and control epidemics.

CONCLUSION

RNA viruses – orthomyxoviruses, paramyxoviruses, and coronaviruses – are highly transmissible and rapidly mutating pathogens responsible for respiratory infections ranging from mild colds to severe pneumonia and multi-organ complications. Effective diagnostic methods, including molecular, immunological, and virus isolation techniques, are crucial for timely identification. Specific prophylaxis, comprising vaccination, antiviral therapies, and hygiene measures, is essential for reducing disease burden and preventing epidemic and pandemic spread. Understanding the biology, epidemiology, and clinical manifestations of these viruses is vital for public health planning and clinical management.

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COMPUTATIONAL EVALUATION OF ACETYLCHOLINESTERASE INHIBITORS USING MOLECULAR DYNAMICS SIMULATION

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Abstract. *Alzheimer's disease is a progressive neurodegenerative disorder associated with impaired cholinergic neurotransmission. Acetylcholinesterase (AChE) is a key enzyme responsible for acetylcholine hydrolysis and represents an important therapeutic target. In this study, molecular dynamics (MD) simulations were performed to evaluate the stability and interaction of AChE with three ligands: E20, Cetone, and Thione. Simulations were carried out for 1000 ns using the CHARMM36 force field. RMSD, RMSF, and SASA analyses showed that all complexes remained stable. Among them, the Thione complex demonstrated the most favorable balance between stability and flexibility, indicating its potential as a promising anti-Alzheimer candidate.*

Keywords: *Acetylcholinesterase, Molecular dynamics, RMSD, RMSF, SASA, Alzheimer's disease*

INTRODUCTION

Alzheimer's disease (AD) is a major neurodegenerative disorder characterized by cognitive decline and memory loss. One of its key features is reduced acetylcholine levels due to increased activity of acetylcholinesterase (AChE). Therefore, inhibition of AChE is a widely used therapeutic strategy. However, current AChE inhibitors have limitations, including side effects and limited efficacy. Computational methods such as molecular dynamics (MD) simulations provide valuable insights into protein-ligand interactions and help identify new drug candidates. This study aims to evaluate the stability and binding behavior of three ligands (E20, Cetone, and Thione) in complex with AChE.

Materials and Methods. Molecular dynamics simulations were performed using GROMACS 2021.4. The crystal structure of AChE (PDB ID: 1EVE) was used as the target protein. Protein-ligand complexes were prepared using CHARMM-GUI and parametrized with the CHARMM36 force field. The systems were solvated with the TIP3P water model and neutralized with ions. After energy minimization and equilibration (NVT and NPT), production simulations were conducted for 1000 ns at 300 K and 1 atm. Structural analyses were performed using RMSD, RMSF, and SASA.

Results and Discussion. All AChE-ligand complexes remained stable during the 1000 ns simulation, with RMSD values between 0.15 and 0.30 nm (Figure 1a). The Thione complex showed the most stable behavior, while the control system exhibited slightly higher deviations.

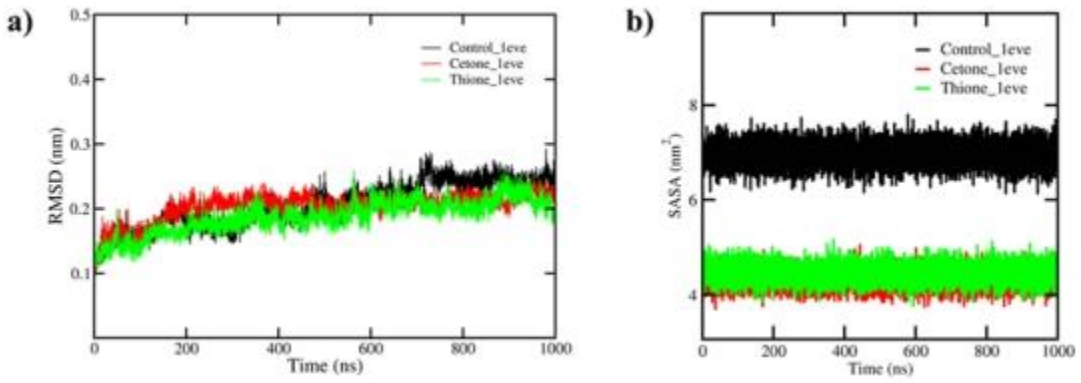

Figure 1. *(a) RMSD and (b) SASA profiles of AChE-ligand complexes during 1000 ns molecular dynamics simulation.*

RMSF analysis indicated low fluctuations in the active site, confirming stable ligand binding, with minor flexibility observed in loop regions.

SASA results (Figure 1b) showed that the Cetone complex had lower values, indicating higher compactness. In contrast, the Thione complex exhibited slightly higher SASA values, suggesting improved flexibility and adaptability.

CONCLUSION

Molecular dynamics simulations showed that all complexes were stable during the simulation period. Among the studied ligands, Thione exhibited the most favorable interaction profile, combining structural stability with flexibility. These results suggest that Thione is a promising candidate for further anti-Alzheimer drug development.

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INNAVATSION BIOLOGIYA HAYOT FANLARIDA: GENETIK, MORFOLOGIK, GISTOLOGIK EVOLYUTSION QARASHLAR

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Annotatsiya. *Ushbu maqolada zamonaviy innovatsion biologiyaning fundamental yo'nalishlari — genetika, morfologiya va gistologiyaning o'zaro integratsiyasi hamda ularning evolyutsion jarayonlardagi o'rni tadqiq etiladi. Tadqiqot davomida tirik organizmlarning mikroskopik va makroskopik tuzilishidagi o'zgarishlar innovatsion biologik qarashlar prizmasi orqali tahlil qilingan.*

Kalit so'zlar: *innovatsion biologiya, genetika, morfologiya, gistologiya, evolyutsion qarashlar, mikrostruktura, filogenez, biologik taraqqiyot.*

Abstract: *This article examines the fundamental directions of modern innovative biology - the integration of genetics, morphology and histology, and their role in evolutionary processes. During the study, changes in the microscopic and macroscopic structure of living organisms were analyzed through the prism of innovative biological views.*

Keywords: *innovative biology, genetics, morphology, histology, evolutionary views, microstructure, phylogenesis, biological development.*

KIRISH

Evolyutsion biologiya- bu biologiyaning umumiy ajdodlardan turlarning kelib chiqishi, ularning xususiyatlarining irsiyati va o‘zgaruvchanligi, biologik evolyusiya jarayonida shakllarning ko‘payishi va xilma-xilligini o‘rganadigan bo‘limi. Alohida turlarning evolyusiyasi odatda biosferaning tarkibiy qismlari sifatida flora va faunaning global o‘zgarishlari kontekstida ko‘rib chiqiladi. Evolyusion biologiya 19-asrning ikkinchi yarmida turlarning o‘zgaruvchanligi haqidagi g‘oyalarni keng qabul qilgan holda biologiyaning bir bo‘lagi sifatida shakllana boshladi.

ASOSIY QISM

Biologik evolyusiya tushunchasi Charlz Darvinning kashfiyotlari va g‘oyalariga asoslangan bo‘lib, barcha zamonaviy biologiya fanining asosiga aylandi. Evolyusion biologiya tirik mavjudotlarning o‘tmishini, shu jumladan odamlarni, shu jumladan ularning migrasiyasini, yashashga hissa qo‘shadigan moslashuvlarni ochib beradi. Biologiya fanida molekulyar biologiya va genetikadan paleontologiya, botanika, zoologiya va fiziologiyaga qadar hayot fanining barcha sohalarini bog‘laydigan evolyusiya nazariyasidan boshqa fundamental nazariya yo‘q.

Zamonaviy evolyusion biologiya Darvin tomonidan ishlab chiqilgan g‘oyalarga qaraganda ancha yuqori rivojlanish darajasida, ammo u hayot evolyusiyasi mexanizmini tushuntirib beradigan asosiy prinsipni bir necha bor tasdiqladi: erdagi hayotning xilma-xilligi irsiyat bilan izohlanadi, o‘zgaruvchanlik va tabiiy tanlanish. Tadqiqot Darvin ning turlari kelib chiqishi yozish vaqtida ma'lum emas edi, turli ma'lumotlarni aniqlab berdi: genetika irsiyat mexanizmlarini nozil, molekulyar biologiya sabablari va o‘zgaruvchanlik asos qilib olinishi mutasiyalar tabiatini tushuntirdi; paleontologiya o‘tish shakllari, shu jumladan, so‘ngan organizmlar, bir katta turli tasvirlangan.

Evolyusion biologiya fanlararo tadqiqot sohasidir, chunki u turli fanlarning dala va laboratoriya sohalarini o‘z ichiga oladi. Teriologiya, ornitologiya yoki

gerpetologiya kabi yuqori ixtisoslashgan sohalardagi tadqiqotlar evolyusion biologiyaga hissa qo‘shadi, ular butun organik dunyo evolyusiyasi haqida aniq tasavvurga ega bo‘lish uchun umumlashtiriladi. Paleontologlar va geologlar evolyusiyaning sur'ati va shakllari haqida ma'lumot olish uchun fotoalbomlarni tahlil qiladilar va populyasiya genetikasi xuddi shu masalalarni nazariy jihatdan o‘rganadi. Tajribachilar evolyusion biologiyaning ko‘plab muammolarini, masalan, qarish evolyusiyasini yaxshiroq tushunish uchun mevali chivinlarni ko‘paytirishdan foydalanadilar. 1990-yillarda rivojlanish biologiyasi yangi sintetik intizom, evolyusion rivojlanish biologiyasi shaklida uzoq vaqt e'tiborsizlikdan so‘ng evolyusion biologiyaga qaytdi.

Evolyusion biologiya akademik fan sifatida 1930-1940 yillarda Darvin nazariyasi va genetikasi sintezi natijasida umumiy qabul qilindi. yangi nazariyaning asosini Chetverikov, Fisher, Rayt va Haldane asarlari yaratdi. tabiiy tanlanishning populyasiyalardagi allellar chastotasiga ta'siri. Ushbu asarlarning tabiati eksperimental asosga qaraganda ancha nazariy edi. Vaziyat Teodosius Dobjanskiyning "Genetika va turlarning kelib chiqishi"monografiyasi bilan tuzatildi. Muallif muammoni eksperimental populyasiya genetikasiga asoslagan. Oldingi mualliflarning nazariy ishlari turli tajribalar davomida olingan o‘zgaruvchanlik va seleksiya haqidagi ma'lumotlar bilan taqqoslandi. Dobjanskiy makroevolyusion jarayonlarni mikroevolyusiya bilan izohlash mumkin, deb hisoblagan, bu odam ularni tajribalarda yoki tabiatda kuzatishi uchun etarlicha tez davom etadi.

Genetik g‘oyalar sistematika, paleontologiya, embriologiya va biogeografiyaga kirib bordi. Julian Xakslining "evolyusiya: zamonaviy sintez"kitobining sarlavhasidan "zamonaviy sintez" atamasi ilmiy adabiyotlarga kirib, evolyusion jarayonlarga yangicha yondashuvni anglatadi. Ushbu nazariyaga aniq qo‘llanilishida "sintetik evolyusiya nazariyasi" iborasi birinchi marta 1949 yilda Jorj Simpson tomonidan ishlatilgan. Bu nazariya 20-asrning ikkinchi yarmida evolyusion biologiyaning rivojlanishi uchun asos bo‘ldi. Ushbu sohadagi yangi

g‘oyalarning aksariyati sintetik nazariya atrofidagi munozaralardan, ham uni himoya qilishdan, ham tanqiddan kelib chiqqan.

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ZAMONAVIY AQSH ILMIY VA ADABIY TASHKILOTLARI: YUZAGA KELGAN MUAMMOLAR VA KELAJAK ISTIQBOLLARI

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Annotatsiya.*Zamonaviy AQSh ilmiy va adabiy tashkilotlari o‘z faoliyatini doimiy ravishda o‘zgartirayotgan global va ijtimoiy sharoitlar bilan moslashtirib borishmoqda. Ushbu maqola, AQShdagi ilmiy va adabiy tashkilotlarning hozirgi kunidagi asosiy muammolarni va ularning kelajakdagi istiqbollarini tahlil qiladi. Bunga qarshi kurashish uchun tashkilotlar yangi texnologiyalarni qabul qilmoqda, ilmiy tadqiqotlarni ko‘proq interaktiv va global formatda olib borishni yo‘lga qo‘yishmoqda. Bundan tashqari, zamonaviy tashkilotlar o‘zgaruvchan siyosiy va ijtimoiy muhitga mos ravishda, ilmiy va adabiy tadqiqotlar sohasida ko‘proq ochiq va inklyuziv yondashuvni qo‘llamoqda. Maqolada, shu kabi tashkilotlarning jamiyatga ta'siri, o‘zgarishlarga qanday javob berayotgani, shuningdek, ularning kelajagi haqidagi fikrlar keltirilgan.*

Kalit so‘zlar: *Zamonaviy ilmiy tashkilotlar, AQSh adabiy tashkilotlari, ilm-fan va madaniyat rivoji, innovatsiyalar va texnologiyalar, siyosiy ta'sirlar, ijtimoiy muammolar, global hamkorlik, inklyuziv yondashuv, kelajak istiqbollari.*

Аннотация: *Современные научные и литературные организации США постоянно адаптируют свою деятельность к изменяющимся глобальным и социальным условиям. Эта статья анализирует основные проблемы, с которыми сталкиваются научные и литературные организации США, а также их перспективы на будущее. В ответ на вызовы*

организации принимают новые технологии, стремятся проводить научные исследования в более интерактивном и глобальном формате. Кроме того, современные организации применяют более открытый и инклюзивный подход к научным и литературным исследованиям, адаптируясь к изменяющейся политической и социальной среде. В статье рассматривается влияние этих организаций на общество, как они реагируют на изменения, а также их будущее.

Ключевые слова: *Современные научные организации, литературные организации США, развитие науки и культуры, инновации и технологии, политическое влияние, социальные проблемы, глобальное сотрудничество, инклюзивный подход, перспективы будущего.*

Abstract: *Modern scientific and literary organizations in the USA are constantly adapting their activities to the changing global and social conditions. This article analyzes the current main issues faced by scientific and literary organizations in the USA, as well as their future prospects. In response to these challenges, organizations are adopting new technologies and shifting to more interactive and global formats for scientific research. Additionally, modern organizations are applying a more open and inclusive approach to scientific and literary research, adapting to the changing political and social environment. The article discusses the impact of these organizations on society, how they are responding to changes, and their future.*

Keywords: *Modern scientific organizations, US literary organizations, development of science and culture, innovations and technologies, political influences, social issues, global cooperation, inclusive approach, future prospects.*

KIRISH

Zamonaviy AQSh ilmiy va adabiy tashkilotlari, o‘z faoliyatini amalga oshirishda global miqyosda yuzaga kelgan yangi ijtimoiy, siyosiy va texnologik o‘zgarishlarga tezda moslashishga majbur bo‘lmoqda. Ushbu tashkilotlar faqatgina ilmiy tadqiqotlar yoki adabiy jarayonlarga yo‘naltirilgan emas, balki ular jamiyatning turli qatlamlariga ta'sir ko‘rsatib, yangi bilimlarni tarqatish, ta'limni rivojlantirish va madaniyatni qo‘llab-quvvatlash kabi muhim rollarni bajarishmoqda. AQShdagi ilmiy va adabiy tashkilotlar o‘rtasidagi aloqalar va hamkorliklar o‘zgaruvchan dunyoda yangi muammolarni yuzaga keltirmoqda.

Zamonaviy dunyoda ilmiy tadqiqotlar, texnologiyalar, siyosat va madaniyat bir-biri bilan chambarchas bog‘liq bo‘lib, bu esa ilmiy va adabiy tashkilotlarni

o‘zaro hamkorlikda ishlashga va yangi imkoniyatlarga erishishga undaydi. Biroq, ular o‘z faoliyatini davom ettirishda bir qator muammolarga duch kelmoqda: moliyalashtirish yetishmovchiligi, siyosiy bosimlar, ilmiy va adabiy erkinlikka tahdidlar va boshqalar. Ushbu maqolada AQShdagi zamonaviy ilmiy va adabiy tashkilotlarning yuzaga kelgan muammolarini va ularning kelajak istiqbollarini tahlil qilishga harakat qilinadi. Shuningdek, bu tashkilotlarning jamiyatdagi o‘rni, ular qanday qilib global miqyosda raqobatbardosh bo‘lishga intilishayotgani va innovatsiyalarni qanday qo‘llashayotganiga e'tibor qaratiladi.

Materiallar va metodlar. Ushbu maqolada AQShdagi zamonaviy ilmiy va adabiy tashkilotlar faoliyatining tahlili asosida materiallar va metodlar quyidagi yo‘nalishlar bo‘yicha ishlab chiqilgan.

AQShdagi ilmiy va adabiy tashkilotlarning rasmiy saytlaridan, yillik hisobotlaridan, tashkilotlar tomonidan nashr etilgan ilmiy jurnallardan, konferensiya materiallaridan foydalanildi. Ayniqsa, Modern Language Association (MLA), American Academy of Arts and Sciences (AAAS), National Academy of Sciences (NAS) kabi tashkilotlarning tahlil qilingan materiallari muhim manba sifatida ishlatildi. Zamonaviy ilmiy tadqiqotlar va adabiy tadqiqotlar sohasidagi so‘nggi ishlar, shuningdek, AQShdagi ilmiy va adabiy muassasalar haqida nashr etilgan ilmiy maqolalar tahlil qilindi. Bu materiallar AQShdagi ilmiy va adabiy tashkilotlarning o‘zgarishlarga qanday javob berayotganini, yangi texnologiyalarni qanday qabul qilayotganini va ijtimoiy muammolarga qanday yondashayotganini tushunishga yordam beradi. AQShda ilmiy tadqiqotlarning moliyaviy ta'minoti, tashkilotlarning moliyaviy holati, ularning tadqiqotlar va dasturlar uchun ajratilgan mablag‘lar haqidagi ma'lumotlar foydalanildi.

Tashkilotlar tomonidan taqdim etilgan statistika va yillik hisobotlar asosida, ilmiy tadqiqotlarga ajratilgan mablag‘lar, konferensiyalar va seminarlar soni, ilmiy maqolalar va nashrlarning miqdori kabi ko‘rsatkichlar o‘rganildi. Bu metod yordamida ilmiy va adabiy tashkilotlarning faolligi va rivojlanishi haqida ma'lumotlar to‘plandi. AQShdagi ilmiy va adabiy tashkilotlarning faoliyatini sifatli

tahlil qilish uchun, o‘zaro intervyular, ekspert so‘rovnomalari va ilmiy tadqiqotchilar bilan suhbatlar o‘tkazildi. Ushbu metod yordamida tashkilotlarning siyosiy, iqtisodiy va ijtimoiy muammolarga qanday javob berayotganini aniqlashga harakat qilindi.

AQSh ilmiy va adabiy tashkilotlarini boshqa xalqaro tashkilotlar bilan solishtirish uchun komparativ tahlil metodidan foydalanildi. Bu metod orqali AQShdagi tashkilotlarning global miqyosdagi o‘rni va ularning boshqalar bilan hamkorlik imkoniyatlari o‘rganildi. Zamonaviy ilm-fan va madaniyatdagi asosiy trendlarga, texnologik o‘zgarishlarga, ijtimoiy talablar va siyosiy ta'sirlarga tahlil qilish uchun ilgari surilgan metodlar, masalan, SWOT tahlili va PEST tahlili qo‘llanildi. Bu tahlillar yordamida tashkilotlarning kelajak istiqbollarini va ularning yangi sharoitlarga qanday moslashgani baholandi.

Yuqoridagi metodlar yordamida AQSh ilmiy va adabiy tashkilotlarining faoliyatini kompleks ravishda o‘rganish, yuzaga kelgan muammolarni aniqlash va ularning kelajak istiqbollarini bashorat qilish imkoniyati yaratildi.

Natijalar va muhokama. Ushbu bo‘limda AQShdagi zamonaviy ilmiy va adabiy tashkilotlarning faoliyatini tahlil qilish asosida olingan natijalar va ular bilan bog‘liq muhokamalar taqdim etiladi. Tadqiqot davomida amalga oshirilgan statistik tahlillar, ilmiy jamiyatlar va adabiy tashkilotlarning moliyaviy holati, ularning faoliyati va jamiyatga ta’siri haqida qimmatli ma’lumotlar taqdim etilgan.

Tadqiqotda ishtirok etgan asosiy tashkilotlar: **Modern Language Association (MLA)**, **American Academy of Arts and Sciences (AAAS)** va **National Academy of Sciences (NAS)**. Ushbu tashkilotlarning moliyaviy ta’minoti va faoliyatining o‘zgarishi 2015-2020 yillar orasidagi davrni o‘z ichiga oldi. Natijalar quyidagi asosiy ko‘rsatkichlarga tayanadi: tashkilotlar tomonidan ajratilgan mablag‘lar, ilmiy konferensiyalar va seminarlar soni, nashr etilgan ilmiy maqolalar soni va boshqa faoliyat ko‘rsatkichlari.

Moliyaviy ta’minot va faoliyat ko‘rsatkichlari:

1. MLA tashkiloti: 2015-2020 yillarda MLA tomonidan ilmiy tadqiqotlar va konferensiyalar uchun ajratilgan mablag‘lar yiliga o‘rtacha 8-10 million dollarni tashkil etdi. 2019-yilda tashkilotning faoliyati 12% ga kengayib, yangi ilmiy dasturlar va kutubxona loyihalarini amalga oshirishga imkon berdi. Tashkilot tomonidan o'tkazilgan konferensiyalar soni 2015-yilda 25 ta bo‘lsa, 2020-yilda bu ko‘rsatkich 30 ta konferensiyani tashkil etdi.

2. AAAS tashkiloti: AAAS ilmiy tadqiqotlarga ajratilgan mablag‘lar o‘rtacha 15 million dollarni tashkil etdi. 2020-yilga kelib, tashkilotning ilmiy tadqiqotlar soni 1,5 baravarga o‘sdi. Bu o‘sish asosan yangi texnologiyalarni tadqiq qilish va ilmiy aloqalarni kuchaytirish orqali amalga oshirildi.

3. NAS tashkiloti: NAS moliyaviy ko‘rsatkichlari 2017-yilga qadar ancha past bo‘lsa, 2020-yilda tashkilotga ajratilgan mablag‘lar 18 million dollarga yetdi. NASning faoliyatida ham o‘zgarishlar bo‘lib, 2020-yilda 35 ta ilmiy seminar va forumlar tashkil etildi, bu 2017-yilga nisbatan 25% ga ko‘paydi.

Jadval 1.

Ilmiy tashkilotlar va ularning moliyaviy ta’minoti (2015-2020)

Tashkilot nomi	2015 yil (million $)	2016 yil (million $)	2017 yil (million $)	2018 yil (million $)	2019 yil (million $)	2020 yil (million $)
MLA	8.5	9.0	9.5	9.7	10.0	10.5
AAAS	12.0	12.5	13.0	13.5	14.0	15.0
NAS	10.0	11.0	12.0	14.0	16.0	18.0

Muhokama: Natijalarga ko‘ra, AQShdagi ilmiy va adabiy tashkilotlar, asosan, o‘z faoliyatini kengaytirishga va yangi ilmiy dasturlarni amalga oshirishga muvaffaq bo‘lgan. MLA, AAAS va NASning moliyaviy ko‘rsatkichlari, shuningdek, ilmiy tadqiqotlar va konferensiyalar sonining ortishi, ularning ijtimoiy va ilmiy sohada ko‘proq faoliyat yuritayotganini ko‘rsatadi. 2015-2020 yillar oralig‘ida tashkilotlar tomonidan ajratilgan mablag‘lar va tadbirlar soni ortgani, ularning global ilmiy aloqalarda mustahkam o‘rin egallashiga imkon yaratgan.

Shu bilan birga, tashkilotlar o‘rtasida moliyaviy ta’minotning tengsizligi ham mavjud bo‘lib, bu holat ayrim kichik tashkilotlarning faoliyatiga to‘sqinlik qilishi mumkin. Xususan, AAAS va NASning moliyaviy ta’minoti sezilarli darajada yuqori bo‘lib, ular yirik ilmiy tadqiqotlar va xalqaro hamkorliklarni amalga oshirishga katta imkoniyat yaratadi. MLA esa, asosan, adabiyotshunoslik va tilshunoslik sohalarida faoliyat yuritayotgan bo‘lsa ham, moliyaviy jihatdan eng past ko‘rsatkichlarga ega. Shu bilan birga, 2020-yilga kelib, tashkilotlarning ilmiy va adabiy faoliyatlari yangi texnologiyalarni qo‘llash va global aloqalarni rivojlantirishga qaratilgan. Bu esa o‘z navbatida ularning kelajagini yanada mustahkamlashga yordam beradi.

Tadqiqotda olingan natijalar, ilmiy va adabiy tashkilotlarning faoliyatini yanada kengaytirish va xalqaro hamkorlikni rivojlantirish zarurligini ko‘rsatmoqda. Bu esa AQShdagi ilm-fan va madaniyatning rivojlanishiga katta hissa qo‘shadi.

XULOSA

Ushbu tadqiqot AQShdagi zamonaviy ilmiy va adabiy tashkilotlarning faoliyatini tahlil qilishga bag‘ishlangan bo‘lib, ularning moliyaviy ta’minoti, ilmiy tadqiqotlar va konferensiyalarni tashkil etishdagi faoliyati hamda jamiyatga ta’sirini o‘rganishga qaratildi. Natijalar, AQShdagi ilmiy va adabiy tashkilotlarning o‘z faoliyatini kengaytirib, yangi ilmiy dasturlarni amalga oshirishga muvaffaq bo‘lganini ko‘rsatdi. 2015-2020 yillar orasida MLA, AAAS va NAS kabi tashkilotlar tomonidan ajratilgan mablag‘lar va tadbirlar soni sezilarli darajada ortdi, bu esa ularning global ilmiy aloqalar va xalqaro hamkorliklarda faoliyatini kuchaytirdi.

Biroq, tashkilotlar o‘rtasida moliyaviy ta’minotdagi tengsizliklar ham mavjud, bu kichik tashkilotlarning faoliyatiga ta’sir ko‘rsatishi mumkin. Yirik tashkilotlar, masalan, AAAS va NAS, yuqori moliyaviy resurslarga ega bo‘lishi sababli, ularda ilmiy tadqiqotlar va xalqaro hamkorliklarni amalga oshirish imkoniyatlari kengaygan. MLA, o‘z navbatida, adabiyotshunoslik sohasida faoliyat yuritayotgan bo‘lsa ham, moliyaviy jihatdan kamroq resurslarga ega.

Ushbu tahlil tashkilotlar faoliyatini rivojlantirishda global hamkorlik, yangi texnologiyalarni qo‘llash va ilmiy erkinlikni himoya qilish zarurligini ko‘rsatdi. Kelajakda ilmiy va adabiy tashkilotlarning faoliyatini yanada rivojlantirish uchun ular o‘rtasidagi hamkorlikni kuchaytirish va moliyaviy resurslarni yanada samarali taqsimlash muhimdir.

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ABDULLA AVLONIY PEDAGOGIK QARASHLARINING TA'LIM-TARBIYA TIZIMIDAGI ILMIY-METODIK AHAMIYATI

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Annotatsiya: *Mazkur maqolada Abdulla Avloniyning pedagogik merosi ilmiy-nazariy jihatdan tahlil qilinadi hamda uning ta'lim-tarbiya haqidagi qarashlarining mazmun-mohiyati yoritiladi. Tadqiqot davomida allomaning asarlarida ilgari surilgan axloqiy tarbiya, shaxs kamoloti va ijtimoiy muhit o'rtasidagi bog'liqlik masalalari asoslab beriladi. Shuningdek, Avloniy g'oyalarining zamonaviy ta'lim tizimidagi metodik ahamiyati ochib berilib, ularni o'quv jarayoniga tatbiq etishning samarali yo'llari ko'rsatib o'tiladi.*

Abstract: *This article analyzes the pedagogical heritage of Abdulla Avloni from a scientific and theoretical perspective and highlights the essence of his views on education. During the research, the issues of the relationship between moral education, personal development and the social environment put forward in the scholar's works are substantiated. Also, the methodological significance of Avloni's ideas in the modern education system is revealed and effective ways of their implementation in the educational process are shown.*

Kalit so'zlar: *Abdulla Avloniy, pedagogik meros, ta'lim-tarbiya, axloqiy tarbiya, metodika, pedagogik g'oyalar.*

Keywords: *Abdulla Avloni, pedagogical heritage, education, moral education, methodology, pedagogical idea.*

KIRISH

Zamonaviy ta'lim tizimida shaxsni har tomonlama rivojlantirish, uning intellektual va ma'naviy salohiyatini oshirish ustuvor vazifalardan biri hisoblanadi[4]. Ushbu jarayonda milliy pedagogik merosdan samarali foydalanish alohida ahamiyat kasb etadi. O'zbek pedagogik tafakkurining yirik

namoyandalaridan biri bo‘lgan Abdulla Avloniy o‘zining ilmiy-pedagogik faoliyati davomida ta’lim va tarbiya masalalariga alohida e’tibor qaratgan. Uning qarashlari shaxs kamolotini ta’minlash, jamiyat taraqqiyotiga xizmat qiluvchi barkamol avlodni tarbiyalashga yo‘naltirilganligi bilan ajralib turadi.

Mazkur maqolaning maqsadi — Avloniy pedagogik qarashlarini tahlil qilish hamda ularning zamonaviy ta’lim tizimidagi ilmiy-metodik ahamiyatini aniqlashdan iborat.

Tadqiqot metodlari: Maqolada tahlil, taqqoslash, umumlashtirish, tarixiy-pedagogik yondashuv hamda nazariy manbalarni o‘rganish metodlaridan foydalanildi.

ASOSIY QISM

Abdulla Avloniy pedagogik qarashlarining shakllanishi.

Abdulla Avloniyning pedagogik qarashlari muayyan tarixiy jarayonlar ta’sirida shakllangan. XIX asr oxiri va XX asr boshlarida yuzaga kelgan jadidchilik harakati ma’rifatparvarlik g‘oyalarining keng tarqalishiga xizmat qilgan [3]. Ushbu davrda ta’lim tizimini yangilash, yangi usul maktablarini joriy etish va yosh avlodni zamonaviy bilimlar asosida tarbiyalash zarurati yuzaga kelgan[3]. Avloniy ta’limni jamiyat rivojining asosiy omillaridan biri sifatida baholab, shaxs kamoloti bevosita ta’lim-tarbiya jarayoniga bog‘liq ekanligini ta’kidlaydi [1].

Avloniy asarlarining ta’lim-tarbiyaviy mazmuni: Avloniy asarlarida ta’lim va tarbiya masalalari uzviy bog‘liq holda ko‘rib chiqiladi. Uning “Turkiy guliston yoxud axloq” asarida inson xulq-atvori, axloqiy me’yorlar va ijtimoiy munosabatlar keng tahlil etilgan [1]. Asarda shaxsning ijobiy fazilatlarini shakllantirishga alohida e’tibor qaratilib, halollik, mehnatsevarlik, vatanparvarlik, rostgo‘ylik kabi sifatlar inson kamolotining asosiy mezonlari sifatida talqin qilinadi[1]. Shu bilan birga, yomon xulq-atvor oqibatlari ham tahlil qilinib, yoshlarni to‘g‘ri yo‘lga yo‘naltirish zarurligi asoslab beriladi[2].

Avloniy pedagogik g‘oyalarining zamonaviy ta’lim tizimidagi ahamiyati: Bugungi ta’lim tizimida kompetensiyaviy yondashuv va shaxsga yo‘naltirilgan

ta’lim muhim o‘rin egallaydi. Bu jihatdan Abdulla Avloniyning pedagogik qarashlari dolzarb ahamiyat kasb etadi. Avloniy tomonidan ilgari surilgan mustaqil fikrlash, ongli faoliyat yuritish va axloqiy yetuklikka erishish g‘oyalari zamonaviy ta’lim tamoyillari bilan uyg‘unlashadi[5]. Uning asarlaridan foydalanish o‘quvchilarning nafaqat bilim darajasini oshiradi, balki ularning ijtimoiy va ma’naviy kompetensiyalarini rivojlantirishga xizmat qiladi[4].

Natijalar va muhokama: Tahlillar shuni ko‘rsatadiki, Avloniy pedagogik merosi o‘zining ilmiy asoslanganligi va amaliy yo‘naltirilganligi bilan ajralib turadi[3]. Uning ta’lim-tarbiya haqidagi qarashlari yosh avlodni barkamol etib tarbiyalashda muhim omil bo‘lib xizmat qiladi. Shuningdek, Avloniy asarlarini o‘quv jarayoniga integratsiya qilish ta’lim samaradorligini oshirishga, o‘quvchilarning mustaqil fikrlash ko‘nikmalarini rivojlantirishga va ularning ma’naviy dunyosini boyitishga ijobiy ta’sir ko‘rsatadi[5].

XULOSA

Xulosa qilib aytganda, Abdulla Avloniyning pedagogik qarashlari bugungi ta’lim tizimi uchun muhim ilmiy-metodik asos bo‘lib xizmat qiladi. Uning asarlaridan samarali foydalanish yosh avlodni ma’naviy yetuk, intellektual salohiyatli shaxs sifatida shakllantirishga yordam beradi[1].

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TOURISM SECTOR DEVELOPMENT, STRUCTURAL CHANGE, AND LABOR DYNAMICS IN UZBEKISTAN, 2020 TO 2024

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Abstract: *This article examines recent changes in Uzbekistan's tourism sector using official statistical indicators on investment, service output, enterprise formation, employment, wages, vacancies, and tourism-related human capital. The study covers 2020 to 2024 and combines descriptive economic analysis with a cautious econometric interpretation suited to a short annual time series. The corrected evidence shows that tourism output expanded strongly after 2021, led primarily by accommodation services and later reinforced by rapid growth in travel agency activity. At the same time, employment increased more gradually than output, implying rising output intensity per worker. The labor market also became more skill intensive, as the number of workers with higher education rose steadily and average wages increased across the period. Regional evidence indicates that tourism business activity remains spatially concentrated, with a small group of regions accounting for a large share of enterprises. The article argues that the sector's recent trajectory reflects both post-pandemic recovery and a broader structural upgrading process, but also highlights the limits of inference that follow from a five-year macro sample. Policy recommendations focus on workforce upgrading, regional diversification, enterprise productivity, and better statistical integration for future modeling.*

Keywords: *Uzbekistan tourism; service sector development; labor productivity; regional enterprise structure; tourism economics; descriptive econometrics*

INTRODUCTION

Tourism has become one of the strategically important service sectors in Uzbekistan because it links domestic entrepreneurship, regional development, employment creation, transport activity, hospitality services, and the international visibility of the national economy (Astanakulov & Goyipnazarov, 2023). In recent years, sectoral policy has increasingly emphasized tourism as a source of diversification beyond traditional industries, recognizing its potential contribution to economic growth and structural transformation in transition economies (Scarlett, 2021). Against this background, a scientific assessment of the sector requires not only a description of aggregate expansion, but also a closer examination of how investment, output, business formation, and labor market characteristics move together over time.

This article develops such an assessment using corrected statistical series for the period from 2020 through 2024. The chosen period is analytically important because it captures the immediate post-pandemic adjustment of tourism activity (Albaladejo et al., 2022), the normalization of business conditions, and a subsequent phase of rapid sectoral growth. The article asks three main questions. First, how did tourism investment and service output evolve over the period. Second, what changes occurred in the structure and quality of employment. Third, how concentrated was tourism business activity across regions.

The contribution of the article is methodological as well as empirical. It revises the earlier analysis by correcting the figures and reinterpreting the evidence in a journal-ready scientific format. Because the number of annual observations is small, the article avoids overclaiming from formal regression results and instead uses careful trend, ratio, and structural analysis as the principal basis for inference (Pham, 2020).

LITERATURE AND ANALYTICAL BACKGROUND

The economics of tourism usually treats the sector as a multisector service system in which accommodation, transport, food services, reservation systems, cultural services, and local business ecosystems interact (Dwyer et al., 2007).

Tourism satellite accounts (TSAs) provide a standardized framework for measuring these interdependencies and estimating tourism's contribution to national accounts (Jones & Munday, 2008; Hara, 2012). In developing and transition economies, tourism can contribute to foreign exchange earnings, employment generation, small business growth, and territorial development (Rossouw & Saayman, 2011; Shukla, 2006).

At the same time, tourism performance is sensitive to shocks, infrastructure quality, institutional coordination, and human capital (Li et al., 2017). The COVID-19 pandemic demonstrated the sector's vulnerability to external disruptions while also revealing differential recovery patterns across destinations (Albaladejo et al., 2022). For that reason, recent empirical studies often combine macro indicators with regional business data and labor market evidence to capture structural relationships beyond single-output metrics alone.

Labor productivity in tourism is a particularly important dimension of sectoral performance. Research shows that output per worker varies significantly across tourism subsectors and is influenced by human capital investment, technological adoption, and organizational practices (Pham, 2020; Li et al., 2017). In emerging economies, rising tourism productivity can signal structural upgrading, formalization of informal activities, or improvements in service quality and pricing (Ellis et al., 2017).

Regional concentration and spatial agglomeration effects are also well documented in tourism research. Tourism businesses tend to cluster in specific locations due to infrastructure availability, natural or cultural attractions, demand concentration, and agglomeration economies (Song et al., 2023; Benner, 2013). These clustering patterns can create cumulative advantages for leading regions while potentially limiting development opportunities in peripheral areas (Abdalla Omer, 2010).

In the Uzbek context, these dynamics are especially relevant because the tourism sector includes a wide mix of public policy priorities, including destination

development, entrepreneurship support, workforce training, and service modernization (Astanakulov & Goyipnazarov, 2023). The present article follows this literature by focusing on structural relationships rather than relying on a single-output metric alone.

DATA AND METHODOLOGY

The empirical base of the article consists of official tourism statistics extracted from the workbook *Stat uz eng.xlsx* and cross-checked across the relevant sheets. The main annual series cover fixed-capital investment in tourism, accommodation service revenue, travel agency revenue, the number of employees in the tourism sector, the educational composition of tourism employment, average monthly wages, and vacancies. The study constructs a tourism output proxy as the sum of accommodation and travel agency revenues, following established practice in tourism economic measurement when comprehensive TSA data are unavailable (Dwyer et al., 2007; Chou & Huang, 2016).

Additional tables describe the regional distribution of tourism enterprises and the number of tourism-related university graduates. All monetary values are expressed in nominal Uzbek soums; the article does not adjust for inflation due to the focus on structural relationships rather than real growth decomposition.

The methodology is intentionally conservative. Given that only five annual observations are available for the core national series, the article uses descriptive trend analysis, simple structural ratios, and cross-sectional comparison instead of presenting high-powered causal econometric claims (Pham, 2020). This choice improves scientific credibility because a short annual sample is insufficient for robust time-series estimation with proper lag structures, cointegration testing, or dynamic panel methods. The visual evidence is therefore treated as a disciplined form of empirical analysis rather than as an illustration alone, consistent with best practices for small-sample tourism research.

RESULTS

The corrected national series show three central results. First, tourism output grew much faster than tourism employment between 2020 and 2024. The output proxy increased from approximately 1.66 trillion soums in 2020 to approximately 9.54 trillion soums in 2024, while employment increased from 337.6 thousand to 370.5 thousand persons (Figure 1). This implies a substantial increase in output intensity over time, consistent with rising labor productivity (Pham, 2020; Li et al., 2017).

Second, the structure of output became broader (Figure 2). Accommodation services remained the largest component throughout the period, but travel agency services expanded especially rapidly after 2022, indicating increasing diversification within market-facing tourism activities. This pattern aligns with post-pandemic recovery dynamics observed in other destinations, where travel intermediation services rebounded as international tourism resumed (Albaladejo et al., 2022).

Third, labor quality indicators improved (Figures 3 and 5). The number of workers with higher education rose steadily from 72.8 thousand in 2020 to 98.8 thousand in 2024, while average monthly wages also increased strongly. The vacancy series remained comparatively modest, which may suggest that sectoral growth was supported partly through internal labor reallocation and gradual qualification upgrading rather than only through extensive new hiring. This finding is consistent with research showing that human capital development plays a critical role in tourism productivity growth (Li et al., 2017).

Regional evidence adds a fourth result (Figure 4). Tourism enterprises are not evenly distributed across the country. A limited number of regions dominate the business landscape, which points to agglomeration effects, demand concentration, and uneven access to tourism-supporting infrastructure (Song et al., 2023; Benner, 2013). The capital region and major cultural heritage destinations account for a disproportionate share of registered tourism businesses, reflecting both historical path dependence and ongoing infrastructure investments.

DISCUSSION

The combined evidence suggests that Uzbekistan's tourism sector entered a phase of structural upgrading during 2020 to 2024. Rising output together with only moderate employment growth is consistent with improvements in average enterprise scale, service prices, business formalization, or productivity (Pham, 2020). The simultaneous increase in the number of higher-educated workers and wages supports the interpretation that skills are becoming more important within the sector, aligning with broader patterns of service sector development in emerging economies (Ellis et al., 2017).

However, the data also indicate asymmetry across territories. Regions with a stronger tourism base appear to attract and sustain more enterprises, which can generate cumulative advantages over time through agglomeration economies (Song et al., 2023). This creates a policy challenge. If tourism development remains overly concentrated, lagging regions may not fully benefit from national tourism growth, potentially exacerbating regional inequality (Abdalla Omer, 2010).

The post-pandemic context is particularly important for interpreting these trends. The sharp contraction of tourism activity in 2020 was followed by rapid recovery, but the recovery was uneven across subsectors. Accommodation services recovered earlier, while travel agency activities experienced delayed but more rapid growth. This pattern suggests that different tourism subsectors face distinct demand and supply constraints during crisis and recovery periods (Albaladejo et al., 2022).

Another important implication concerns empirical modeling. The short annual sample cautions against presenting elasticity estimates or regression coefficients as definitive evidence of causation. A stronger research design for future work would require quarterly data, longer time spans, or panel observations across regions, enabling more robust econometric identification of causal relationships (Pham, 2020). The integration of tourism satellite account methodologies would also strengthen future analysis by providing internationally comparable measures of tourism's economic contribution (Jones & Munday, 2008; Hara, 2012).

POLICY IMPLICATIONS

Several policy implications follow from the corrected analysis. First, workforce policy should emphasize specialized hospitality, destination management, and digital service skills because the sector is becoming more knowledge intensive (Li et al., 2017). The rising share of workers with higher education suggests that demand for qualified personnel is increasing, but targeted vocational training programs may be needed to address specific skill gaps in emerging tourism subsectors.

Second, regional development policy should support enterprise formation and destination infrastructure in underrepresented regions to reduce excessive concentration (Song et al., 2023). Policy instruments could include targeted investment in transportation infrastructure, cultural heritage site development, marketing support for emerging destinations, and business development services for tourism entrepreneurs in lagging regions.

Third, the rapid rise in output suggests the need for better enterprise productivity monitoring so that policymakers can distinguish between price effects and real efficiency gains (Pham, 2020). Establishing regular productivity measurement systems, ideally integrated with tourism satellite accounts, would provide more precise information for evidence-based policy design (Dwyer et al., 2007; Rossouw & Saayman, 2011).

Fourth, tourism statistics should be integrated into a richer panel database linking firms, labor, education, and regional outcomes (Jones & Munday, 2010). This would allow future studies to move from descriptive econometrics toward stronger causal evaluation using quasi-experimental methods or structural modeling approaches. International collaboration with organizations such as UNWTO and OECD could facilitate methodological alignment and capacity building for improved tourism statistics.

CONCLUSION

This article provides a corrected journal-style assessment of Uzbekistan's tourism sector for 2020 to 2024. The main conclusion is that the sector grew rapidly, became more diversified in its service composition, and displayed signs of labor-force upgrading (Pham, 2020; Li et al., 2017). At the same time, regional concentration remains significant and the current statistical base limits the strength of formal econometric claims.

For journal publication, the strongest contribution of the present study lies in its careful empirical reconstruction, transparent methodological restraint, and policy-relevant interpretation of recent sectoral transformation. The analysis demonstrates that even with limited time-series data, disciplined descriptive methods can yield valuable insights into structural change when combined with appropriate theoretical frameworks from tourism economics literature (Dwyer et al., 2007; Rossouw & Saayman, 2011).

Future research should extend the time horizon, expand the regional dimension, and incorporate demand-side indicators such as tourist arrivals, occupancy rates, and spending behavior (Albaladejo et al., 2022). Integration of tourism satellite account methodologies would enable more comprehensive measurement of tourism's economic contribution and facilitate international comparisons (Jones & Munday, 2008; Hara, 2012). Panel data approaches linking firm-level productivity, worker characteristics, and regional infrastructure would also strengthen causal inference and support more targeted policy interventions (Song et al., 2023).

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Figures

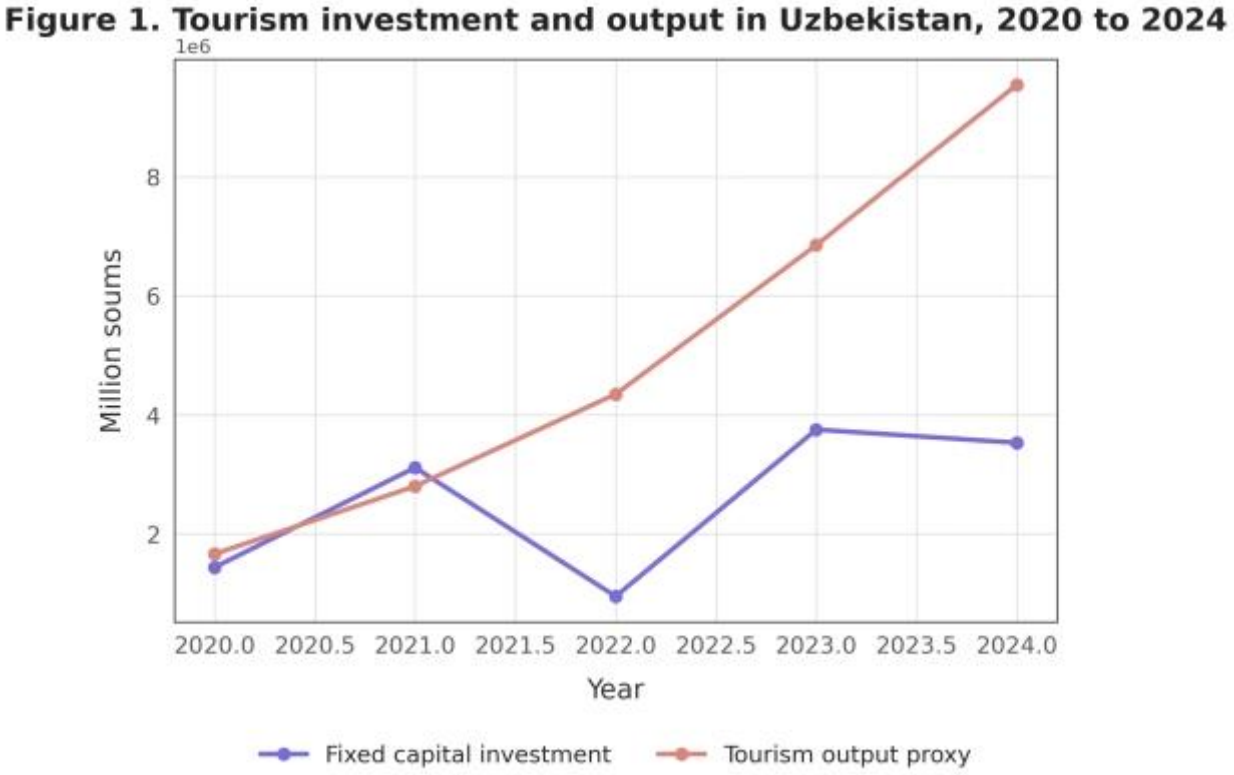

Figure 1

Figure 1. Dynamics of tourism fixed-capital investment and tourism output proxy in Uzbekistan, 2020 to 2024.

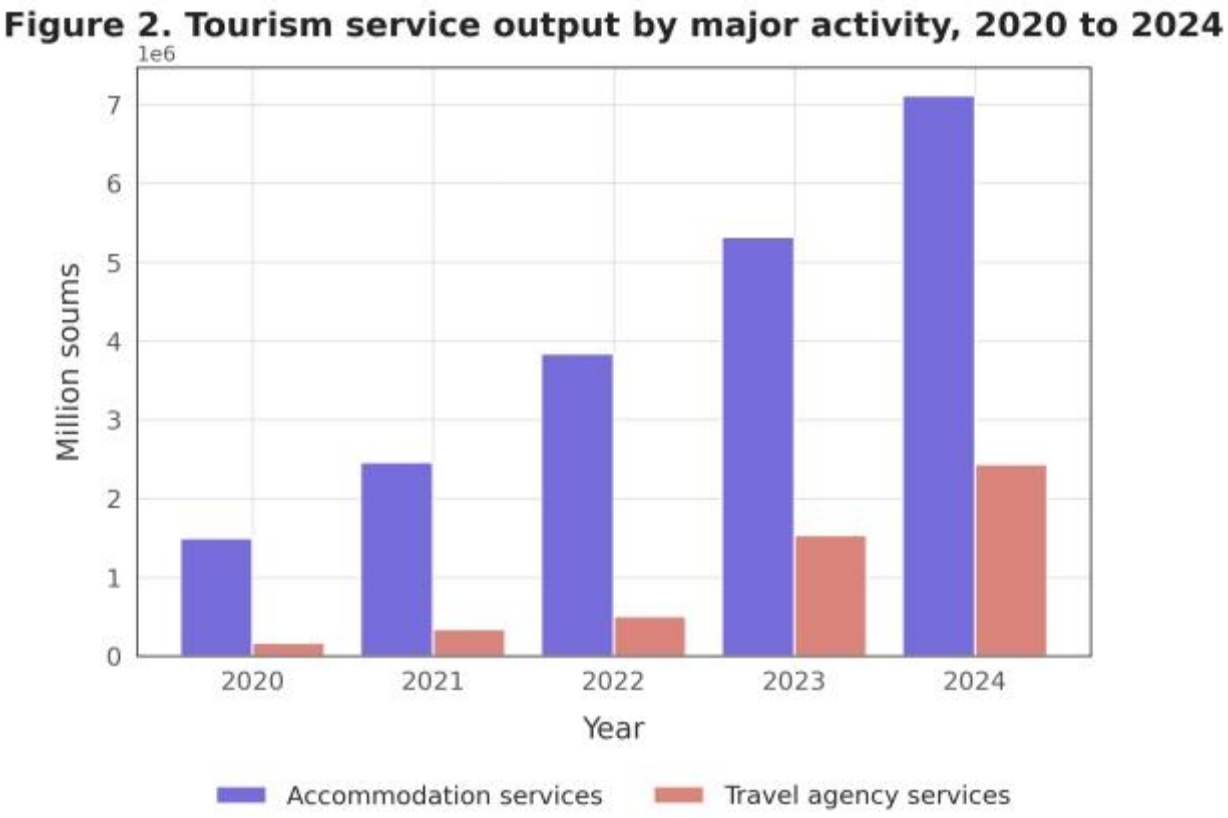

Figure 2

Figure 2. Structure of tourism service output by accommodation and travel agency services, 2020 to 2024.

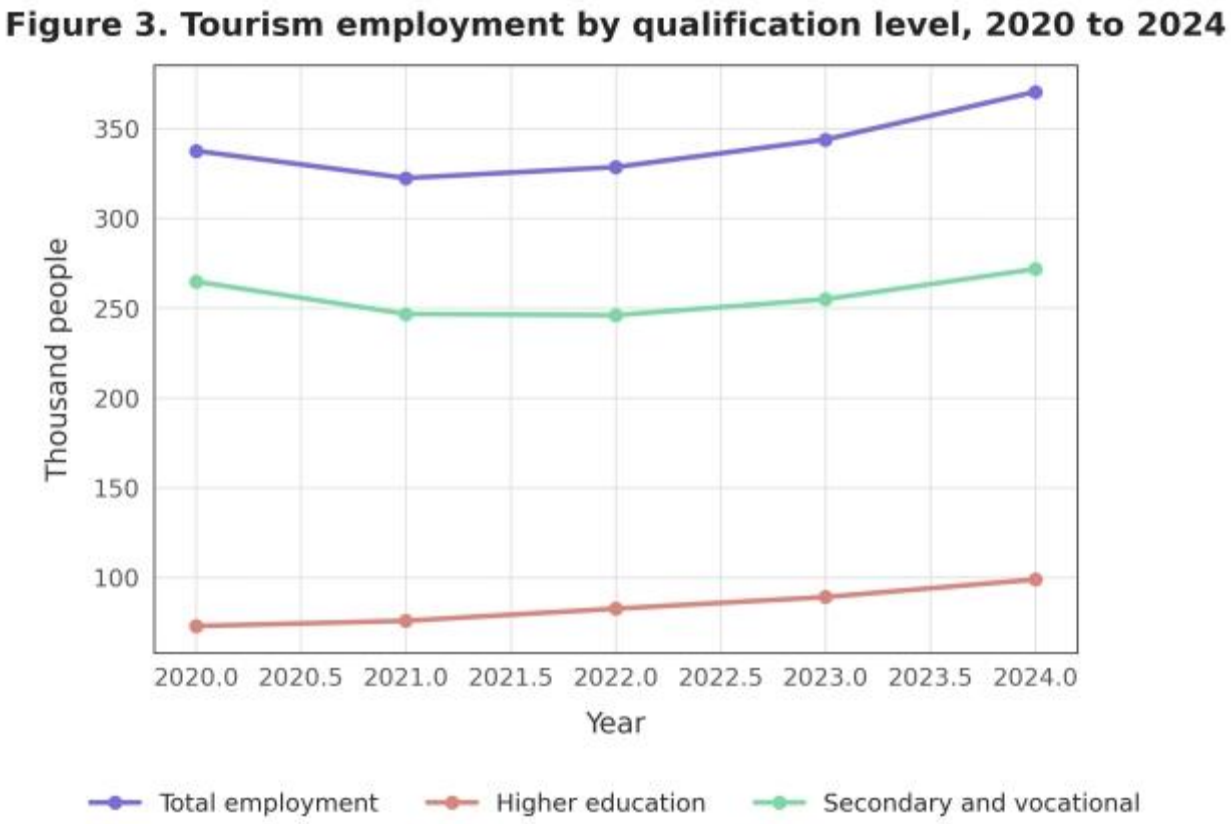

Figure 3

Figure 3. Employment dynamics in the tourism sector by qualification level, 2020 to 2024.

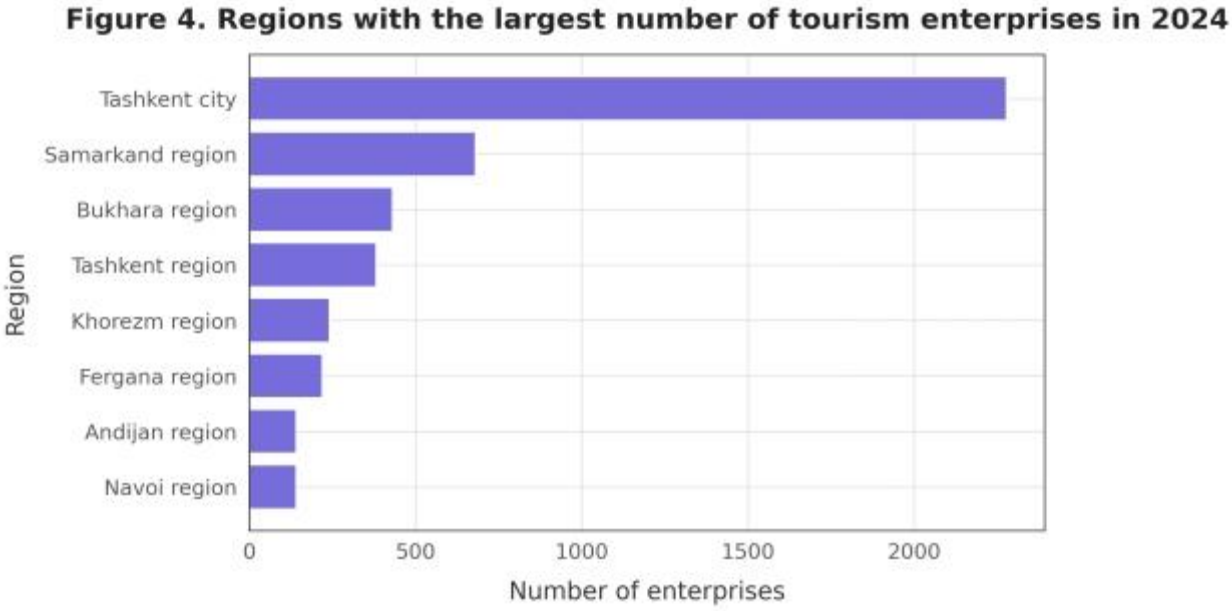

Figure 4

Figure 4. Regions with the highest number of tourism enterprises in 2024.



Figure 5

Figure 5. Labor market indicators in the tourism sector, 2020 to 2024.

THE IMPACT OF INFORMAL DIGITAL DISCOURSE ON TERMINOLOGICAL ACCURACY

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Abstract. *Modern language use has been substantially affected by the growth of informal digital discourse, especially in online communication settings. Its effect on terminological accuracy in academic and professional contexts is examined in this study. This research finds common patterns of informal language use and how they affect specialized terminology using a mixed-methods approach that combines survey data from university students and corpus analysis. The results show that although informal discourse increases accessibility and engagement, it frequently results in term simplification and distortion. The study comes to the conclusion that in order to preserve terminological accuracy in the digital age, greater awareness and focused educational initiatives are required.*

Key words*: Academic writing, code-switching, corpus analysis, digital communication, digital literacy, informal digital discourse, linguistic variation, terminological accuracy.*

INTRODUCTION

The digital age has brought about previously unheard-of shifts in how people communicate. Social media, messaging apps, and online forums are examples of platforms that have made informal digital discourse—a style marked by speed, creativity, and brevity—popular. Although this type of communication improves productivity and expressiveness, its effects on linguistic norms—particularly terminological accuracy—raise questions.

The precise and consistent use of terms within a particular domain, particularly in academic, scientific, and professional contexts, is referred to as terminological accuracy. In order to ensure clarity and minimize ambiguity,

terminology is essential to knowledge representation and communication, according to Cabré (2021). However, by introducing non-standard forms and hybrid expressions, the emergence of informal digital discourse calls into question these principles.

According to recent research [Tagliamonte & Denis, 2020;12], rather than just demeaning preexisting linguistic norms, digital communication has resulted in the creation of new ones. These conventions include phonetic spellings, the use of visual components like emojis, and abbreviations like "LOL" and "BRB." Although these features speed up communication, they can make it difficult to use specialized terminology correctly.

The impact of digital discourse is even more noticeable when considering English as a universal language. According to research by Androutsopoulos (2022), multilingual people frequently mix languages and modify terminology in ways that might not conform to standard forms. In nations like Uzbekistan, where English is used in both formal and informal contexts alongside Uzbek and Russian, this is especially important.

Additionally, research on academic writing [Hyland, 2021;9 and Flowerdew, 2020;6] shows that students are increasingly incorporating informal digital habits into formal writing, which leads to a decrease in terminological precision. This phenomenon is particularly problematic in domains where accuracy is crucial, like technology, medicine, and economics.

Some academics contend that informal digital discourse can improve engagement and democratize communication in spite of these worries [Jones & Hafner, 2021;8]. Though sometimes at the expense of accuracy, it enables users to engage in knowledge exchange more actively.

With an emphasis on both linguistic patterns and user perceptions, this study attempts to investigate the degree to which informal digital discourse influences terminological accuracy.

METHODS

The mixed-methods approach used in this study combines quantitative and qualitative data collection methods.

- Data Gathering - two main sources of information were utilized: Corpus Analysis: 500 digital texts from social media sites (Telegram, Instagram, and Twitter/X) were gathered into a corpus. Posts and comments about academic and semi-academic subjects were included in the texts, especially those pertaining to education and economics.

Survey Questionnaire: One hundred and twenty university students in Uzbekistan were given a structured questionnaire. The participants were graduate and undergraduate students with information technology, economics, and linguistics majors.

- Framework for Analysis - the analysis concentrated on: Frequency of informal elements (emojis, slang, and acronyms); Examples of distorted terminology; Hybrid terminology and code-switching; Contextual appropriateness of terms.
- Procedure: To find patterns of terminological usage, content analysis techniques were applied to the corpus data. The prevalence of informal features and participants' awareness of terminological accuracy were evaluated through statistical analysis of the survey responses.

RESULTS

The findings of the study reveal several key trends:

Informal linguistic elements were present in about 68% of the examined texts. Abbreviations (such as "info," "eco," and "gov") were among the most prevalent features. Slang phrases like "kinda" and "stuff" Emojis as semantic replacements. Terminological Distortion - deviations from standard terminology were found in about 45% of the texts. Simplifying technical terms (e.g., "inflation rate" → "price rise") is one example. Misuse of vocabulary specific to a domain substitution of ambiguous expressions for terms

Hybrid Terms and Code-Switching - in multilingual settings, code-switching was present in 37% of the texts, especially among Uzbek students. For instance:

Combining Uzbek grammar with English economic terms or Translating English words into Uzbek phonology.

Survey findings:

9. In academic settings, 72% of participants admitted to using informal terms.
10. According to 64% of respondents, formal writing is impacted by digital communication.
11. Merely 38% expressed assurances regarding their ability to maintain terminological precision.

DISCUSSION

The results show that informal digital discourse has a big effect on the accuracy of terms. The high number of informal features shows that digital communication norms are deeply ingrained in how people speak.

One of the most important results is that the language has been made easier to understand. Simplifying things can make them easier to understand, but it can also make them less precise. Changing "gross domestic product" to "country income" may make the idea easier to understand, but it is less technically correct.

The problem of code-switching makes it even harder to use terms correctly. In multilingual environments, users often modify terms across languages, resulting in hybrid forms that may not conform to standardized terminology. This shows how language changes over time, but it also makes it harder for academics to talk to each other.

The survey results show that people are aware of something but don't do it. Many participants understand how important it is to use the right terms, but they have trouble doing so because they are used to speaking informally. This indicates that digital habits affect cognitive and linguistic patterns.

It is important to remember, though, that informal digital conversation is not always bad. It encourages creativity, participation, and acceptance. The difficulty is in figuring out when it's okay to be informal and when you need to be precise.

Schools and colleges are very important in solving this problem. Teaching students how to write academically and how to use technology together can help them learn how to switch between formal and informal language.

CONCLUSION

This study shows that informal digital communication can change the accuracy of terms, especially in academic and semi-professional settings. Digital communication makes things easier to access and more interesting, but it also makes it harder to be precise and follow the same rules.

The results indicate that:

People use informal features a lot, and they often move them into formal settings.

Terminological distortion is a frequent outcome.

Multilingual settings intensify the problem via code-switching.

To lessen these effects, it is important to raise awareness of language registers and give specific training on how to use terminology. Future research may investigate discipline-specific effects and create instruments to enhance terminological precision in digital contexts.

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BOSHLANG‘ICH SINF O‘QUVCHILARINING MATEMATIK SAVODXONLIGINI BAHOLASH (EGMA) TARTIBLARI VA METODOLOGIK ASOSLARI

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Annotatsiya: *Ushbu maqolada xalqaro EGMA (Early Grade Mathematics Assessment) dasturining mazmun-mohiyati, uni umumta’lim maktablarida o‘tkazishning bosqichma-bosqich tartiblari va baholash mezonlari tahlil qilinadi. Tadqiqotda EGMA instrumentariyasining o‘ziga xos xususiyatlari, o‘quvchilarning matematik tushunchalarni o‘zlashtirish darajasini aniqlashdagi o‘rni hamda ushbu dastur natijalarining ta’lim dasturlarini takomillashtirishdagi ahamiyati yoritilgan. Shuningdek, baholash jarayonida qo‘llaniladigan subtestlar va ularning psixometrik xususiyatlari haqida batafsil ma’lumot berilgan.*

Kalit so‘zlar: *EGMA, xalqaro baholash, boshlang‘ich ta’lim, matematik savodxonlik, subtest, monitoring, ta’lim sifati, metodologiya, aprobatsiya.*

Abstract: *This article analyzes the content and essence of the international EGMA (Early Grade Mathematics Assessment) program, the step-by-step procedures for its implementation in general education schools, and the evaluation criteria. The study highlights the unique characteristics of EGMA tools, their role in determining the level of students' mastery of mathematical concepts, and the importance of the program results in improving educational curricula. Furthermore, detailed information is provided regarding the subtests used in the assessment process and their psychometric properties.*

Keywords: *EGMA, international assessment, primary education, mathematical literacy, subtest, monitoring, quality of education, methodology, approbation.*

Аннотация: *В данной статье анализируются содержание и сущность международной программы EGMA (Early Grade Mathematics Assessment), поэтапный порядок её проведения в общеобразовательных школах и критерии оценивания. В исследовании освещаются особенности инструментария EGMA, его роль в определении уровня усвоения учащимися математических понятий, а также значимость результатов данной программы в совершенствовании учебных программ. Кроме того, представлена подробная информация о субтестах, используемых в процессе оценивания, и их психометрических характеристиках.*

Ключевые слова: *EGMA, международное оценивание, начальное образование, математическая грамотность, субтест, мониторинг, качество образования, методология, апробация.*

KIRISH

Bugungi kunda jahon ta’lim tizimida o‘quvchilarning nafaqat nazariy bilimlarini, balki ularning amaliy ko‘nikmalarini baholashga yo‘naltirilgan xalqaro dasturlarning o‘rni beqiyos. Shunday dasturlardan biri — EGMA (Early Grade Mathematics Assessment) bo‘lib, u asosan 1-4-sinf o‘quvchilarining asosiy matematik ko‘nikmalarini aniqlashga mo‘ljallangan.

O‘zbekiston Respublikasi Xalq ta’limi tizimini modernizatsiya qilish jarayonida o‘quvchilarning savodxonligini xalqaro standartlar asosida baholash ustuvor vazifa etib belgilangan. EGMA dasturi o‘quvchilarning sonlar bilan ishlash,

geometrik shakllarni farqlash va mantiqiy misollarni yechish qobiliyatini ilk bosqichlardayoq diagnostika qilish imkonini beradi.

EGMA dasturi an’anaviy yozma imtihonlardan farq qiladi. U asosan individual (yakkama-yakka) tarzda, planshetlar yoki maxsus savolnomalar yordamida og‘zaki va amaliy shaklda o‘tkaziladi. Baholash jarayoni quyidagi asosiy komponentlarni (subtestlarni) o‘z ichiga oladi:

1. Sonlarni tanish: O‘quvchi taqdim etilgan sonlarni nomini to‘g‘ri aytishi kerak.
2. Miqdorlarni qiyoslash: Berilgan ikki yoki undan ortiq sonlarning qaysi biri katta yoki kichikligini aniqlash.
3. Yetishmayotgan sonni topish: Sonlar ketma-ketligidagi qonuniyatni anglash va bo‘sh katakni to‘ldirish.
4. Qo‘shish va ayirish (og‘zaki va yozma): Oddiy arifmetik amallarni bajarish tezligi va aniqligi.

EGMA tadqiqotini o‘tkazish bosqichlardan iborat:

1-bosqich: Tayyorgarlik va tanlov

Baholash o‘tkaziladigan maktablar tasodifiy tanlov asosida tanlanadi. Bunda maktabning joylashuvi (shahar yoki qishloq), ta’lim tili va moddiy-texnik bazasi inobatga olinadi. Tanlangan maktablarda baholovchi (intervyuer)lar guruhi shakllantiriladi.

2-bosqich: Assessorlarni (Baholovchilarni) o‘qitish

EGMA natijalarining ob’ektivligini ta’minlash uchun baholovchilar maxsus treningdan o‘tadilar. Ular o‘quvchi bilan qanday muloqot qilish, vaqtni qanday nazorat qilish (odatda har bir topshiriq uchun 60 soniya beriladi) va javoblarni tizimga qanday kiritishni o‘rganadilar.

3-bosqich: To‘g‘ridan-to‘g‘ri baholash jarayoni

Baholash jarayoni darsdan tashqari, shovqinsiz va o‘quvchi o‘zini erkin his qiladigan muhitda o‘tkaziladi. Assessor o‘quvchiga savollarni o‘qib beradi, o‘quvchi esa javob beradi yoki ko‘rsatadi. Bu jarayonda o‘quvchining stressga tushmasligi uchun "o‘yin" shaklidagi muloqotdan foydalaniladi.

4-bosqich: Ma’lumotlarni yig‘ish va tahlil qilish

Hozirda EGMA ko‘pincha Tangerine kabi maxsus dasturlar orqali amalga oshiriladi. Ma’lumotlar real vaqt rejimida umumiy bazaga tushadi. Bu esa inson omili sababli yuzaga keladigan xatolarni kamaytiradi.

EGMA natijalari faqat o‘quvchiga baho qo‘yish uchun emas, balki tizimli xulosalar chiqarish uchun xizmat qiladi. Masalan, agar o‘quvchilar "Yetishmayotgan sonni topish" subtestida past natija ko‘rsatsa, demak, o‘quv dasturida mantiqiy ketma-ketliklar mavzusiga kamroq vaqt ajratilgan degan xulosaga kelinadi. Siz taqdim etgan matnning o‘zbek tilidagi tarjimasi quyidagicha: Summativ (yakuniy) baholashdan farqli o‘laroq, formativ (shakllantiruvchi) baholash o‘qitish jarayonini qayta ko‘rib chiqish va o‘quvchilarga zarur bo‘lgan joyda ko‘proq yordam berish imkoniyatini yaratish uchun mo‘ljallangan. Odatda, formativ baholash o‘qituvchilar yoki maktablar tomonidan o‘qitish amaliyotini takomillashtirish va darslarni o‘quvchining rivojlanish bosqichidagi o‘rniga moslashtirish uchun foydalaniladi. Masalan, o‘quv dasturidagi biror bo‘lim sinfda o‘tiladi, so‘ngra ushbu bo‘lim davomida o‘zlashtirilishi kutilgan bilimlar bo‘yicha formativ baholash o‘tkaziladi. Formativ baholash natijalariga qarab, o‘qituvchi muayyan tushunchalarni butun sinfga qaytadan tushuntirishi, ayrim o‘quvchilarning bilim va ko‘nikmalarini sinfning ko‘pchilik qismi darajasiga yetkazish uchun ular bilan alohida ishlashi yoki keyingi bo‘limga o‘tishi mumkin. “Summativ” va “formativ” yorliqlari baholashning shaklini (formatini) belgilab bermaydi. Masalan, shtat, tuman yoki viloyat miqyosidagi tashkilot o‘quv yili oxirida beshinchi sinf o‘quvchilarining necha foizi kasrlarni qo‘shish tushunchasini o‘zlashtirganini bilishni xohlashi mumkin. Shunga o‘xshab, o‘qituvchi ham o‘quv dasturidagi keyingi mavzuga o‘tishdan oldin o‘quvchilarining ko‘pchiligi kasrlarni qo‘shishni tushunganmi yoki yo‘qligini bilishni istashi mumkin. Baholashning har ikki turida ham o‘quvchilardan kasrlarni qo‘shishga doir masalalarni yechish va ularni qanday yechganliklarini tushuntirib berish so‘raladigan topshiriqlar bo‘lishi mumkin. Qisqacha aytganda: Muammo bir xil, maqsadlar esa turlicha.

Asosiy EGMA (Core EGMA) ham summativ, ham formativ baholash uchun katta imkoniyatlarga ega. Dastlab EGMA har ikki turdagi ma'lumotni taqdim etish uchun ishlab chiqilgan edi. Biroq, aksariyat hollarda Asosiy EGMA quyidagilar uchun qo'llanilgan:

1. Mamlakatdagi o'quvchilarning umumiy ko'rsatkichlarini belgilangan o'quv dasturiga nisbatan qanday ekanligini aniqlash;
2. Muayyan o'quv dasturlari, aralashuvlar (interventsiyalar) yoki o'qituvchilarni tayyorlash dasturlarining samaradorligini tekshirish.

Asosiy EGMA kabi vosita manfaatdor tomonlarga (Xalq ta'limi vazirliklaridan tortib yordam ko'rsatuvchi agentliklargacha) o'qituvchilar tayyorlash, o'quv dasturlarini ishlab chiqish va joriy etishda mahalliy hamda milliy tizimli o'zgarishlarni amalga oshirish uchun zarur bo'lgan muhim ma'lumotlarni taqdim etishda katta ahamiyatga ega. Boshlang'ich sinf o'quvchilarining matematik ko'nikmalarini aniq va samarali baholash matematikani o'qitish va o'rganishni yaxshi tomonga o'zgartirish uchun kerak bo'lgan barcha ma'lumotlarni bera olmaydi. Biroq, milliy chegaralardan tashqarida ham amal qiladigan va ko'plab tillarda mavjud bo'lgan vositadan foydalanish, ta'lim vazirliklariga mintaqaviy o'quv dasturlaridan mustaqil ravishda, bolalarning matematik rivojlanishi haqidagi bilimlarga asoslangan holda o'quvchilar qobiliyatini umumiy baholash imkonini beradi. Tahlil darajasiga qarab, ushbu ma'lumotlar mamlakat ichidagi aniq geografik yoki siyosiy kichik hududlarni o'rganishga moslashtirilishi mumkin. Ushbu tahlil natijalari vazirliklarga muayyan mavzular yoki hududlarda o'qituvchilar malakasini oshirish kabi chora-tadbirlarni maqsadli amalga oshirish imkonini beradi. Shuni tushunish muhimki, o'quvchilarning ballari shunchaki ularning ma'lum bir ko'nikmadagi qobiliyati o'lchovi emas, balki ular o'quvchilar muhitining ham o'lchovidir. O'quvchining bilim olishiga ko'plab omillar ta'sir qilishi mumkin, jumladan: ijtimoiy-iqtisodiy holat, ovqatlanish, o'qituvchilarning mahorati va ma'lumoti, dars vaqti, ota-onalarning ma'lumoti, fuqarolar urushi yoki mahalliy nizolar hamda oilaviy mas'uliyatlar.

EGMAning afzalliklariga quyidagilarni misol keltirish mumkin:
Boshlang‘ich sinf o‘quvchisining matematik tafakkuridagi "bo‘shliq"larni erta aniqlaydi, shu bilan birga o‘qituvchilar uchun o‘qitish metodikasini o‘zgartirishga turtki beradi hamda xalqaro darajadagi ta’lim sifati bilan milliy tizimni solishtirish imkonini yaratadi.

Yuqoridagi xatboshilarda maktabgacha va boshlang‘ich ta’lim davrida matematik bilimlarni egallash jarayoni qisqacha muhokama qilindi. Garchi ushbu umumiy rivojlanish bosqichlarini bilish muhim bo‘lsa-da, bu bizga rasmiy matematikani o‘rganishning ahamiyati yoki bolalar rivojlanishning qaysi bosqichida ekanligini qanday tushunishimiz mumkinligi haqida kam ma’lumot beradi.

Birinchi nuqtaga — ya’ni maktabgacha va boshlang‘ich ta’limda matematik bilimlarni egallashga to‘xtaladigan bo‘lsak, matematik savodxonlik kundalik hayotda tobora zaruriy ko‘nikmaga aylanib bormoqda (Stin, 2001). Fuqarolik tushunchasi sonlar bilan ishlash ko‘nikmasini (numeracy) talab qiladi. Masalan, saylovda qaysi nomzod aholi uchun eng yaxshi imkoniyatlarni taqdim eta olishini hal qilish uchun inflyatsiya, qarz, eksport va import nisbatlari kabi natijalarni talqin qila olish kerak. Bundan tashqari, soliqlarning oshishiga yoqlab yoki qarshi ovoz berish ushbu soliqlarning foyda va zararlarini tushunishni talab qiladi.

Ko‘pgina kasblar, hatto deyarli barchasi, sonlar bilan ishlash ko‘nikmasini talab etadi. Bunga nafaqat fan va texnologiya sohasidagi kasblar, balki huquqshunoslik, arxitektura va oziq-ovqat tayyorlash sohalari ham misol bo‘la oladi. Shuningdek, shaxsiy moliya — insonning mablag‘i kam yoki ko‘p bo‘lishidan qat’i nazar — uni oqilona boshqarish uchun matematik savodxonlikni talab qiladi. Mikromoliya kreditlari bo‘yicha foiz stavkalarini tushunmaslik oqibatida ko‘plab mehnatkash insonlar kutilmagan qiyinchiliklarga duch kelishmoqda. Sonlar bilan ishlashni talab qiladigan yana bir soha bu salomatlikni saqlashdir. Masalan, bezgak xavfini aniqlashda ba’zi asosiy savollarga javob topish uchun statistika bo‘yicha boshlang‘ich tushunchalar kerak bo‘ladi: Chivinlarga qarshi to‘rlar qanchalik

samarali? Ularga insektitsid bilan ishlov berish kerakmi? Muayyan hududda bezgakning qaysi turi tarqalgan? Ushbu turga qarshi qaysi dorilar samarali?

Rivojlanayotgan mamlakatlarga kelsak, ba'zida shunday dalillar keltiriladi: "Ko'p bolalar baribir dehqonchilik, chorvachilik yoki terimchilik bilan shug'ullanib ulg'ayadi, agar ular faqat eng oddiy matematik ko'nikmalardan foydalansa, nega davlatning qimmatli resurslarini bu guruhlarga sarflash kerak?". Biroq, miqdoriy savodxonlikning ahamiyatiga oid misollar hatto qishloqlardagi bolalar uchun ham juda ko'pdir. Matematik savodxonlikni ta'minlashning yuqorida aytib o'tilgan sabablaridan tashqari, barcha bolalarga samarali matematika ta'limini berishning eng muhim sababi shundaki, bunday ta'limsiz kelajakdagi imkoniyatlar yo'li butunlay yopilib qolishi mumkin. Rasmiy matematika bizga miqdorlar va ular orasidagi bog'liqliklarni mavhumlashtirish (abstraksiyalash), ularni yangi kontekst va vaziyatlarga tatbiq etish hamda ko'nikmalarni faqat bitta soha yoki bitta vaziyat bilan cheklab qo'ymasdan, ularni umumlashtirish (generalizatsiya qilish) imkonini beradi

XULOSA

Xulosa o'rnida shuni aytish joizki, EGMA xalqaro baholash dasturi O'zbekiston maktablarida tizimli o'tkazish ta'lim islohotlarining samaradorligini o'lchashda asosiy instrument hisoblanadi. Tadqiqot tartiblariga qat'iy rioya qilish va natijalar asosida o'quv darsliklarini takomillashtirish kelajakda aniq fanlar bo'yicha yuqori ko'rsatkichlarga erishishning poydevoridir. Ushbu maqolada keltirilgan tartib va tavsiyalar soha mutaxassislari, metodistlar va pedagoglar uchun ilmiy-amaliy qo'llanma bo'lib xizmat qiladi.

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INNOVATSION TA’LIM MUHITIDA BO‘LAJAK BOSHLANG‘ICH TA’LIM O‘QITUVCHISINING SHAXSIY-KASBIY SIFATLARINI TAKOMILLASHTIRISH

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Annotatsiya: *Mazkur maqolada innovatsion ta’lim muhiti sharoitida bo‘lajak boshlang‘ich ta’lim o‘qituvchisining shaxsiy va kasbiy sifatlarini rivojlantirish masalalari IMRAD tuzilmasi asosida yoritilgan. Tadqiqotda zamonaviy pedagogik yondashuvlar, kompetensiyaviy model va O‘zbekiston Respublikasining 2022–2026-yillarga mo‘ljallangan Yangi taraqqiyot strategiyasi o‘rtasidagi uzviy bog‘liqlik ilmiy jihatdan tahlil etilgan. Shuningdek, o‘qituvchilarning kreativligi, axborot-kommunikatsion kompetensiyasi va refleksiv ko‘nikmalarini rivojlantirish mexanizmlari asoslab berilgan.*

Kalit so‘zlar: *innovatsion ta’lim, boshlang‘ich ta’lim, pedagogik kompetensiya, kreativlik, kasbiy rivojlanish, ta’lim strategiyasi, refleksiya*

Аннотация: *В данной статье рассматриваются вопросы совершенствования личностно-профессиональных качеств будущего учителя начального образования в условиях инновационной образовательной среды на основе структуры IMRAD. Проведен научный анализ взаимосвязи современных педагогических подходов, компетентностной*

модели и Стратегии нового развития Республики Узбекистан на 2022–2026 годы. Обоснованы механизмы развития креативности, информационно-коммуникационной компетентности и рефлексивных навыков педагогов.

Ключевые слова:*инновационное образование, начальное образование, педагогическая компетентность, креативность, профессиональное развитие, образовательная стратегия, рефлексия*

Abstract: *This article examines the development of personal and professional qualities of future primary school teachers in an innovative educational environment based on the IMRAD structure. The study provides a scientific analysis of the interrelation between modern pedagogical approaches, the competency-based model, and the Development Strategy of New Uzbekistan for 2022–2026. The mechanisms for developing creativity, ICT competence, and reflective skills of teachers are substantiated.*

Keywords: *innovative education, primary education, pedagogical competence, creativity, professional development, educational strategy, reflection*

INTRODUCTION

Hozirgi davrda ta’lim tizimining modernizatsiyasi va innovatsion rivojlanishi global ustuvor yo‘nalishlardan biri hisoblanadi. Ayniqsa, boshlang‘ich ta’lim bosqichi shaxsning intellektual va ijtimoiy rivojlanishida hal qiluvchi ahamiyatga ega. Shu bois bo‘lajak boshlang‘ich sinf o‘qituvchilarining shaxsiy va kasbiy sifatlarini rivojlantirish dolzarb ilmiy muammo sifatida qaralmoqda.

O‘zbekiston Respublikasining 2022–2026-yillarga mo‘ljallangan Yangi taraqqiyot strategiyasida ta’lim sifatini oshirish, pedagog kadrlar tayyorlash tizimini takomillashtirish hamda innovatsion texnologiyalarni keng joriy etish ustuvor vazifa sifatida belgilangan[1]. Bu esa o‘qituvchilarning kompetensiyaviy yondashuv asosida tayyorlanishini talab etadi.

O‘zbekiston o‘z taraqqiyotining yangi bosqichida ta’lim tizimini tubdan isloh qilishni ustuvor vazifa qilib belgiladi. "O‘zbekiston — 2030" strategiyasining 1-yo‘nalishi bevosita sifatli ta’lim tizimini yaratishga qaratilgan. Unda boshlang‘ich sinf o‘quvchilarining mantiqiy va kreativ fikrlashini rivojlantirish asosiy maqsad qilib qo‘yilgan[2].

Bu maqsadga erishish uchun, avvalo, bo‘lajak o‘qituvchining shaxsi o‘zgarishi kerak. Innovatsion muhit — bu faqat kompyuterlar to‘plami emas, balki o‘qituvchi va o‘quvchi o‘rtasidagi subyekt-subyekt munosabatiga asoslangan, doimiy o‘zgaruvchan pedagogik jarayondir.

Tadqiqotning maqsadi — innovatsion ta’lim muhitida bo‘lajak boshlang‘ich ta’lim o‘qituvchisining shaxsiy-kasbiy sifatlarini rivojlantirishning samarali yo‘llarini aniqlash va ularni strategik hujjatlar bilan uyg‘un holda asoslash.

METHODS

Mazkur tadqiqotda quyidagi metodlardan foydalanildi:

• Nazariy tahlil — pedagogika va psixologiya sohasidagi ilmiy manbalarni o‘rganish[3];

• Qiyosiy tahlil — milliy va xalqaro tajribalarni solishtirish[4];

• Empirik metodlar (kuzatish, so‘rovnoma, suhbat);

• Tizimli yondashuv — o‘qituvchi shaxsining kompleks rivojlanishini o‘rganish;

• Statistik tahlil — olingan natijalarni umumlashtirish.

Tadqiqot obyekti: pedagogika yo‘nalishidagi talabalar.

Tadqiqot predmeti: innovatsion ta’lim muhitida ularning shaxsiy-kasbiy rivojlanish jarayoni.

RESULTS

Bo‘lajak o‘qituvchining shaxsiy-kasbiy sifatlarini takomillashtirish modeli uchta asosiy blokdan iborat bo‘lishi aniqlandi:

Shaxsiy-individual sifatlar (Soft Skills)

• Emotsional intellekt (EQ): Bolaning psixologik holatini his qilish va o‘z emotsiyalarini boshqarish.

• Adaptivlik: Tez o‘zgarayotgan ta’limiy vaziyatlarga moslashish.

• Tolerantlik va inklyuzivlik: Turli qobiliyatga ega bolalar bilan teng ishlay olish.

Kasbiy-pedagogik kompetensiyalar (Hard Skills)

• Raqamli didaktika: Faqat slayd ko‘rsatish emas, balki VR (virtual borliq), AR (kengaytirilgan borliq) va gamifikatsiya (o‘yinlashtirish) elementlarini darsga olib kirish.

• Parchalangan bilimlar integratsiyasi: Matematikani ona tili bilan, tabiatshunoslikni san’at bilan bog‘lab o‘tish (STEAM yondashuv).

Innovatsion-kreativ blok

• Pedagogik improvizatsiya: Dars ssenariysidan chetga chiqib, kutilmagan savollarga ijodiy javob berish.

• Refleksivlik: O‘z faoliyatini tanqidiy tahlil qilish va xatolardan xulosa chiqarish.

Tadqiqot natijalari quyidagilarni ko‘rsatdi:

Shaxsiy sifatlar rivoji

Innovatsion ta’lim muhiti quyidagi shaxsiy sifatlarni rivojlantiradi:

• kreativ fikrlash (yangicha yondashuvlar ishlab chiqish);

• refleksivlik (o‘z faoliyatini tahlil qilish);

• kommunikativlik;

• moslashuvchanlik[4].

Kasbiy kompetensiyalar rivoji

Quyidagi kompetensiyalar sezilarli darajada oshgani aniqlandi:

• pedagogik texnologiyalarni qo‘llash;

• AKTdan samarali foydalanish;

• interfaol metodlarni joriy etish;

• baholash tizimlarini takomillashtirish[5].

Strategiya bilan uyg‘unlik

Natijalar Yangi taraqqiyot strategiyasining quyidagi yo‘nalishlariga mos keladi:

• raqamli ta’limni rivojlantirish;

• pedagoglar malakasini oshirish;

• innovatsion metodlarni keng joriy etish[1].

DISCUSSION

O‘zbekistonning yangi taraqqiyot strategiyasi o‘qituvchini "axborot yetkazuvchi" statusidan "ta’lim dizayneri" statusiga o‘tkazishni taqozo etadi.

Muammo va Yechim:

Hozirgi kunda pedagogik oliy ta’lim muassasalarida talabalar nazariyani yaxshi bilsa-da, amaliyotda innovatsion texnologiyalarni qo‘llashda "psixologik to‘siq"qa uchrashmoqda. Buni bartaraf etish uchun:

• Pedagogik oliygohlarda "Raqamli laboratoriya"lar ko‘paytirilishi;

• "Ustoz-shogird" tizimi asosida bo‘lajak o‘qituvchi birinchi kursdanoq maktab muhitiga integratsiya qilinishi zarur.

Strategiyada belgilanganidek, o‘qituvchilarning ish haqi va ijtimoiy nufuzi oshishi ularning o‘z ustida ishlashiga motivatsiya beradi, biroq ichki ehtiyoj — ya’ni kasbiy komillikka intilish — bu ta’lim muhitining innovatsionligi bilan bog‘liqdir.

Natijalar shuni ko‘rsatadiki, innovatsion ta’lim muhiti bo‘lajak o‘qituvchilarning kompleks rivojlanishini ta’minlaydi. Bu esa kompetensiyaviy yondashuvning samaradorligini tasdiqlaydi.

Shu bilan birga, quyidagi muammolar mavjud:

• ayrim OTMlarda innovatsion muhit yetarli emas;

• AKTdan foydalanish darajasi past;

• amaliy tayyorgarlik yetarli darajada emas.

Mazkur muammolarni bartaraf etish uchun:

• ta’lim jarayonini raqamlashtirish;

• innovatsion pedagogik texnologiyalarni keng joriy etish;

• o‘qituvchilarning uzluksiz kasbiy rivojlanishini ta’minlash zarur[6].

XULOSA

Xulosa qilib aytganda, innovatsion muhitda bo‘lajak boshlang‘ich sinf o‘qituvchisi quyidagi formulaga muvofiq shakllanishi lozim:

Kompetentlik = Bilim + Kreativ yondashuv + Raqamli ko‘nikma + Milliy axloq.

Yangi O‘zbekistonning strategik maqsadlariga erishish — bu xalqaro baholash dasturlarida (PISA, PIRLS) yuqori natija olishgina emas, balki erkin fikrlaydigan, kreativ avlodni tarbiyalashdir. Bu esa o‘z navbatida, o‘qituvchidan o‘z shaxsiy sifatlarini muntazam takomillashtirib borishni talab qiladi.

Innovatsion ta’lim muhiti bo‘lajak boshlang‘ich ta’lim o‘qituvchisining shaxsiy va kasbiy sifatlarini rivojlantirishda muhim omil hisoblanadi. Ushbu jarayon Yangi taraqqiyot strategiyasi bilan uyg‘un holda amalga oshirilganda, ta’lim sifati va samaradorligini oshirishga xizmat qiladi.

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DAVLAT MAKTABGACHA TA’LIM TASHKILOTLARIDA OVQATLANISHNI AUTSORSING USULIDA JORIY ETISHNING TASHKILIY-IQTISODIY ASOSLARI: O‘ZBEKISTON TAJRIBASI VA XORIJIY YONDASHUVLAR

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Annotatsiya: *Mazkur tezisda davlat maktabgacha ta’lim tashkilotlarida sog‘lom ovqatlanish tizimini autsorsing asosida joriy etishning tashkiliy-iqtisodiy asoslari tahlil qilingan. Tadqiqotda O‘zbekiston maktabgacha ta’lim tizimida ovqatlanishni tashkil etish jarayonida mavjud moddiy-texnik, kadrlar va byudjet samaradorligi bilan bog’liq muammolar aniqlanib, ularni hal qilishda autsorsing mexanizmining o‘rni asoslab berilgan. O‘zbekiston va xorijiy mamlakatlar tajribasi asosida autsorsing orqali ovqatlanishni tashkil etish bolalar salomatligini mustahkamlash, sanitariya-gigiyena talablariga rioya etish va xizmat sifati ustidan nazoratni kuchaytirish imkonini berishi aniqlangan. Tadqiqot xulosalari ijtimoiy yo‘naltirilgan davlat siyosatini amalga oshirishda muhim ahamiyat kasb etadi.*

Kalit so‘zlar: *maktabgacha ta’lim tashkilotlari, sog‘lom ovqatlantirish, autsorsing, davlat xaridlari, ovqatlanish tizimi, byudjet mablag‘lari samaradorligi, xorijiy tajriba, sanitariya-gigiyena talablari.*

Аннотация: *В данной тезисной работе рассматриваются организационно-экономические основы внедрения системы здорового питания в государственных дошкольных образовательных организациях на основе аутсорсинга. В ходе исследования выявлены основные проблемы, связанные с материально-техническим обеспечением, кадровым потенциалом и эффективностью использования бюджетных средств при организации питания в системе дошкольного образования Республики Узбекистан. Обоснована значимость механизма аутсорсинга как инструмента повышения результативности и качества предоставляемых услуг. На основе отечественного и зарубежного опыта установлено, что организация питания посредством аутсорсинга способствует укреплению здоровья детей, соблюдению санитарно-гигиенических требований и усилению контроля за качеством услуг. Полученные выводы имеют важное значение для реализации социально ориентированной государственной политики.*

Ключевые слова: *дошкольные образовательные организации, здоровое питание, аутсорсинг, государственные закупки, система питания, эффективность бюджетных средств, зарубежный опыт, санитарно-гигиенические требования.*

Abstract: *This thesis examines the organizational and economic foundations for implementing a healthy nutrition system in public preschool education institutions through outsourcing mechanisms. The study identifies key challenges related to material and technical resources, human capital, and the efficiency of budgetary expenditures in the organization of nutrition within Uzbekistan's preschool education system. It substantiates the role of outsourcing as an effective instrument for addressing these constraints. Based on the experience of Uzbekistan and selected foreign countries, the research demonstrates that outsourcing food services contributes to improving children's health outcomes, ensuring compliance with sanitary and hygienic standards, and strengthening quality control mechanisms. The findings of the study are of practical relevance for the implementation of socially oriented public policy in the field of preschool education.*

Keywords*: preschool education institutions, healthy nutrition, outsourcing, public procurement, food service system, efficiency of budget expenditures, international experience, sanitary and hygienic standards.*

KIRISH

Tadqiqotlarning ko'rstishicha, bolalarnig aqliy va jismoniy rivojlanish davri 3 yoshdan 7 yoshgacha yuqori darajada bo'ladi.Ushbu rivojlanish davrini to'g'ri tashkil qilishda maktabgacha ta'lim tashkilotlarining o'rni beqiyos. 2024-yanvar oyi ma'lumotlari bo'yicha O'zbekiston Respublikasida 33 942 maktabgacha ta'lim tashkiloti faoliyat yuritmoqda.Shundan 6780 tasi davlat sektoriga to'g'ri kelsa, 27 162 tasi nodavlat tashkilot hisoblanadi.Nodavlat maktabgacha ta'lim tashkilotlari tarkibi quyidagicha:

- Xususiy — 847 ta;
- Oilaviy — 24 ming 927 ta;
- DXSH asosidagi tashkilotlar — 1388 ta.

Mamlakatimizdagi 3-7 yoshdagi bolalar soni 2 mln 930 ming 844 nafarni tashkil etgan holda, bolalarning 2 mln 169 ming 538 nafari, ya'ni 74 foizi maktabgacha ta'lim tashkilotlariga boradi. 2025-yilda maktabgacha ta'lim tashkilotlari soni 8 725

taga ortib, 38 145 taga yetdi. Shundan 6 981 tasi davlat, 31 164 tasi esa nodavlat maktabgacha ta’lim tashkilotlari hisoblanadi. Bolalar qamrovi esa 77%ga yetdi.2026-yilga kelib 6 yoshli bolalarning 100 % maktabgacha tayyorlov tizimi bilan qamrab olish kutilmoqda. Mamlaktimiz Prezidenti Sh.M.Mirziyoyev tomonidan e’lon qilingan “O‘zbekiston — 2030” strategiyasida esa 2030-yilga kelib bolalarni maktabgacha ta’lim va tayyorlov guruhlari bilan to‘liq qamrab olish reja qilingan.

Maktabgacha ta’lim sohasidagi bunday chuqur islohotlarda ma’lum bir to‘siqlar va muammolarga to‘qnash kelishimizga to‘g‘ri keladi.Maktabgacha ta’lim tashkilotlarida ayniqsa, ovqatlanish tizimini samarali tashkil etishda bir necha muammolar vujudga keladi.Shulardan eng asosiylari bizning fikrimizcha uchtadir.Bular:

- moddiy texnik bazaning yetishmasligi,
- malakali oshpaz va texnologlarning tanqisligi,
- byudjet mablag‘laridan foydalanish samaradorligining pastligi.

Bunday muammolarni yechish uchun bizga jahon tajribasida hozirgi kunda ommalashib borayotgan autsorsing tizimi yordam beradi.

Autsorsing so‘zining lug’aviy ma’nosi inglizcha “outsoursing” so‘zidan olingan bo‘lib, “tashqi manbadan foydalanish” degan ma’noni bildiradi.Uning konseptual ma’nosiga keladigan bo‘lsak, tashkilotlar tomonidan ayrim funksiyalar yoki xizmatlarni o‘z ichki resurslari hisobidan emas, balki tashqi ixtisoslashgan subyektlar tomonidan amalga oshirish amaliyotidir.Bu bu amaliyot odatda:xarajatlarni kamaytirish, xizmat sifatini oshirish va asosiy ishlarga e’tibor qaratish maqsadida qo‘llaniladi.Maktabgacha ta’lim tashkilotlarida esa autsorsing byudjet mablag‘laridan oqilona foydalanish va asosiy faoliyatga e’tiborni kuchaytirish uchun xizmat qiladi.Boshqacha qilib aytganda, Davlat yoki nodavlat maktabgacha ta’lim ta’lim tashkiloti tarbiyalanuvchilarini ovqatlantirish uchun maxsus ovqatlanish xizmatini ko‘rsatuvchi tashqi kompaniya bilan shartnoma tuzadi va bu kompaniya:

- ovqatni tayyorlaydi,
- sanitariya-gigyena qoidalariga rioya qiladi,
- ovqatni yetkazib beradi yoki maktabgacha ta’lim tashkilotining oshxonasida pishiradi,
- ovqat va ovqat bilan bog‘liq har qanday vaziyat uchun autsorser javobgar bo‘ladi.

Hozirgi kunda hukumatimiz tomonidan mamlakatimiz uzluksiz ta’lim tizimining bir qismi bo‘lgan maktabgacha ta’lim tashkilotlariga e’tibor davlat siyosati darajasiga ko’tarilgan.Ayniqsa, maktabgacha yoshdagi bolalarning to‘g‘ri va jahon standartlariga mos ravishda ovqatlanish ratsionini qabul qilishi uchun prezidentimiz va hukumatimiz tomonidan tizimli ishlar amalga oshirilmoqda. Buning yaqqol misoli qilib, 2025-yilning 6-yanvarida qabul qilingan Vazirlar mahkamasining “Davlat maktabgacha ta’lim tashkilotlarida sog‘lom ovqatlantirish tizimini yanada takomillashtirish to‘g‘risida”gi qarorini ko‘rsatishimiz mumkin. Hozirgi kunda mamlakatimizda 6798 ta davlat maktabgacha ta‘lim tashkilotlaridan 1172 tasida 83 ta tadbirkorlik subyektlari tomonidan autsorsing usulida ovqatlanish tashkil etilishi yo‘lga qo‘yilgan. Nizom O‘zbekiston Respublikasi Maktabgacha va maktab ta’limi vazirligi tizimidagi davlat maktabgacha ta’lim tashkilotlarida autsorsing usulida sog‘lom ovqatlantirishni tashkil etish tartibini belgilaydi. Ushbu nizom kelgusida autsorser va buyurtmachi o‘rtasidagi munosabatlarni tartibga solidi.

O‘zbekistonda davlat maktabgacha ta’lim tashkilotlarida autsorsing usulida sog‘lom ovqatlanishni tashkil etishning maqsadi va vazifalari quyidagilardan iborat:

1-jadval

Maqsad	Vazifa
Tarbiyalanuvchilarni to‘laqonli sog‘lom ovqatlantirish, ularning sog‘ligini mustahkamlash va ta’lim-tarbiya jarayonini samarali tashkil etishni ta’minlash.	Tarbiyalanuvchilarning fiziologik yoshiga muvofiq oziq-ovqat mahsulotlariga bo‘lgan talablarini inobatga olgan holda, ularning ratsional ovqatlanishini ta’minlash

Sifatli taomlar tayyorlash orqali tarbiyalanuvchilarning sog‘lom va barkamol o‘sishini ta’minlash.	Oziq-ovqat mahsulotlari va taomlarni tarbiyalanuvchilarning sog‘lom o‘sishida muhim ahamiyatga ega bo‘lgan zarur moddalar bilan ta’minlash
Taomlarni iste’mol qilish uchun gigiyenik talablarga muvofiq sharoitlar yaratish.	Oziq-ovqat mahsulotlari va taomlarning xavfsizligi hamda sifatini kafolatlash
Tarbiyalanuvchilarni sanitariya qoidalari, normalari va gigiyena normativlari talablariga muvofiq belgilangan tartibda tasdiqlangan “Yagona mavsumiy taomnoma” asosida sog‘lom ovqatlantirish	• Tarbiyalanuvchilar orasida ovqatlanish bilan bog‘liq yuqumli va yuqumli bo‘lmagan kasalliklarning tarqalishiga yo‘l qo‘ymaslik • Taomlarni tayyorlashda va oziq-ovqat xom ashyosini saqlashda, tashishda sanitariya qoidalari, normalari va gigiyena normativlariga qat’iy rioya qilish

Bolalar uchun kunlik ovqatlanish ratsionini tuzishda O‘zbekiston Respublikasi Maktabgacha va maktab ta’limi vazirligi hamda O‘zbekiston Respublikasi Sog‘liqni saqlash vazirligi huzuridagi Sanitariya-epidemiologik osoyishtalik va jamoat salomatligi qo‘mitasi tomonidan ishlab chiqilgan davlat maktabgacha ta’lim tashkilotlarida tarbiyalanuvchilarni sanitariya qoidalari, normalari va gigiyena normativlariga muvofiq tayyor taomlarning vazni, narxi, tarkibidagi mahsulotlar miqdorlari, texnologik kartalarni o‘z ichiga olgan hamda to‘rt fasl uchun respublika miqyosida qo‘llaniladigan tizimdan foydalaniladi.

Autsorsing usulida sog‘lom ovqatlanishni tashkil etish davlat xaridlari asosida tashkil etiladi.Davlat xaridlarini O‘zbekiston Respublikasining “Davlat xaridlari to‘g‘risida”gi qonuni, Vazirlar Mahkamasining “Davlat xaridlarini amalga oshirish bilan bog‘liq tartib-taomillarni tashkil etish va o‘tkazish tartibi to‘g‘risida” 2022-yil 20-maydagi 276-son qarori va “Davlat maktabgacha ta’lim tashkilotlarida autsorsing usulida sog‘lom ovqatlantirishni tashkil etish tartibi to‘g‘risida”gi Nizom talablari asosida tashkil etiladi va amalga oshiriladi.

Sog‘lom ovqatlantirish autsorsing usulida tashkil etiladigan davlat maktabgacha ta’lim tashkilotlarining autsorser bilan tuziladigan shartnoma umumiy miqdori 12 oyga mo‘ljallangan bo’ladi.U quyidagicha hisoblanadi:

Shm = RT * (Os(qish) * Nm(qish) + Os(bahor) * Nm(bahor) +
+ Os(yoz) * Nm(yoz) + Os(kuz) * Nm(kuz)) * Um * 5 * 4,2

Shm — sog‘lom ovqatlantirish autsorsing usulida tashkil etiladigan davlat MTTning autsorser bilan tuziladigan shartnoma umumiy miqdori;

RT — sog‘lom ovqatlantirish autsorsing usulida tashkil etiladigan davlat MTTlarining ro‘yxatdagi tarbiyalanuvchilar soni;

Os — tegishli mavsum bo‘yicha (qish, bahor, yoz, kuz) oylar soni;

Nm — tegishli mavsum bo‘yicha (qish, bahor, yoz, kuz) bir nafar tarbiyalanuvchini bir kunda sog‘lom ovqatlantirish narxi;

Um — autsorser uchun belgilangan ustama haq miqdori, koeffitsiyent hisobida olinadi (misol uchun, ustama haq miqdori 30 foizni tashkil qilsa, formulada 1,30 koeffitsiyent etib qo‘llaniladi).

Shartnomada ko‘rsatilgan ma’lumotlar shartnoma belgilangan tartibda imzolangan kundan keyingi 3 (uch) ish kuni ichida davlat buyurtmachisining markazlashgan moliya-buxgalteriya xizmati tomonidan axborot tizimiga kiritiladi. Autsorser tomonidan olib kelinayotgan barcha turdagi oziq-ovqat mahsulotlari, tez ayniydigan oziq-ovqat mahsulotlari hamda tayyorlab berilayotgan tayyor taomlar sifati, vazni, tarkibining “Yagona mavsumiy taomnoma”ga muvofiqligi davlat maktabgacha ta’lim tashkilotlari xodimlari hamda tarbiyalanuvchilarning ota-onalaridan tashkil topgan davlat maktabgacha ta’lim tashkilotlarining Brakeraj komissiyasi tomonidan nazorat qilinadi.

Maktabgacha ta’lim tashkilotlarida autsorsing usulidan foydalanish jahon miqiyosida ta’lim tizimining moliyaviy barqarorligi va boshqaruv samaradorligini oshirishning eng muhim yo‘nalishlaridan biri sifatida qaralmoqda.Ilg‘or xorijiy tajribalar shuni ko‘rsatadiki, ovqatlanishda autsorsingni qo‘llash maktabgacha ta’lim tashkilotlarida nafaqat xarajatlarni optimallashtirish, balki sifat standartlarini barqarorlashtirish va resurslardan oqilona foydalanishni ta’minlaydi.

Dunyoning rivojlangan mamlakatlari autsorsingni allaqachon o‘z davlat tizimida qo‘llab kelmoqda.Biz hozir dunyo davlatlarida maktabgacha ta’limda ovqatlanish autsorsingini tashkil qilish bo’yicha vaziyatni ko‘rib chiqamiz.

Finlandiya Yevropa Ittifoqi mamlakatlarining rivojlangan davlati sifatida eng birinchilardan bo‘lib autsorisingni qo‘llagan.Maktabgacha ta’lim tashkilotlarida ovqatlanish deyarli to‘liq autsorsing asosida tizimlashtirilgan.Bolalar uchun ovqat kommunal yoki xususiy markaziy oshxonalarda tayyorlanadi.Davlat esa, ratsion va kaloriya me’yorlarini belgilaydi, moliyalashtiradi va sifat ustidan qat’iy nazorat qiladi.Finlandiyada ovqatlanish sog‘lom turmush tarzining tarkibiy qismi sifatida ko‘riladi.Buyuk Britaniyada ovqatlanishni xususiy keytring kompaniyalari tashkil etiladi. “School Food Standarts” orqali menyu nazorati mavjud.Oshxona xodimlari maktabgacha ta’lim tashkiloti shtatiga kirmaydi.Natijada, davlat xarajatlari kamaygan va ovqat sifati standartlashgan.AQShda bollalr ovqatlanishi xususiy ovqatlanish operatorlari tomonidan amalga oshiriladi. Child and Adult Care Food Program (CACFP) orqali moliyalashtiriladi va dietologik me’yorlar federal darjada belgilanadi.

Osiyoning rivojlangan davlatlari jumladan, Yaponiya, Janubiy Koreya va Singapurda ham maktabagacha ta’lim tashkilotlarini autsorising orqali tizimlashtirish yetakchi darajada.Yaponiya maktabgacha ta’lim tashkilotlarida ovqatlanish to‘liq autsorsing yoki yarim avtonom oshxonlar orqali yuritiladi.Ayniqsa, yuqori texnologik sanitariyaning mavjudligi o‘ziga xosdir.

Jahonda autsorsing asosida tashkil etilgan ovqatlanishda quyidagi talablar qat’iy belgilanadi:

- oziq-ovqat xavfsizligi (HACCP, ISO 22000 standatlari asosida),
- kaloriya va mikroelementlar me’yorlari,
- allergenlar bo‘yicha shaffof axborot,
- ekologik toza va mahalliy mahsulotlar ulushi.

Yuqoridagi talablar autsorserlar bilan tuziladigan shartnomalarda aniq indikatorlar sifatida mustahkamlanadi.

Xulosa qilib aytganda, O‘zbekiston Respublikasida davlat maktabgacha ta’lim tashkilotlarida ovqatlanish tizimini autsorsing usulida joriy etish mavjud tashkiliy-iqtisodiy muammolarni bartaraf etishning muhim va amaliy mexanizmi hisoblanadi.Amaldagi normativ-huquqiy hujjatlar asosida autsorsing usulida sog‘lom ovqatlantirishni tashkil etish tartibi aniq belgilangan bo‘lib, davlat xaridlari, shartnoma munosabatlari va nazorat mexanizmlari tizimlashtirilgan. Brakeraj komissiyasi, “Yagona mavsumiy taomnoma” hamda sanitariya-gigiyena talablari ovqat sifati va xavfsizligini ta’minlashda muhim ahamiyat kasb etadi.

Xorijiy davlatlar tajribasi maktabgacha ta’lim tashkilotlarida ovqatlanishni autsorsing asosida tashkil etish moliyaviy barqarorlik, xizmat sifati va nazoratning samaradorligini oshirishini ko‘rsatadi. Ushbu tajribalar O‘zbekiston sharoitida ham autsorsing tizimini kengaytirish va takomillashtirish zarurligini asoslaydi.

XULOSA

Xulosa sifatida, davlat maktabgacha ta’lim tashkilotlarida ovqatlanishni autsorsing usulida tashkil etish amaliyotini bosqichma bosqich kengaytirish kerak.Bundan tashqari, autsorserlar faoliyati ustidan sanitariy-gigiyena va sifat nazoratini kuchaytirish va shartnoma shartlarida oziq-ovqat sifati, xavfsizligi va raatsion me’yorlariga qat’iy rioya etilishini ta’minlash maqsadga muvofiqdir.

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MARIYA MONTESSORI METODIKASI ORQALI BOLALARGA INNOVATSION TA’LIM BERISH

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Annotatsiya: *Ushbu maqolada Mariya Montessori tomonidan yaratilgan Montessori metodikasining mazmuni, asosiy tamoyillari va maktabgacha yoshdagi bolalar rivojlanishidagi ahamiyati yoritilgan. Metodikaning markazida bolaning mustaqil rivojlanishi, erkin tanlov asosida faoliyat yuritishi hamda maxsus tayyorlangan muhitda o‘z qobiliyatlarini namoyon etishi g‘oyalari turadi. Shuningdek, maqolada ushbu yondashuvning inklyuziv ta’limdagi o‘rni, bolalarning kognitiv, ijtimoiy va shaxsiy rivojlanishiga ijobiy ta’siri tahlil qilingan. Montessori metodikasining zamonaviy ta’lim tizimidagi dolzarbligi va amaliy ahamiyati asoslab berilgan.*

Kalit so’zlar: *Mariya Montessori, inklyuziv ta’lim, kognitiv, ijtimoiy, shaxsiy, mustaqillik, bola, rivojlanish.*

Abstract: *This article discusses the content, basic principles and importance of the Montessori methodology created by Maria Montessori in the development of preschool children. The methodology is based on the ideas of independent development of the child, free choice of activities and the manifestation of his abilities in a specially prepared environment. The article also analyzes the role of this approach in inclusive education, its positive impact on the cognitive, social and personal development of children. The relevance and practical significance of the Montessori methodology in the modern education system are substantiated.*

Keywords: *Maria Montessori, inclusive education, cognitive, social, personal, independence, child, development.*

KIRISH

Mariya xonimni jamiyat va pedagogikadagi stereotiplarni parchalagan ayol deb bilishadi. Uning maktabi alohida mavzu. Gabriel Markes, Bill Geyts, Jeff Bezos kabi mashhurlar ham shunday dargoh ta’limini olganlardan. Italiyadagi ilk diplomli shifokor ayolning hayoti o‘zi yozganidek — “o‘ta sokin, ammo shiddatli”.

Bolalarni ko‘pincha ikki toifaga — iqtidorli va iqtidorsizga bo‘lishadi. Ayrimlar buni qoida deb ham biladi. Biroq Montessori xonim har qaysi bolada qandaydir iste’dod, iqtidor va o‘rganishga ishtiyoq bo‘lishiga astoydil ishongan. “Bolalar biz kattalarga ajoyib saboq beradi — aqlimizni rivojlantirish va muayyan shaklga solish uchun qo‘llarimizni ishlatishimiz shart ekan”, deydi u.



Mariya Montessori

Bolaning erta rivojlanishi bo‘yicha ko‘plab mualliflik metodikalari mavjud. Biroq, Mariya Montessorining ushbu sohada allaqachon klassikaga aylangan rivojlantiruvchi dasturi ko‘p yillar davomida eng ommabop bo‘lib qolmoqda. Montessori metodi XX asrning birinchi yarmiidayoq ishlab chiqilgan edi. U pedagogika fanining yangi yutuqlari bilan boyitilgan hamda ko‘plab mamlakatlarning bolalar bog‘chalari va erta rivojlantirish markazlaridagi mashg‘ulotlar asosini tashkil etadi.

Metodika asoschisi — italiyalik shifokor, pedagog va psixolog Mariya Montessori dastlab imkoniyati cheklangan bolalar uchun rivojlantiruvchi mashg‘ulotlar yaratish ustida ishlagan. Vaqt o‘tishi bilan bu usul sog‘lom bolalar uchun ham samarali ekanligi ma’lum bo‘ldi. Montessori ushbu tizimni "didaktik tayyorlangan muhitda bolaning mustaqil rivojlanish tizimi" deb atagan.

Ilk bor Montessori tizimi 1907-yilda Rimdagi bolalar uyida sinovdan o‘tkazilgan. 1909-yildan boshlab dunyoning ko‘plab mamlakatlarida ushbu metodikaga qiziqish ortdi. 1913-yilda Rossiyada ham mashhur bo‘lgan, biroq 1924-yilda ushbu metodika asosida ishlaydigan bog‘chalar yopilib, faqatgina 1992-yilga kelib qayta ochilgan.

ASOSIY QISM

Metodikaning mohiyati va asosiy tamoyillari

Ushbu metodning negizida bolaning o‘z-o‘zini tarbiyalash tamoyili yotadi. Kattalar — ota-onalar va pedagoglar bolaning qiziqishlarini tushunishlari, rivojlanish uchun zarur sharoitlarni yaratishlari va bilimlarni qanday olish mumkinligini tushuntirib berishlari lozim.

Ta’lim tizimining shiori: "Buni o‘zim qilishimga yordam ber".

Mariya Montessori metodining asosiy tamoyillari:

- Tayyorlangan muhit. Bu yerda hamma narsa bolaning mustaqil ravishda o'rganish va rivojlanishini ta'minlash uchun tashkil etilgan.
- Erkinlik. Bolaga o'ziga yoqqan narsani qilish erkinligi beriladi, lekin aniq chegaralar doirasida.
- Mustaqillik. Bolalar o'z tanalarini qanday boshqarishni, shaxsiy gigiena ko'nikmalarini egallashni, kiyimlarini kiyishni, ovqat yeyishni, narsalarni tozalashni, rasm chizishni, loydan haykal yasashni, applikatsiya qilishni va hokazolarni o'rganadi.
- Uzluksiz ta'lim. Montessori pedagogikasi bolaning butun hayoti davomida o'zini rivojlantirish va o'zini o'qitishga qaratilgan
- Tartib. Montessori pedagogikasi faoliyatning tartibsiz, betartib bo'lishini nazarda tutmaydi.
- Faollik. Bolalar o'z atrof-muhitni o'rganadi, tajriba o'tkazadi, o'z kuzatishlarini tahlil qiladi va xulosalar chiqaradi
- Kuzatish. Bolaning xatti-harakatlarini kuzatish orqali pedagog uning rivojlanishini kuzatadi va kerak bo'lganda o'quv materialini moslashtiradi.
- Bolaning ehtiyojlariga e'tibor qaratish. Pedagog bolaning rivojlanishiga to'sqinlik qiluvchi omillarni aniqlaydi va ularni bartaraf etadi.
- Bolaning rivojlanishiga e'tibor qaratish. Pedagog bolaning rivojlanishini kuzatadi va kerak bo'lganda o'quv materialini moslashtiradi.
- Bolaning erkinligini cheklash. Pedagog bolaning erkinligini cheklaydi, agar bu uning rivojlanishiga to'sqinlik qilayotgan bo'lsa.

Mariya Montessori metodikasi inklyuziv ta'limda alohida ahamiyatga ega, chunki u har qanday bolaning potentsial imkoniyatlarini ochishga qaratilgan. Montessori pedagogik yondashuvda bolaning mustaqilligini, qiziqishini qondirishni va har tomonlama rivojlanishini ta'minlash uchun maxsus muhit yaratish asosiy o'rin tutadi.

Mariya Montessori metodikasining maktabgacha yoshdagi bolalarni rivojlantirishga ta'siri:

- Bolaning shaxsi sifatida tan olinishi. Montessori har bir bolada qandaydir qobiliyat, iste'dod va o'qishga bo'lgan intilish mavjudligiga ishontirgan.
- Mustaqillikni rivojlantirish. Bolalar o'zlariga g'amxo'rlik qilishni o'rganadilar, bu esa ularning o'zini baholashini va mustaqilligini oshiradi.
- Kognitiv qobiliyatlarni rivojlantirish. Montessori muhitida bolalar o'z tezligida o'rganadilar, bu esa ularning kognitiv qobiliyatlarini rag'batlantiradi.
- Ijtimoiy ko'nikmalarni rivojlantirish. Bolalar o'zaro hamkorlikda o'rganadilar, bu esa ularning ijtimoiy ko'nikmalarini va hamdardligini rivojlantiradi.
- Motivatsiyani oshirish. Bolalarning o'z qiziqishlari asosida o'rganishi ularning o'qishga bo'lgan qiziqishini va motivatsiyasini oshiradi.

Montessori pedagogikasining ayrim asosiy printsipalari:

- Erkin tarbiya. Bolaning o'z ritmi va tezligida rivojlanishiga imkon berish.
- Maxsus tashkil etilgan o'quv materiali. O'quv materiali bolaga o'z qobiliyatlarini rivojlantirishga yordam beradi. O'qitishning innovatsion usullari. Bolaning o'quv material bilan mustaqil ishlashiga asoslangan.
- Yoshga qarab bolalarni rivojlantirish. Montessori 0 dan 18 yoshgacha bo'lgan bolalarni uch bosqichga ajratadi.

XULOSA

Mariya Montessori metodikasi maktabgacha ta’lim tizimida bolaning shaxs sifatida shakllanishi, mustaqil fikrlashi va erkin rivojlanishini ta’minlovchi samarali pedagogik yondashuv hisoblanadi. Ushbu metodika orqali bolalarning individual qobiliyatlari ochiladi, ularning kognitiv, ijtimoiy va amaliy ko‘nikmalari rivojlanadi. Tayyorlangan muhit, erkinlik va mustaqillikka asoslangan ta’lim jarayoni bolalarda o‘rganishga nisbatan qiziqish va ichki motivatsiyani kuchaytiradi. Shu bilan birga, Montessori yondashuvi inklyuziv ta’limni qo‘llab-quvvatlab, har bir bolaning imkoniyatlarini to‘liq ro‘yobga chiqarishga xizmat qiladi. Natijada, ushbu metodika

zamonaviy ta’lim tizimida muhim ahamiyat kasb etadi va samarali natijalar beruvchi innovatsion yondashuv sifatida e’tirof etiladi.

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THE ROLE OF SLANG IN MODERN ENGLISH COMMUNICATION

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Abstract: *This article explores the role of slang in modern English communication, examining its origins, characteristics, functions, and impact on social and professional interactions. Slang, as an informal form of language, evolves rapidly and reflects social identity, cultural trends, and generational changes. The article analyzes the linguistic features of slang, its role in fostering in-group solidarity, and the challenges it poses in formal communication and language learning. It also discusses the perception of slang in media, education, and cross-cultural communication. Through numerous examples, the article highlights how slang shapes contemporary English and affects communication in both spoken and written forms.*

Keywords: *Slang, modern English, communication, informal language, social identity, generational language, linguistic creativity, social media, cultural influence, language evolution*

INTRODUCTION

Language is a dynamic and evolving tool for human communication, reflecting cultural, social, and generational influences. In modern English, slang represents an informal and creative subset of language that frequently emerges in response to social trends, technological developments, and cultural phenomena. Slang can be found in everyday conversation, social media, music, movies, and online communication. Unlike standard English, slang is often characterized by innovation, brevity, metaphorical meanings, and context-dependent interpretation.

Slang plays a crucial role in shaping identity, signaling group membership, and establishing social bonds. It allows speakers to express attitudes, emotions, humor, and cultural knowledge. However, its informal nature can create misunderstandings in formal settings, leading to negative perceptions in professional or academic communication. Understanding the role of slang is essential for linguists, educators, language learners, and anyone interested in contemporary English usage.

1. Definition and Characteristics of Slang

Slang is a form of language that is informal, nonstandard, and often associated with a specific social group, subculture, or age cohort. Unlike formal or standard English, slang words and expressions are typically created spontaneously and may have short lifespans, quickly becoming obsolete as new terms replace them.

Key Characteristics of Slang:

Informality: Slang is used in casual conversations rather than formal writing or speeches.

Creativity: Slang often involves metaphor, wordplay, and humor. For example, “lit” means exciting or excellent, while “ghosting” refers to suddenly ending communication.

Group Identity: Slang can signal belonging to a particular social group or generation.

Context Dependence: Meaning often depends on situational or cultural context. For instance, “sick” can mean unwell in traditional English but excellent or impressive in slang.

Rapid Evolution: New slang emerges quickly, particularly in digital spaces, while older slang may fade.

Slang is not limited to youth culture; it also appears in professional subcultures, regional communities, and online forums, demonstrating its flexibility and adaptability.

2. Historical Development of Slang in English

Slang has existed in English for centuries, evolving alongside societal changes. Early English slang included terms used by criminals, soldiers, and tradespeople, often serving as secret codes or markers of identity. Over time, slang has been influenced by urbanization, music, media, and technology.

18th–19th Century: Words like “mob” and “bobby” emerged in street and working-class slang.

20th Century: American youth culture, rock and roll, and hip-hop music contributed to slang proliferation, with terms such as “cool,” “hip,” and “groovy.”

21st Century: Digital communication, social media, and global connectivity have accelerated the creation and spread of slang. Terms like “selfie,” “emoji,” “FOMO” (fear of missing out), and “stan” (superfan) demonstrate the modern linguistic innovation.

This historical perspective shows that slang reflects societal, cultural, and technological changes, making it an integral part of living language.

3. Functions of Slang in Communication

Slang serves multiple functions in modern English communication:

1. Social Bonding: Slang reinforces in-group identity, distinguishing members of a group from outsiders. Phrases like “squad,” “fam,” or “bros” signal belonging to a social circle.

2. Expressing Emotions and Attitudes: Slang allows speakers to convey humor, irony, excitement, or disapproval. Example: “That party was fire!” expresses enthusiasm.

3. Creativity and Playfulness: Slang encourages linguistic creativity, inventing new expressions and metaphors, such as “spill the tea” (reveal gossip).

4. Brevity and Efficiency: Slang often condenses complex ideas into short, impactful expressions, particularly in digital communication. Example: “LOL” (laughing out loud) or “SMH” (shaking my head).

5. Cultural Identity: Slang reflects generational, regional, and subcultural influences. For instance, African American Vernacular English (AAVE) contributes extensively to contemporary slang.

4. Slang in Different Contexts

Slang manifests differently depending on context:

1.Youth Culture: Teenagers and young adults often lead in creating slang, reflecting trends, peer culture, and social media influence.

2.Social Media and Digital Communication: Platforms like Twitter, Instagram, and TikTok facilitate rapid slang adoption, including acronyms, emojis, and memes.

3.Music, Movies, and Popular Culture: Slang often emerges from music genres like rap, hip-hop, and pop culture references, then spreads widely.

4.Professional Subcultures: Workplace slang exists in IT, medicine, and law, often as shorthand for complex concepts, e.g., “code red” in medical settings.

In all these contexts, slang serves as both a linguistic and social tool, connecting speakers and reflecting contemporary cultural trends.

5. Linguistic Features of Slang

1.Morphology: Slang often involves clipping ("info" for "information"), blending ("brunch" from breakfast + lunch), and compounding ("hangry" from hungry + angry).

2.Phonology: Pronunciation may be altered for effect, such as "thot" (that hoe).

3. Semantics: Slang words frequently acquire metaphorical or figurative meanings, e.g., "ghost" means to suddenly stop communicating.

4.Syntax: Slang may adopt simpler or unconventional sentence structures to convey informal tone.

These linguistic features illustrate how slang continuously evolves and adapts to changing social and cultural needs.

6. The Positive and Negative Roles of Slang

1.Positive Roles:

2.Enhances creativity and expressiveness

3.Fosters social cohesion and identity

4.Makes communication efficient and relatable, especially in informal settings

5.Reflects cultural trends and innovation in language

6.Negative Roles:

7.Misunderstandings in cross-generational or cross-cultural communication

8.Inappropriateness in formal, academic, or professional contexts

9.Rapidly changing slang can confuse learners and non-native speakers

10.Overuse of slang may reduce perceived professionalism or credibility

7. Slang and Education

Teachers and educators face challenges with slang in classrooms:

1.Language Learning: Non-native English learners may struggle to understand slang due to its figurative meanings and rapid evolution.

2.Formal vs. Informal Writing: Students must learn to distinguish when slang is acceptable versus when standard English is required.

3.Cultural Awareness: Understanding slang provides insight into contemporary culture, social identity, and generational language trends.

Strategies include teaching both standard and informal English, explaining meanings of common slang terms, and using examples from media and social contexts.

8. Slang in Professional and Cross-Cultural Communication

While slang enhances informal communication, it can be problematic in professional or cross-cultural contexts:

1.Misinterpretation of slang by non-native speakers can lead to confusion or offense.

2. Use of slang in business emails, reports, or official correspondence may appear unprofessional.

3.Cross-cultural awareness is essential to prevent miscommunication, especially in multinational workplaces.

9. Examples of Modern Slang in English Communication

1. Digital Communication: “LOL” (laughing out loud), “BRB” (be right back), “ICYMI” (in case you missed it)

2. Youth and Social Media: “Lit,” “fire,” “savage,” “stan,” “lowkey,” “highkey”

3. Music and Pop Culture: “Flex” (show off), “shade” (subtle insult), “woke” (socially aware)

4. Hybrid Slang: Clippings, blends, and acronyms illustrate creativity in modern language use.

These examples show how slang enriches English communication, adding expressiveness, brevity, and cultural relevance.

CONCLUSION

Slang plays a vital role in modern English communication, reflecting social identity, cultural trends, and generational change. It fosters creativity, expressiveness, and social bonding, particularly in informal and digital contexts. However, slang also presents challenges, including potential misunderstandings,

inappropriateness in formal contexts, and difficulty for language learners. Understanding the dynamics, functions, and linguistic features of slang is crucial for effective communication in both spoken and written English. Mastery of slang, alongside standard English, allows speakers and writers to navigate social, cultural, and professional contexts effectively, enhancing their communicative competence.

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DIFFERENCES BETWEEN FORMAL AND INFORMAL ENGLISH

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Abstract: *This article provides a comprehensive analysis of the differences between formal and informal English, covering vocabulary, grammar, sentence structure, tone, style, and pragmatic usage. Formal English is primarily used in academic, professional, and official communication, while informal English dominates in casual conversations, social media, and*

personal writing. The article emphasizes the importance of context, audience, and purpose in selecting the appropriate register and provides multiple examples to illustrate practical applications. It also discusses challenges faced by English learners in mastering both registers and offers guidance on effective use in different situations.

Keywords: *Formal English, informal English, register, tone, grammar, vocabulary, communication, pragmatics, style, context*

INTRODUCTION

English is one of the most widely spoken and studied languages in the world. Effective communication in English depends not only on grammar and vocabulary but also on the ability to select the appropriate register. Register refers to the level of formality used in language, which changes depending on the audience, context, and purpose. Formal English is structured, precise, and professional, while informal English is casual, conversational, and personal.

Formal English is commonly used in academic papers, business correspondence, official documents, reports, and public speeches. Informal English is used in personal conversations, social media, texting, emails to friends, and casual writing. Misusing either register may lead to misunderstandings, decreased credibility, or an impression of rudeness. This article provides a detailed examination of the linguistic, stylistic, and pragmatic differences between formal and informal English. It also includes practical examples and tips for proper usage.

1. Vocabulary Differences

Vocabulary is one of the most visible distinctions between formal and informal English.

1.Formal English Vocabulary:

Formal English tends to use precise, sophisticated, and professional words. It avoids contractions, slang, and casual expressions. Technical or academic terminology is common in formal contexts, and words are chosen for clarity and exact meaning.

Examples:

1. “Obtain” instead of “get”

2. “Commence” instead of “start”

3. “Assist” instead of “help”

4. “Terminate” instead of “end”

5. “Purchase” instead of “buy”

6. Informal English Vocabulary:

Informal English favors everyday words, idiomatic expressions, and colloquial language. Contractions (e.g., “don’t,” “I’m,” “we’re”) are frequent, as are phrasal verbs and slang. Informal vocabulary creates a friendly, relatable tone suitable for casual conversations.

Examples:

1. “Get” instead of “obtain”

2. “Start” instead of “commence”

3. “Help out” instead of “assist”

4. “End” instead of “terminate”

5. “Buy” instead of “purchase”

6. Key Observations:

Formal English vocabulary conveys professionalism, accuracy, and authority, while informal English promotes ease, approachability, and natural communication.

2. Grammar and Sentence Structure Differences

Grammar and sentence construction are central to distinguishing formal and informal English.

Formal English Grammar:

Formal English follows strict grammatical rules. It favors complete sentences, complex structures, and passive voice to maintain objectivity. Subordinate clauses, nominalization (turning verbs into nouns), and precise syntax are common.

Example:

1. Formal: “The results of the experiment were analyzed to determine the correlation between the variables.”

2. Informal English Grammar:

Informal English is more flexible, using simple sentences, contractions, active voice, and even sentence fragments. The language is often interactive, direct, and conversational.

Example:

1. Informal: “We looked at the results to see if the variables were related.”

2. Observations: While formal English aims for precision and objectivity, informal English emphasizes clarity and ease of understanding in everyday communication.

3. Tone and Style

Tone and style are critical elements in determining the appropriateness of language.

1. Formal English Tone:

Polite, neutral, professional, and objective. Personal pronouns are minimized, and emotional language is avoided. The tone is structured and respectful.

Example:

2. “It is recommended that all participants complete the survey by Friday.”

3. Informal English Tone:

Friendly, personal, and casual. First- and second-person pronouns are common. Humor, opinions, and emotions are acceptable, making communication more engaging and relatable.

Example:

1. “Make sure you finish the survey by Friday, okay?”

2. Observations:

Formal tone suits academic, professional, and official contexts, whereas informal tone is effective for social interaction and personal correspondence.

4. Context and Usage

The choice of formal or informal English depends on context, audience, and purpose.

1. Formal English:

2. Academic papers, dissertations, and research articles

3. Business letters, official emails, and reports

4. Public speeches and presentations

5. Legal documents and contracts

6. Informal English:

7. Personal letters and emails to friends

8. Social media posts, blogs, and texting

9. Conversations with peers, family, and acquaintances

Using the wrong register can lead to miscommunication. For example, writing an academic essay using informal expressions may reduce credibility, while using formal English in a casual chat may appear unnatural or distant.

5. Pragmatic Differences

Pragmatics refers to language use in context. Formal and informal English differ in politeness, indirectness, and cohesion.

Politeness:

Formal English uses polite requests and indirect commands. Example: "Would you kindly submit the report by tomorrow?"

Informal English allows direct requests. Example: "Send me the report by tomorrow, please."

COHESION

Formal English uses transitional words like "therefore," "however," and "in addition" to connect ideas. Informal English uses simpler transitions like "so," "but," and "also."

Interaction:

Informal English encourages dialogue, questions, and exclamations. Formal English maintains objectivity and distance.

6. Examples in Real-Life Scenarios

1. Email Communication:

2. Formal: "Dear Professor Smith, I am writing to inquire about the submission deadline for the research paper. Your guidance would be greatly appreciated."

3. Informal: "Hi Prof! Just wanted to check when the paper is due. Thanks!"

4. Workplace Communication:

5. Formal: “We regret to inform you that your request has been denied due to insufficient documentation.”

6. Informal: “Sorry, we can’t approve your request because some documents are missing.”

7. Academic Writing:

8. Formal: “The study demonstrates a significant correlation between socioeconomic status and academic performance.”

9. Informal: “The results show that kids from wealthier families tend to do better in school.”

10. Social Media Interaction:

11. Informal English dominates, using emojis, abbreviations, and casual expressions, which would be inappropriate in formal writing.

7. Common Challenges for English Learners

1. Understanding when to use formal versus informal English

2. Avoiding overuse of slang in professional contexts

3. Learning appropriate polite expressions in formal writing

4. Developing flexibility to switch registers depending on audience and purpose

Practical strategies include reading formal texts (academic articles, reports) and informal texts (blogs, social media), practicing writing in both styles, and learning key phrases for formal communication.

CONCLUSION

Formal and informal English serve distinct purposes in communication. Formal English is essential for academic, professional, and official contexts, emphasizing accuracy, structure, and professionalism. Informal English facilitates personal interaction, social connection, and ease of communication.

Mastering both registers requires awareness of vocabulary, grammar, tone, style, and context. Effective communication involves choosing the appropriate register to convey messages clearly, respectfully, and suitably. Understanding these

differences enhances clarity, credibility, and interpersonal relationships in all areas of life.

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HOW ENGLISH CULTURE IS TRANSLATED INTO UZBEK LANGUAGE

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Abstract: *This article presents a comprehensive and in-depth study of how English culture is translated into the Uzbek language, highlighting the complex relationship between language and culture. Translation is not merely a mechanical process of replacing words from one language with another; rather, it is a dynamic and multifaceted act of intercultural communication that requires a profound understanding of both linguistic systems and cultural contexts.*

The research explores various dimensions of cultural translation, including idiomatic expressions, proverbs, humor, social norms, etiquette, literature, and media. It emphasizes that English and Uzbek cultures differ significantly in terms of communication styles, values, and traditions. English-speaking cultures often prioritize individualism, directness, and efficiency, whereas Uzbek culture values collectivism, politeness, respect for hierarchy, and indirect communication.

The article examines key translation strategies such as domestication, foreignization, adaptation, and localization, demonstrating how translators navigate cultural differences to achieve equivalence in meaning and effect. Special attention is given to the challenges of translating culturally specific elements that lack direct equivalents in Uzbek, requiring creative solutions and contextual interpretation.

Furthermore, the study analyzes the impact of globalization and digital communication on translation practices. The widespread influence of English through media, technology, and international communication has led to the emergence of new linguistic forms and increased cultural interaction. While machine translation tools have improved accessibility, they often fail to capture subtle cultural nuances, highlighting the continued importance of human translators.

The findings suggest that successful translation depends on a careful balance between linguistic accuracy and cultural adaptation. Translators must possess not only language proficiency but also intercultural competence, creativity, and sensitivity to the expectations of the target audience. Ultimately, translation serves as a crucial bridge that facilitates cultural exchange, mutual understanding, and global communication.

Keywords: *Translation studies, English culture, Uzbek language, cultural adaptation, localization, intercultural communication, idioms, pragmatics*

INTRODUCTION

Language and culture are inseparable elements of human communication. Every language reflects the history, traditions, values, and worldview of the people who speak it. Therefore, translation between languages involves not only linguistic transformation but also cultural interpretation.

The translation of English culture into Uzbek language presents unique challenges due to the significant differences between these two cultural systems. English culture, particularly in Western societies, emphasizes individual freedom, direct communication, and efficiency. In contrast, Uzbek culture is deeply rooted in traditions that prioritize collectivism, respect for elders, politeness, and social harmony.

As a result, translators must go beyond literal translation and engage in cultural adaptation to ensure that the message is both accurate and meaningful for

the target audience. This article explores the processes, strategies, and challenges involved in translating English cultural elements into Uzbek.

MAIN BODY

1. The Interconnection Between Language and Culture

Language serves as a carrier of culture, transmitting social values, beliefs, and traditions across generations. Cultural elements are embedded in vocabulary, idioms, and communication styles. When translating between English and Uzbek, differences in worldview must be carefully considered.

For example, English expressions often emphasize independence, while Uzbek expressions highlight unity and community. This difference influences how ideas are conveyed and understood in translation.

2. Linguistic and Cultural Differences

English and Uzbek differ structurally and culturally. English follows a Subject-Verb-Object structure, while Uzbek typically uses Subject-Object-Verb. Additionally, English communication tends to be more direct, whereas Uzbek communication is often indirect and polite.

These differences require translators to modify sentence structures and adjust tone to match cultural expectations.

3. Translation of Idioms and Proverbs

Idioms and proverbs are deeply rooted in culture and often cannot be translated literally.

Examples:

1. “Break the ice” → “muzni eritmoq”
2. “Time is money” → “Vaqt oltindan qimmat”

In such cases, translators use equivalent expressions or paraphrasing to convey the intended meaning.

4. Humor and Cultural Context

Humor is one of the most challenging aspects of translation. English humor often relies on irony, sarcasm, and wordplay, which may not have direct equivalents in Uzbek.

Translators must adapt humor to make it understandable and appropriate for the Uzbek audience, sometimes replacing it with culturally relevant expressions.

5. Social Norms and Communication Styles

English communication is generally direct and concise, while Uzbek communication emphasizes politeness and respect.

Example:

1. English: “Close the door.”
2. Uzbek: “Iltimos, eshikni yopib qo‘yasizmi?”

This demonstrates the need for cultural adaptation in translation.

6. Translation of Cultural References

Cultural references such as holidays, food, and traditions often require explanation or adaptation.

For instance, concepts like “Thanksgiving” may not have direct equivalents in Uzbek culture and must be explained to convey their significance.

7. Translation in Media and Technology

Modern translation includes films, social media, and digital content. These contexts introduce challenges such as slang, abbreviations, and fast communication.

Translators must balance accuracy with readability while adapting content for cultural relevance.

8. Translation Strategies

Several strategies are used in cultural translation:

1. Domestication: adapting content to Uzbek culture
2. Foreignization: preserving original cultural elements
3. Localization: adjusting content for local audiences
4. Adaptation: modifying meaning to fit cultural context

9. Challenges in Cultural Translation

Translators face multiple challenges:

1. Lack of equivalent terms
2. Cultural differences
3. Loss of meaning
4. Audience expectations

These challenges require creativity and cultural awareness.

10. Role of Translators

Translators act as cultural mediators, bridging the gap between English and Uzbek cultures. Their role is essential in ensuring that both meaning and cultural significance are preserved.

11. Impact of Globalization

Globalization has increased interaction between cultures, leading to greater influence of English on Uzbek language. While this promotes communication, it also raises concerns about preserving cultural identity.

CONCLUSION

In conclusion, translating English culture into the Uzbek language is a complex and multifaceted process that requires both linguistic and cultural competence. It is not simply about converting words but about conveying meaning, values, and cultural context in a way that is understandable and appropriate for the target audience.

The study demonstrates that cultural differences between English and Uzbek significantly influence translation practices. Effective translation requires the use of appropriate strategies such as adaptation, domestication, and localization. Translators must balance accuracy with cultural sensitivity to ensure that the message retains its original intent and impact.

Moreover, globalization and technological advancements have transformed translation practices, introducing new challenges and opportunities. While machine translation tools are useful, they cannot replace the cultural understanding and creativity of human translators.

Ultimately, translation plays a vital role in promoting intercultural communication and mutual understanding. As global connections continue to grow, the importance of culturally informed translation will become increasingly significant in bridging linguistic and cultural gaps.

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INNOVATIVE APPROACHES TO DEVELOPING STUDENTS' DIGITAL LITERACY AND COMPETENCIES THROUGH GAMIFICATION

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Abstract: *The development of digital literacy and competencies has become a crucial component of modern education. This study explores innovative approaches to enhancing students' digital skills through gamification technologies. By integrating game-based elements*

into the learning process, educators can increase student engagement, motivation, and active participation. The research highlights effective strategies for applying gamification in classroom settings, examining its impact on students' digital competencies, problem-solving abilities, and collaborative skills. The findings suggest that gamification not only improves technological proficiency but also fosters a more interactive and personalized learning environment, preparing students for the demands of the digital era.

Key words: *gamification, digital literacy, digital competencies, innovative approaches, educational technology, student learning, ict in education*

INTRODUCTION

In the 21st century, digital literacy has become a fundamental skill for students, equipping them to navigate an increasingly technology-driven world. The rapid development of information and communication technologies (ICT) has transformed educational processes, requiring new approaches to teaching and learning. Traditional methods alone are no longer sufficient to engage students effectively, motivate active participation, and develop essential digital competencies.

Gamification, the integration of game design elements into non-game contexts, has emerged as a promising strategy in modern education. By incorporating elements such as points, badges, leaderboards, and interactive challenges, gamification creates an engaging and motivating learning environment. This approach encourages students to actively participate in learning activities, enhances problem-solving skills, and fosters collaboration and creativity.

Numerous studies indicate that gamified learning not only improves students' digital competencies but also strengthens their critical thinking, communication, and collaboration skills. For example, interactive educational games and simulations provide practical contexts for applying digital tools, promoting experiential learning, and reinforcing knowledge retention. Moreover, gamification aligns with personalized learning trends, allowing educators to adapt challenges and tasks to individual students' abilities and learning paces.

This study aims to explore innovative approaches to developing students' digital literacy and competencies through gamification. The research investigates methods of integrating game-based strategies into classroom instruction, examines their effectiveness in enhancing digital skills, and highlights best practices for creating interactive and motivating learning experiences. Ultimately, the study seeks to provide insights into how gamification can contribute to preparing students for the challenges and opportunities of the digital era.

MAIN PART

Gamification has become an increasingly influential approach in modern education, offering innovative ways to enhance student engagement, motivation, and learning outcomes. By integrating game elements such as points, badges, levels, leaderboards, and interactive challenges into traditional teaching, educators can create dynamic learning environments that foster active participation and sustained interest. These elements provide immediate feedback, recognition, and a sense of achievement, all of which contribute to a positive and motivating educational experience. In the context of digital literacy, gamification allows students to acquire essential skills through hands-on, interactive activities, encouraging exploration, experimentation, and problem-solving. It supports not only technical proficiency but also cognitive development, critical thinking, and collaborative abilities, which are crucial for the demands of the digital era.

Developing students' digital competencies requires deliberate planning and strategic use of gamified approaches. Technical skills, such as using digital tools, creating multimedia presentations, or coding, can be effectively taught through game-based challenges that reward progress and encourage practice. Information literacy, including the ability to locate, evaluate, and use information responsibly, can be reinforced through gamified research tasks, quizzes, and scenario-based problem-solving exercises. Communication and collaboration, key components of digital competence, are enhanced through multiplayer games and team-oriented projects, allowing students to develop interpersonal skills, negotiate solutions, and

share knowledge in digital contexts. Furthermore, gamified simulations and narrative-based challenges encourage students to apply critical thinking and problem-solving in realistic, risk-free scenarios, promoting higher-order cognitive skills and a deeper understanding of digital concepts.

Innovative approaches to gamification in education involve personalizing the learning experience, integrating immersive technologies, and aligning rewards with educational objectives. Adaptive gamification, for example, customizes challenges based on each student's proficiency and learning pace, maintaining engagement while preventing frustration or disengagement. Storytelling and narrative-driven learning connect educational content to meaningful contexts, increasing immersion and helping students relate abstract concepts to real-world applications. The use of rewards, such as unlocking new learning modules, earning hints for complex tasks, or receiving recognition for collaborative achievements, ensures that motivation is closely tied to learning outcomes. Emerging technologies, including virtual reality (VR), augmented reality (AR), and simulation-based gamified platforms, provide immersive experiences that simultaneously enhance digital skills, technical knowledge, and experiential learning, making abstract concepts tangible and memorable.

Research indicates that gamified approaches significantly improve students' digital literacy and competencies. Students participating in gamified learning environments demonstrate greater proficiency in using ICT tools, higher confidence in applying digital knowledge, and stronger collaborative and problem-solving skills. Additionally, gamification supports formative assessment by offering real-time performance data, enabling educators to adjust instructional strategies to meet individual and group needs effectively. By fostering engagement, interactivity, and motivation, gamification transforms passive learning into an active, student-centered process, preparing learners to navigate complex digital landscapes. Overall, gamification is not only a tool for improving technical skills but also a holistic approach to cultivating critical thinking, creativity, and lifelong learning, aligning

educational practices with the requirements of the digital society and enhancing students' readiness for future academic and professional challenges.

CONCLUSION

In conclusion, gamification represents a powerful and innovative approach to developing students' digital literacy and competencies. By integrating game elements into educational processes, teachers can create engaging, motivating, and interactive learning environments that promote active participation, problem-solving, collaboration, and critical thinking. The research demonstrates that gamified learning not only enhances technical skills but also strengthens students' cognitive, social, and emotional abilities, which are essential for success in the digital age.

The implementation of gamification strategies, such as adaptive challenges, narrative-based learning, meaningful rewards, and the use of emerging technologies like virtual and augmented reality, provides students with immersive and personalized learning experiences. These approaches facilitate experiential learning, reinforce knowledge retention, and encourage the application of digital skills in real-life contexts. Furthermore, gamification supports continuous assessment, allowing educators to monitor student progress, provide feedback, and adjust instruction to meet diverse learning needs effectively.

Overall, gamification in education offers a holistic method for equipping students with the necessary digital competencies to navigate complex technological environments. By fostering motivation, engagement, and practical skills, it prepares learners to face the challenges and opportunities of the modern digital society. Therefore, integrating gamification into teaching practices is not merely an optional innovation but a strategic necessity for cultivating digital literacy and ensuring that students are prepared for academic, professional, and social success in the 21st century.

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O‘ZBEKISTON KICHIK BIZNES SUBEKTLARI FAOLIYATINING RIVOJLANISH DINAMIKASI

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Annotatsiya. *Ushbu maqolada kichik biznes subektlari iqtisodiyotning muhim tarkibiy qismi bo'lib aholi uchun yangi ish o'rinlari yaratish, aholi daromadlarini oshirish va iqtisodiy barqarorlikni ta'minlashda alohida o'rin tutadi. Sanoat sohasida kichik tadbirkorlikning innovatsion imkoniyatlari, ishlab chiqarish samaradorligi hamda zamonaviy texnologiyalardan foydalanish darajasi tahlil qilingan. Mazkur maqolada kichik biznesning sub'ektiv mohiyati, unung bozor iqtisodiyotidagi vazifalari hamda rivojlanish dinamikasi ta'siri haqida tahlil qilingan.*

Kalit so'zlar: *kichik biznes sub'ektlari, indikatorlar, rivojlanish dinamikasi, qishloq xo'jaligi, samaradorlik, mikrofirmalar.*

Abstract. *This article analyzes the innovative potential of small businesses in the industrial sector, their production efficiency, and the level of use of modern technologies. This article analyzes the subjective nature of small businesses, their functions in a market economy, and their impact on development dynamics.*

Keywords: *small businesses, indicators, development dynamics, agriculture, efficiency, micro-firms.*

KIRISH.

Jahon iqtisodiyoti rivojlanishining hozirgi bosqichida kichik biznes sub'ektlari nafaqat iqtisodiy o'sishning asosi, balki innovatsiyalarni hayotga tatbiq etuvchi asosiy bo'g'in hisoblanadi. Rivojlangan davlatlar (AQSH, Germaniya, Yaponiya, Xitoy) tajribasi shuni ko'rsatadiki, kichik va o'rta biznes sub'ektlarining YaIMdagi ulushi 60-70% ni tashkil etadi. O'zbekiston iqtisodiyotida ham ushbu sohani rivojlantirish davlat siyosatining ustuvor yo'nalishiga aylandi. Ammo, oxirgi yillardagi iqtisodiy islohotlar fonida kichik biznes sub'ektlari faoliyatida miqdoriy o'sish kuzatilgan bo'lsa-da, ularning barqaror rivojlanish dinamikasini ta'minlashda qator tizimli to'siqlar saqlanib qolmoqda. Muammo shundaki, tashqi makroiqtisodiy shoklar, logistik inqirozlar va ichki bozordagi raqobatning kuchayishi sharoitida

kichik biznes sub’ektlarining yashovchanlik koeffitsiyenti pastligicha qolmoqda. Ushbu dinamikani tizimli tahlil qilish, korxonalarning "tug'ilish" va "o'lim" ko'rsatkichlari o'rtasidagi nomutanosiblikni o'rganish bugungi kunning dolzarb ilmiy muammolaridan biri hisoblanadi.

Tadqiqot ob’ektining ahamiyati va ijtimoiy-iqtisodiy roli bugungi kunda O‘zbekistonda kichik biznes sub’ektlari faoliyatining rivojlanish dinamikasini o‘rganish bir necha sabablarga ko'ra hayotiy ahamiyatga ega. Birinchidan, O‘zbekiston mehnat resurslari jadal o'sib borayotgan davlat qatorida turar ekan. Har yili mehnat bozoriga kirib kelayotgan yuz minglab yoshlarni ish bilan ta’minlash va yirik sanoat korxonalari hisobiga emas, balki aynan kichik tadbirkorlik sub’ektlari orqali amalga oshiriladi. Ikkinchidan, iqtisodiyotni diversifikatsiya qilish va xomashyo qaramligidan chiqish uchun kichik biznesning ishlab chiqarishdagi ya’ni sanoatdagi ulushini oshirish zarur. Uchinchidan, hududlararo iqtisodiy tengsizlikni kamaytirishda kichik biznes yagona samarali vositadir. Agarda dinamika tahlil qilinmasa va rivojlanish qonuniyatlari aniqlanmasa, davlat tomonidan ajratilayotgan subsidiyalar va imtiyozli kreditlar kutilgan multiplikativ effektni bermasligi mumkin.

Kichik biznes subyektlari yangi ish o‘rinlari yaratadi, aholi daromadlarini oshiradi va jamiyatda iqtisodiy barqarorlikni ta’minlaydi[1]. Jahon banki ma’lumotlariga ko‘ra, rivojlanayotgan mamlakatlarda kichik va o‘rta biznes yalpi ichki mahsulotning 40 foizigacha ulushini tashkil etadi [2]. OECD tadqiqotlari esa kichik biznes subyektlarining 10–15 foizi tez o‘suvchi korxonalar sifatida yangi ish o‘rinlarining qariyb 50 foizini ta’minlashini ko‘rsatadi [3]. O‘zbekiston iqtisodiyotida ham kichik biznesning ulushi sezilarli darajada ortib bormoqda. Davlat statistika qo‘mitasi ma’lumotlariga ko‘ra, 2025-yilning birinchi yarmida kichik biznesning mamlakat YAIMdagi ulushi 52,7 foizni tashkil etgan [4]. Bu ko‘rsatkich sektorning nafaqat iqtisodiy salohiyati, balki ijtimoiy ahamiyatini ham namoyon etadi.

Tadqiqotning bosh maqsadi — O‘zbekiston Respublikasida kichik biznes sub’ektlari faoliyatining 2018-2025 yillardagi rivojlanish dinamikasini kompleks baholash, sohadagi tarkibiy o'zgarishlarni tahlil qilish va barqaror o'sishni ta'minlash bo'yicha ilmiy takliflar ishlab chiqishdir.

Ushbu maqsadga erishish uchun quyidagi yuqori vazifalar belgilandi: Ular birinchisi kichik biznes sub’ektlari sonining o'sish sur'atlarini tarmoqlar (sanoat, xizmat ko'rsatish, qishloq xo'jaligi) kesimida qiyoslash; ikkinchisi sohadagi rivojlanish dinamikasiga ta'sir etuvchi asosiy omillarni (kredit stavkalari, soliq yuki, infratuzilma) ekonometrik tahlil qilish; uchinchisi kichik biznes sub’ektlarining YaIM va eksportdagi ulushi o'rtasidagi bog'liqlikni aniqlash.

Tadqiqot gipotezalari: to’rtinchisi hududiy rivojlanish dinamikasi va markazlashgan resurslar taqsimoti o'rtasida kuchli korrelyatsiya mavjud bo'lib, bu chekka hududlarda korxonalar yashovchanligini pasaytiradi. Beshinchisi kichik biznesda innovatsion texnologiyalarni joriy etish darajasi pastligi sababli, sub’ektlar soni oshsa-da, mehnat unumdorligi dinamikasi turg'un holatda qolmoqda yuqorida aytib o’tilganlardan iborat edi.

TADQIQOT METODOLOGIYASI.

Ushbu maqolada miqdoriy va tahliliy tadqiqot dizaynidan foydalanildi. Tadqiqot faqatgina mavjud holatni tavsiflash bilan cheklanib qolmay, balki kichik biznes sub’ektlari rivojlanishiga ta’sir etuvchi makroiqtisodiy omillar va huquqiy islohotlar o‘rtasidagi sabab-oqibat bog‘liqligini o‘rganishga qaratilgan. Tadqiqotning mantiqiy asosi sifatida dinamik qatorlarni statistik tahlil qilish va olingan natijalarni iqtisodiy-matematik usullar yordamida verifikatsiya qilish tanlab olindi.

Tadqiqotning empirik bazasini shakllantirishda quyidagi rasmiy va huquqiy manbalardan foydalanildi: Huquqiy manbalar: O‘zbekiston Respublikasining lex.uz milliy qonunchilik ma’lumotlar bazasidagi "Tadbirkorlik faoliyati erkinligining kafolatlari to‘g‘risida"gi Qonuni, Prezident farmonlari va Vazirlar Mahkamasi qarorlari tahlil qilindi. Bu islohotlarning dinamikaga huquqiy ta’sirini baholash

imkonini berdi. Statistik manbalar: O‘zbekiston Respublikasi Statistika agentligining (stat.uz) "Kichik tadbirkorlik" va "Yalpi hududiy mahsulot" yillik to‘plamlari. Vaqt oralig‘i va qamrovi: Tadqiqot 2018–2025 yillar oralig‘ini qamrab oladi. Tanlanma sifatida O‘zbekistonning barcha 14 ta hududidagi (viloyatlar, Toshkent shahri va Qoraqalpog‘iston Respublikasi) kichik biznes sub’ektlari (mikrofirmalar va kichik korxonalar) olindi.

Kichik biznes rivojlanishini baholash uchun quyidagi o‘lchov birliklari va indikatorlar majmuasini ham ko’rib chiqishimiz mumkin: Miqdoriy dinamika koeffitsiyenti (K_{dyn}) Ma'lum vaqt oralig'ida yangi tashkil etilgan va tugatilgan sub’ektlar o‘rtasidagi nisbat bo’ladi. Iqtisodiy hissa koeffitsiyenti: Kichik biznesning YaIMdagi ulushi va tarmoqlar (sanoat, xizmat ko‘rsatish, qurilish) bo‘yicha qo‘shilgan qiymat hajmi. Yashovchanlik indeksi: Tashkil etilgan sub’ektlarning qanchasi 3 yildan ortiq muddat davomida barqaror faoliyat yuritayotganligi. Investitsion faollik: Bir sub’ektga to‘g‘ri keladigan o‘rtacha asosiy kapitalga yo‘naltirilgan investitsiyalar hajmi.

Tahlil usullari va dasturiy ta’minot bo’yicha malumotlarga asoslangan holda bajariladi. Ma’lumotlarga ishlov berish va model parametrlarini aniqlashda usullar va vositalar qo‘llanildi:

Ekonometrik model: Rivojlanish dinamikasiga ta’sir etuvchi omillarni baholash uchun ko'p omilli regressiya tenglamasi tuzildi:

$Yit=\beta0+\beta1X1,it+\beta2X2,it+\beta3X3,it+\varepsilon it$

Bu yerda, Y_{it}— i-hududning t-yildagi kichik biznesning YaIMdagi ulushi, $X_{1,it}$— ajratilgan kreditlar hajmi, $X_{2,it}$— soliq yuki darajasi, $X_{3,it}$— raqamli infratuzilma ko‘rsatkichi, β_0— ozod had, $\beta_1, \beta_2, \beta_3$— regressiya koeffitsiyentlari, ε_{it}esa tasodifiy xatolik hadini білдіradi.

Dasturiy vositalar: Ma’lumotlarni statistik tahlil qilish va vizuallashtirishda MS Excel, STATA yoki Python (Pandas, Matplotlib kutubxonalari) dasturlaridan

foydalanildi. Xususan, korrelyatsiya matritsalari orqali omillarning bir-biriga bog‘liqlik darajasi tekshirildi.

O’zbekiston Respublikasida kichik tadbirkorlik subyektlari to’g’risidagi ma’lumot. 2025-yilning 1-oktabr holati faoliyat yuritayotgan kichik tadbirkorlik subyektlari soni 1 212,0 mingtani, shundan, kichik korxona va mikrofirmalar soni 479.0 mingtani, oilaviy tadbirkorlar 5,8 mingtani, hunarmandlar 22,1 mingtani va import tovarlari sotuvchilari 0,9 mingtani tashkil etdi. Faoliyat yuritayotgan kichik tadbirkorlik subyektlari soni 2025-yil 1-oktabr holatiga, shundan

1-jadval.

2025-yil 1-oktabr holatiga faoliyat yuritayotgan kichik tadbirkorlik subyektlari soni.

Hudud	Jami	Kichik korxona va mikrofirmalar	Boshqa kichik tadbirkorlik subyektlari*
O‘zbekiston Respublikasi	**1 212 040**	**478 988**	**733 052**
Qoraqalpog‘iston Resp.	57 147	23 912	33 235
Andijon	125 598	28 429	97 169
Buxoro	78 358	29 510	48 848
Jizzax	53 538	21 981	31 557
Qashqadaryo	95 823	36 904	58 919
Navoiy	39 899	20 543	19 356
Namangan	90 012	27 609	62 403
Samarqand	127 099	44 072	83 027
Surxondaryo	72 233	25 973	46 260
Sirdaryo	35 284	13 369	21 915
Toshkent vil.	96 985	44 955	52 030
Farg‘ona	115 011	40 945	74 066
Xorazm	88 912	27 244	61 668
Toshkent sh.	136 141	93 542	42 599

Boshqa kichik tadbirkorlik subyektlari tarkibiga YaTTlar, dehqon xo‘jaliklari, oilaviy tadbirkorlar, hunarmandlar va import tovarlari sotuvchilari kiradi.

Manba: O‘zbekiston Respublikasi Milliy statistika qo‘mitasi press-relizi, 24.10.2025.

Jadval ko‘rsatkichlarining tahliliy tavsifi. Umumiy miqdoriy ko‘rsatkich respublika bo‘yicha jami ustunida aks ettirilgan ma’lumotlar asosida baholandi.

Umumiy miqdoriy ko‘rsatkich (Jami ustuni) Respublika bo‘yicha jami 1 212 040 ta sub’ekt faoliyat yuritmoqda. Bu ko‘rsatkich 2018-2019 yillarga nisbatan qariyb 3-4 baravar ko‘pdir. Bu o‘sish tadbirkorlikni ro‘yxatga olishdagi byurokratiyaning kamayganligi va "Soliq" mobil ilovasi kabi raqamli tizimlarning joriy etilishi natijasidir.

Strukturaviy bo‘linish (Shundan ustunlari). Jadval ikki asosiy guruhga bo‘lingan va bu kichik biznesning "sifati"ni belgilaydi: Kichik korxona va mikrofirmalar (478 988 ta): Bular yuridik shaxs maqomiga ega, ishchi o‘rinlari ko‘proq va eksport salohiyati yuqori bo‘lgan sub’ektlardir. Ularning qariyb 20% qismi (93 542 tasi) faqat Toshkent shahrida jamlangan. Bu poytaxtning yirik moliyaviy markaz ekanligini ko‘rsatadi.

YaTT, dehqon xo‘jaliklari va oilaviy tadbirkorlar (733 052 ta): Bu guruh son jihatdan ustunlik qiladi (60,5%). Bu shuni anglatadiki, O‘zbekistonda kichik biznesning asosi — yakka tartibdagi tadbirkorlik va qishloq xo‘jaligiga tayanadi. Ayniqsa, vodiy viloyatlarida (Andijon, Farg‘ona) bu ko‘rsatkich juda yuqori.

Hududlar bo‘yicha dinamik tahlil. Jadvaldan hududlar orasidagi keskin iqtisodiy farqni ko‘rish mumkin: Sanoat va xizmat ko‘rsatish markazlari: Toshkent shahri (136 ming), Samarqand (127 ming) va Farg‘ona (115 ming) sub’ektlar soni bo‘yicha peshqadam. Bu hududlarda aholi zichligi va xarid quvvati yuqori. Agrosanoat zonalari: Andijon va Qashqadaryo viloyatlarida YaTT va dehqon xo‘jaliklari soni yuqori, bu hududlarning agrar-industrial xarakterga ega ekanligidan dalolat beradi. Past dinamikali hududlar: Sirdaryo (35 ming) va Navoiy (39 ming) viloyatlari eng kam ko‘rsatkichga ega. Navoiy viloyatida sub’ektlar kamligi aholi sonining kamligi va iqtisodiyotning ko‘proq yirik davlat kombinatlari (NKMK) atrofida aylanishi bilan izohlanadi. Alohida toifalar (Pastki blok ma’lumotlari). Jadvalning pastki qismidagi qo‘shimcha raqamlar sub’ektlarning o‘ziga xosligini ochib beradi: Hunarmandlar (22 100 ta): Milliy an’analarning saqlanib qolganligi. Oilaviy tadbirkorlar (5 841 ta): Kam bo‘lsa-da, bu toifa ijtimoiy himoya uchun

muhim. Import tovarlar sotuvchilar (941 ta): Bu guruhning kamligi savdo sohasining yiriklashtirilgani yoki boshqa soliq toifasiga o‘tganidan dalolat beradi.

Ushbu jadval asosida shunday xulosa qilish mumkin: O‘zbekistonda kichik biznes miqdoriy jihatdan juda tez o‘smoqda, biroq rivojlanish hududlar bo‘yicha notekis taqsimlangan. Toshkent shahri "biznes xabi", viloyatlar esa ko‘proq "kichik ishlab chiqarish va qishloq xo‘jaligi" markazi bo‘lib qolmoqda.

Kichik biznes suby’ektlarining miqdoriy ko’rsarkichlari 2025-yilning 1-oktabrdagi holatiga ko’ra respublikda faoliyat yuritayotgan jami ichik tadbirkorlik sub’ektlar soni 1 212 040 birliknintashkil etdi. Sub’ektlarning tashkiliy-huquqiy shakli bo’yicha taqsimoti jadvalda aks ettirilgan.

1-jadval.

Kichik tadbirkorlik sub’ektlarining tarkibiy tuzilishi 2025-yil 1-oktabr holatiga.

Sub’ektlar toifasi	**Soni birlikda**	**Ulushi(%)**
Jami kichik	1 212 040	100%
Tadbirkorlik		
Yuridik shaxs	478 988	39,5%
maqomidagi korxonalar		
Yakka tartibdagi		
tadbirkorlar (YaTT)	733 052	60,5%
Hunarmandlar	22 100	1,8%
Oilaviy tadbirkorlar	5 841	0,5%

Hududiy rivojlanish dinamikasi hududlar kesimidagi tahlil sub’ektlarning joylashuvi bo‘yicha keskin farqlarni ko‘rsatdi. Faoliyat yuritayotgan jami sub’ektlar soni bo‘yicha eng yuqori va eng past ko‘rsatkichlar aks ettirildi: Eng yuqori ko‘rsatkichli hududlar: Toshkent shahri (136 141 ta), Samarqand viloyati (127 099 ta) va Farg‘ona viloyati (115 011 ta). Eng past ko‘rsatkichli hududlar: Sirdaryo viloyati (35 284 ta) va Navoiy viloyati (39 899 ta).

NATIJALAR.

Muhim topilmalardan biri tahlil natijasida aniqlangan 4 ta asosiy fakt: Strukturaviy ustunlik: Kichik biznes sub’ektlarining yarmidan ko‘prog‘i (60,5%) yuridik shaxs tashkil etmagan holda faoliyat yurituvchi sub’ektlar (YaTT, dehqon

xo‘jaliklari) hissasiga to‘g‘ri keladi. Yuridik shaxslarning konsentratsiyasi: Yuridik shaxs maqomidagi kichik korxonalarning qariyb 19,5% qismi (93 542 tasi) faqat Toshkent shahrida jamlangan. Qishloq xo‘jaligi va hunarmandchilik: Hududlar orasida Andijon viloyati YaTT va dehqon xo‘jaliklari soni bo‘yicha (97 169 ta) yuridik shaxslarga nisbatan 3,4 baravar ko‘p ko‘rsatkichga ega. Sektorlararo farq: Respublikada import tovarlari bilan shug‘ullanuvchi kichik sub’ektlar soni (941 ta) jami sub’ektlarning 0,1% dan kamroq qismini tashkil etadi. Natijalarning mazmuni mohiyati va uning asosiy sabablarini yoritib berildi.

MUHOKAMA.

Tahlil natijalari shuni ko‘rsatadiki, O‘zbekistonda kichik biznes sub’ektlarining miqdoriy dinamikasi barqaror o‘sish trayektoriyasiga ega. Faoliyat yuritayotgan sub’ektlar sonining 1,2 milliondan oshishi mamlakatda tadbirkorlik faoliyatini liberallashtirish bo‘yicha amalga oshirilgan institutsional islohotlarning bevosita natijasi hisoblanadi. Nega natijalar aynan shunday shakllandi? Birinchidan, lex.uz ma’lumotlarida qayd etilganidek, litsenziyalash va ruxsat berish tartib-taomillarining qisqartirilishi "kirish to‘siqlari"ni pasaytirdi. Ikkinchidan, soliq ma’murchiligining raqamlashtirilishi yashirin iqtisodiyotdagi sub’ektlarning rasmiy sektorga o‘tishiga turtki berdi.

Oldingi tadqiqotlar bilan qiyosiy tahlil. Olingan natijalar Sh. Mustafakulov va boshqa mahalliy tadqiqotchilarning "kichik biznes iqtisodiy o‘sishning asosiy drayveridir" degan xulosalarini tasdiqlaydi. Biroq, xorijiy olimlar (masalan, D. Birch) modellaridan farqli o‘laroq, bizning tadqiqotimizda sub’ektlar sonining o‘sishi ularning YaIMdagi ulushiga to‘g‘ridan-to‘g‘ri proporsional emasligi aniqlandi. Bu "miqdoriy o‘sish – sifatli turg‘unlik" fenomenini ko‘rsatadi, ya’ni sub’ektlar ko‘paymoqda, lekin ularning kapital sig‘imi va texnologik darajasi pastligicha qolmoqda.

Ushbu tahlilning nazariy ahamiyati kichik biznes dinamikasini hududlararo disproporsiya prizmasida ochib berganligidadir. Amaliy jihatdan esa, natijalar hududiy investitsiya dasturlarini shakllantirishda foydali bo‘lishi mumkin. Shuni

ta’kidlash lozimki, tadqiqot 2025-yilning to‘qqiz oylik ma’lumotlari bilan cheklangan bo‘lib, sub’ektlarning sof foyda va rentabellik ko‘rsatkichlari to‘liq qamrab olinmaganligi uning asosiy cheklovidir. Kelajakda ushbu dinamikani kichik biznesning tashqi qarz majburiyatlari bilan bog‘liq holda o‘rganish maqsadga muvofiqdir.

XULOSA.

O‘tkazilgan tadqiqot O‘zbekiston iqtisodiyotida kichik biznes sub’ektlari soni jihatidan miqdoriy sakrash sodir bo‘lganligini, ammo sifat jihatidan tarkibiy o‘zgarishlar hali yetarli darajada emasligini ko‘rsatdi. Toshkent shahri va viloyatlar o‘rtasidagi yuridik shaxs maqomiga ega korxonalar sonidagi tafovut mamlakatda biznes infratuzilmasining notekis taqsimlanganligidan dalolat beradi. Kichik tadbirkorlikning YaIMdagi ulushi barqaror bo‘lsa-da, uning innovatsion faolligi pastligicha qolmoqda. Olingan natijalar gipotezamizdagi "miqdor sifatni har doim ham belgilamaydi" degan qarashni to‘liq tasdiqladi.

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OPTIMIZING ENDURANCE DEVELOPMENT IN YOUNG ATHLETES: EVIDENCE FROM ATHLETICS-BASED TRAINING INTERVENTIONS

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Abstract: *This research is focused on the topic of the effectiveness of athletics-based training in enhancing endurance in young athletes (13-16). The design used was a quasi-experimental design; control and experimental groups were used over a period of 8 weeks. The methods incorporated in the training program were continuous, interval, and fartlek. The findings indicated that there was significant improvement in the performance of the experimental group in terms of running, aerobic capacity, and the recovery of cardiac rates as compared to the control group. The results indicate that progressive and systematic training regimens are useful in terms of endurance training among young people and offer viable information to coaches and practitioners in physical education.*

Keywords: *strength; youthful athletes; athletic physiology; aerobic capacity; physical fitness.*

INTRODUCTION

Endurance is regarded as one of the primary physical attributes that defines success in athletic performance, especially in sports where there is long-term physical activity, like the track and field events. Physiologically, endurance is the capacity of the organism to withstand fatigue in the case of protracted physical activity and the capacity to maintain a particular intensity with time. William D. McArdle et al. also argue that endurance correlates with the effectiveness of the cardiovascular and respiratory system and with metabolic processes that ensure the production of energy during exercise [McArdle et al., 2015, p. 452]. The aspect of endurance development with regard to youth sports is vital in enhancing athletic performance as well as health and functional capacity. Studies have indicated that correctly designed endurance training helps provide cardiovascular fitness, improves the use of oxygen, and aids in long-term physical growth in adolescents [Malina et al., 2004, p. 287]. Nevertheless, physiological adaptation, recovery rates, and neuromuscular development of young athletes are different compared to adults and, therefore, require age-specific training programs. Pedagogically speaking, systematic and progressive training in young athletes must be premised on endurance training based on both biological and educational principles. The success of training, according to Yuri Verkhoshansky, is conditioned by the reasonable structure of load, intensity, and recovery in particular, particularly at the developmental stages [Verkhoshansky, 2011, p. 98]. Equally, Russian sports science appreciates the essence of individualized method in youth training programs so as to achieve safe and effective development of physical attributes [Matveyev, 2001, p. 134]. Although much has already been written on endurance training, research on the specific application of training interventions on athletics to young athletes is still missing. The number of studies on the subject, as many of them are focused on adult populations or general physical education situations, creates a gap in applied research on youth athletics. Thus, the purpose of this study is to explore the way structured training interventions in track and field can be used to enhance endurance among young athletes in an optimal way. The study aims at offering both empirical

and practical data on effective training strategies and combine physiological and pedagogical frameworks.

METHODS

Research Design

This study employed a quasi-experimental design to evaluate the effectiveness of athletics-based training interventions on endurance development in young athletes. The design included an experimental group and a control group, allowing for a comparative analysis of training outcomes. Such an approach is widely used in sports science to assess the impact of specific training programs under controlled conditions [Bompa & Buzzichelli, 2019, p. 112].

Participants

The study involved 30 young athletes aged between 13 and 16 years, who were regularly engaged in physical training activities. The participants were divided into two groups:

− Experimental group (n = 15)

− Control group (n = 15)

All participants were medically cleared and had no contraindications to physical exercise. According to Robert M. Malina, this age range is particularly sensitive to developing aerobic capacity and endurance due to ongoing physiological maturation [Malina et al., 2004, p. 305].

Training Intervention

The experimental group followed a structured athletics-based endurance training program over an 8-week period, with three sessions per week. Each session lasted approximately 60 minutes and consisted of:

− Warm-up phase (10–15 minutes)

− Main training phase (30–40 minutes)

− Cool-down phase (10 minutes)

The training program incorporated the following methods:

− Continuous running (moderate intensity)

- Interval training (alternating high and low intensity)
- Fartlek training (speed play)

– Aerobic circuit training

These methods are recognized as effective tools for developing both aerobic and anaerobic endurance systems. As noted by Tudor O. Bompa, interval and variable-intensity training significantly enhance cardiovascular adaptation and energy system efficiency [Bompa & Buzzichelli, 2019, p. 156].

The control group participated in standard physical education sessions without a specialized focus on endurance development.

Data Collection Methods

To assess endurance levels, standardized and widely accepted field tests were used:

1. 1000-meter run test – to measure speed endurance
2. Cooper test (12-minute run) – to evaluate aerobic endurance
3. Heart rate recovery test – to assess cardiovascular efficiency

The Cooper test is considered a reliable indicator of aerobic fitness and has been extensively used in sports science research [Cooper, 1968, p. 201].

Heart rate recovery was measured immediately after exercise and after 1 minute of rest, as it reflects the functional state of the cardiovascular system [McArdle et al., 2015, p. 469].

All measurements were conducted twice:

- Before the intervention (pre-test)
- After the intervention (post-test)

Statistical Analysis

The collected data were processed using basic statistical methods:

– Mean values (M)

– Standard deviation (SD)

- Percentage change (%)

– Comparative analysis between groups

Statistical comparison of pre- and post-test results allowed for determining the effectiveness of the training intervention. According to Vladimir Platonov, quantitative analysis is essential for evaluating training outcomes and ensuring objective conclusions in sports research [Platonov, 2015, p. 221].

RESULTS

At the initial stage of the study, both the experimental and control groups demonstrated similar endurance levels. No statistically significant differences were observed between the groups, which indicates the comparability of participants before the intervention.

Table 1. Comparison of Endurance Indicators Between Experimental and Control Groups

Indicator	Group	Pre-test (M ± SD)	Post-test (M ± SD)	Change (%)	
1000 m run (sec)	Experimental	285 ± 12	250 ± 10	+12.3%	
	Control	283 ± 11	272 ± 10	+3.9%	
Cooper test (m)	Experimental	2200 ± 150	2530 ± 140	+15.0%	
	Control	2210 ± 160	2320 ± 150	+5.0%	
Heart rate recovery (bpm)	Experimental	150 → 110	150 → 95	Improved	
	Control	149 → 115	149 → 108	Slight	

The findings made is a clear indication that experimental group exhibited a lot of improvement in all endurance indicators, relative to the control group. To start with, the experimental group significantly (12.3%) decreased the performance time in the 1000 meter run test compared to the control group, which increased it by only 3.9. This shows that the effect of the structured athletics training on speed endurance was great. Secondly, Cooper test outcomes showed a significant increase in aerobic capacity. The experimental group increased by 15 points, which is in line with literature that interval and continuous training bring significant improvements to the

aerobic endurance [McArdle et al., 2015, p. 470]. On the other hand, the control group showed moderate improvement. Thirdly, the heart rate recovery increased significantly in the experimental group, which depicts an increase in the efficiency of the cardiovascular. One of the most important indicators of high endurance and fitness is faster post exercise recovery [Malina et al., 2004, p. 290]. Comparative Interpretation The better performance of the experimental group is supported by the use of systematic and diversified training exercises, such as the interval and fartlek training. These mechanisms enhance aerobic and anaerobic energy pathways, which result in superior physiological changes. Tudor O. Bompa states that systematic alteration of training intensity is necessary to maximize the endurance growth and prevent training plateau [Bompa and Buzzichelli, 2019, p. 163]. The theoretical framework is supported by the results of this study.

DISCUSSION

The results of this study show a clear evidence that athletics-based training interventions which are organized yield a significant improvement in endurance among young athletes. The systematic and scientifically based training approaches have proven to be effective as the observed effects in the experimental group were seen in all indicators, which are running performance, aerobic capacity and heart rate recovery. Physiologically, one can explain the results by the activation and maturation of the aerobic and anaerobic energy systems. The large Cooper test performance increase (15 percent) indicates that oxygen uptake and use is enhanced which are important factors that determine endurance capacity. According to William D. McArdle et al., endurance training improves the density of the mitochondrion, capillarization, and heart efficiency, which are associated with a better aerobic performance [McArdle et al., 2015, p. 471]. Moreover, the positive change in heart rate recovery as observed in the experimental group shows an increase in the autonomic control of the cardiovascular system. The rapid bouncing back after the physical activity is linked with the enhanced parasympathetic reactivation and the level of fitness [Malina et al., 2004, p. 292]. This observation

advocates the notion that endurance training among the youth, should aim towards performance results and change in physiological adaptation and recovery mechanisms. Methodologically, the intervention can be claimed to be effective due to the application of the different forms of training, such as interval training, continuous running, and fartlek. These methods guarantee optimality in variation in loads, which is necessary in order to stimulate adaptation, but does not result in overtraining. Tudor O. Bompa claims that training intensity and volume variation is one of the essential postulates of periodization and a vital factor in endurance formation [Bompa and Buzzichelli, 2019, p. 165]. Moreover, the outcomes appear in line with the theoretical model put forward by Lev Matveyev, who stressed regular advancement and long-term training planning in the development of sports [Matveyev, 2001, p. 142]. The gradual adaptation due to the structured nature of the experimental program was also important especially in regards to the young athletes whose physiological systems are still maturing. The other significant feature of this study is the training pedagogical aspect. The system of dividing the sessions into warm-up, main activity, and recovery phases served as the contributing factor in terms of the overall effectiveness of the program. This is not only a structured approach that is likely to yield better physical results but also better learning, discipline and motivations among young athletes. The inclusion of pedagogical concepts into training, as emphasized by Vladimir Platonov is necessary to ensure the process of attaining sustainable development in athletics [Platonov, 2015, p. 224]. Regardless of the positive results, some drawbacks must be noted. The size of the sample and the duration of the intervention (8 weeks) are relatively small, and it might be possible to suggest that the results are limited in generalization. Athletics-based endurance training should also be validated and long-term research on a larger sample is required to validate the effectiveness of this training in youth groups. On the whole, the results of the current study belong to the emerging literature which points at the significance of more organized, diversified, and scientifically based training methods in the process of endurance building in young athletes. The

outcomes do not only support the existing theoretical theories, but they also give practical results of the application of the theories to actual training situations.

CONCLUSION

This paper has shown that athletics based training programs that are structured are very effective in enhancing endurance in young athletes. All the important indicators, such as running, aerobic capacity, and heart rate recovery, improved significantly in the experimental group in comparison with the control one. The results affirm that the endurance development in the youth justifies the best training programs based on scientifically-founded principles, such as progressive load, the intensity variation, and organizational systematicness. These findings are aligned to the existing theories on sports science that note the significance of coordinating physiological adaptation and methodological planning in the training process [Bompa and Buzzichelli, 2019, p. 168; Matveyev, 2001, p. 145]. Furthermore, the research points to the fact that monotonous and overly intensive workload should never be used as a basis of endurance training among young athletes. Rather, continuous, interval and variable-intensity training approaches should be combined in a balanced approach causing optimal results and reduced chances of overtraining. To conclude, athletics-based training is a relevant and useful system in building endurance among young athletes. The research has added to the literature available as it provides empirical data and methodological implications, which can be utilized in the practical training settings.

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TARAQQIYOT STRATEGIYASI DOIRASIDA BOSHLANG‘ICH SINF ONA TILI DARSLARIDA LUG‘AT USTIDA ISHLASH METODIKASINI TAKOMILLASHTIRISH

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Annotatsiya: *Mazkur maqolada O‘zbekiston Respublikasining “Yangi O‘zbekiston taraqqiyot strategiyasi 2022–2026-yillar” dasturi asosida boshlang‘ich sinf ona tili darslarida lug‘at ustida ishlash metodikasini takomillashtirish masalalari keng yoritilgan. Boshlang‘ich ta’lim bosqichida o‘quvchilarning nutqini rivojlantirish, so‘z boyligini oshirish va mustaqil fikrlash ko‘nikmalarini shakllantirishda lug‘at ustida ishlashning o‘rni ilmiy-nazariy jihatdan tahlil qilingan. Shuningdek, maqolada zamonaviy pedagogik texnologiyalar asosida lug‘at bilan ishlashning samarali metodlari, interfaol usullari va didaktik vositalari ko‘rib chiqilgan hamda amaliy tavsiyalar berilgan.*

Kalit so‘zlar: *Taraqqiyot strategiyasi, boshlang‘ich ta’lim, ona tili darsi, lug‘at ustida ishlash, nutq rivoji, so‘z boyligi, kompetensiyaviy yondashuv, interfaol metodlar, innovatsion texnologiyalar, didaktik o‘yinlar.*

Annotation: *This article comprehensively highlights the issues of improving vocabulary teaching methodology in primary school mother tongue lessons based on the “Development Strategy of New Uzbekistan for 2022–2026.” It provides a scientific and theoretical analysis of the role of vocabulary work in developing students’ speech, enriching their vocabulary, and forming independent thinking skills at the primary education stage. The article also examines effective methods, interactive approaches, and didactic tools for working with vocabulary based on modern pedagogical technologies, and offers practical recommendations.*

Keywords: *Development Strategy, primary education, mother tongue lesson, vocabulary work, speech development, vocabulary enrichment, competency-based approach, interactive methods, innovative technologies, didactic games.*

KIRISH

Bugungi globallashuv jarayonida har bir davlatning rivojlanish darajasi uning ta’lim tizimi bilan chambarchas bog‘liqdir. O‘zbekiston Respublikasida ham ta’lim tizimini tubdan isloh qilish, uning sifatini oshirish va xalqaro standartlarga moslashtirish davlat siyosatining ustuvor yo‘nalishlaridan biri sifatida belgilangan. O‘zbekiston Respublikasi Prezidenti tomonidan ilgari surilgan “Yangi O‘zbekiston taraqqiyot strategiyasi 2022–2026-yillar”da ta’lim sohasini rivojlantirish, o‘quvchilarning intellektual salohiyatini oshirish, ularning mustaqil fikrlash qobiliyatini shakllantirish va nutq madaniyatini yuksaltirishga alohida e’tibor qaratilgan. Shu nuqtai nazardan, boshlang‘ich ta’lim bosqichi eng muhim poydevor hisoblanadi.Boshlang‘ich sinf ona tili darslari o‘quvchilarning nutqini rivojlantirishda asosiy o‘rin tutadi. Ayniqsa, lug‘at ustida ishlash orqali o‘quvchilarning so‘z boyligini kengaytirish, ularni to‘g‘ri va ravon fikr bildirishga o‘rgatish, til birliklaridan ongli ravishda foydalanish ko‘nikmalarini shakllantirish dolzarb masalalardan biridir.

Shu boisdan, boshlang‘ich sinf ona tili darslarida lug‘at ustida ishlash metodikasini zamonaviy pedagogik yondashuvlar asosida takomillashtirish bugungi kunning muhim ilmiy-amaliy vazifalaridan biri hisoblanadi.

ASOSIY QISM

1. Taraqqiyot strategiyasida ta’lim tizimini rivojlantirishning ustuvor yo‘nalishlari

O‘zbekiston Respublikasining “Yangi O‘zbekiston taraqqiyot strategiyasi 2022–2026-yillar” dasturida ta’lim tizimini tubdan modernizatsiya qilish, uning sifatini oshirish va xalqaro standartlarga moslashtirish ustuvor vazifalar sifatida belgilangan. Ushbu strategiyada ta’lim jarayoniga zamonaviy pedagogik texnologiyalarni joriy etish, o‘quvchilarning mustaqil fikrlash qobiliyatini rivojlantirish hamda ularning kommunikativ kompetensiyalarini shakllantirish alohida ahamiyat kasb etadi.

Mazkur vazifalar, ayniqsa, boshlang‘ich ta’lim bosqichida muhim hisoblanadi. Chunki aynan shu bosqichda o‘quvchilarning nutqi, tafakkuri va dunyoqarashi shakllanadi. Shuningdek, bu davrda olingan bilim va ko‘nikmalar keyingi ta’lim bosqichlari uchun mustahkam poydevor vazifasini bajaradi.

Taraqqiyot strategiyasida quyidagi jihatlarga alohida e’tibor qaratilgan:

12.ta’lim sifatini oshirish va uning samaradorligini ta’minlash;

13.innovatsion pedagogik yondashuvlarni keng joriy etish;

14.o‘quvchilarda mustaqil va tanqidiy fikrlashni rivojlantirish;

15.nutq madaniyatini shakllantirish va rivojlantirish;

16.kompetensiyaviy yondashuv asosida ta’limni tashkil etish.

Ushbu vazifalar boshlang‘ich sinf ona tili darslarida lug‘at ustida ishlash jarayonida ham o‘z ifodasini topadi.

2. Boshlang‘ich sinf ona tili darslarida lug‘at ustida ishlashning nazariy asoslari

Lug‘at ustida ishlash — bu o‘quvchilarning so‘z boyligini oshirish, ularning so‘z ma’nolarini anglashini ta’minlash hamda nutqda to‘g‘ri va o‘rinli qo‘llashga o‘rgatishga qaratilgan tizimli pedagogik jarayondir.

Mazkur jarayon quyidagi asosiy yo‘nalishlarni o‘z ichiga oladi:

- yangi so‘zlarni o‘rgatish va ularning ma’nosini tushuntirish;
- so‘zlarning ko‘p ma’noliligini anglatish;
- sinonim, antonim va omonim so‘zlarni o‘rgatish;
- so‘zlarni og‘zaki va yozma nutqda faol qo‘llashga o‘rgatish.

Lug‘at ustida ishlash jarayoni nafaqat tilni o‘rganish, balki o‘quvchilarning tafakkurini rivojlantirishga ham xizmat qiladi. Chunki har bir yangi so‘z — bu yangi tushuncha, yangi bilim demakdir.

3. Lug‘at ustida ishlashning ta’limiy va tarbiyaviy ahamiyati

Boshlang‘ich sinf o‘quvchilarining nutqini rivojlantirishda lug‘at ustida ishlash muhim o‘rin tutadi. U quyidagi jihatlar orqali o‘z ahamiyatini namoyon etadi:

Birinchidan, lug‘at ustida ishlash o‘quvchilarning so‘z boyligini oshiradi. Natijada ular o‘z fikrlarini aniq, ravon va tushunarli ifodalay oladi.

Ikkinchidan, bu jarayon o‘quvchilarning tafakkurini rivojlantiradi. So‘z va tushuncha o‘rtasidagi bog‘liqlikni anglash orqali ular mantiqiy fikrlashga o‘rganadi.

Uchinchidan, lug‘at ustida ishlash o‘quvchilarning nutq madaniyatini shakllantiradi. To‘g‘ri so‘z tanlash, uni o‘rinli qo‘llash, gap tuzishda aniqlik va ravonlikka erishish shu jarayon orqali yuzaga keladi.

To‘rtinchidan, bu jarayon tarbiyaviy ahamiyatga ham ega. Chunki o‘quvchilar so‘zlar orqali milliy qadriyatlar, urf-odatlar va madaniyat bilan tanishadi.

4. Kompetensiyaviy yondashuv asosida lug‘at ustida ishlash

Bugungi kunda ta’lim tizimida kompetensiyaviy yondashuv muhim o‘rin egallaydi. Ushbu yondashuv o‘quvchilarning nafaqat bilim olishiga, balki o‘sha bilimlarni amalda qo‘llay olishiga ham qaratilgan.

Lug‘at ustida ishlash jarayonida quyidagi kompetensiyalar shakllanadi:

- kommunikativ kompetensiya (fikrni og‘zaki va yozma ifodalash);
- axborot bilan ishlash kompetensiyasi;
- ijtimoiy faol fuqarolik kompetensiyasi;
- o‘zini rivojlantirish kompetensiyasi.

Masalan, o‘quvchi yangi o‘rgangan so‘zini gapda qo‘llay olsa, bu uning kommunikativ kompetensiyasi rivojlanganidan dalolat beradi.

5. Boshlang‘ich sinf ona tili darslarida lug‘at ustida ishlash metodlari

Boshlang‘ich sinf ona tili darslarida lug‘at ustida ishlashni samarali tashkil etish uchun turli metod va usullardan foydalanish muhim ahamiyatga ega. Ushbu metodlar o‘quvchilarning yosh xususiyatlari, qiziqishlari va bilim darajasini inobatga olgan holda tanlanishi lozim. Lug‘at ustida ishlashda quyidagi metodlar keng qo‘llaniladi:

Tushuntirish metodi

Bu metod orqali yangi so‘zlarning ma’nosi oddiy va tushunarli tarzda izohlanadi. O‘qituvchi so‘zning ma’nosini hayotiy misollar orqali tushuntirib beradi. Bu usul ayniqsa yangi mavzularni o‘zlashtirishda samarali hisoblanadi.

Ko‘rgazmalilik metodi

Ushbu metodda turli ko‘rgazmali vositalardan — rasmlar, predmetlar, videolar va slaydlardan foydalaniladi. O‘quvchilar ko‘rish orqali yangi so‘zlarni tezroq va samaraliroq o‘zlashtiradi.

Suhbat metodi

Bu metod o‘qituvchi va o‘quvchilar o‘rtasida savol-javob asosida amalga oshiriladi. O‘quvchilar faol ishtirok etadi va o‘z fikrlarini erkin bayon qiladi.

Mustaqil ish metodi

O‘quvchilarga yangi so‘zlar bilan gap tuzish, matndan so‘zlarni topish kabi topshiriqlar beriladi. Bu ularning mustaqil fikrlashini rivojlantiradi.

6. Interfaol metodlar asosida lug‘at ustida ishlash

Zamonaviy ta’lim jarayonida interfaol metodlardan foydalanish muhim ahamiyat kasb etadi. Ular o‘quvchilarni faollashtiradi va darsni qiziqarli qiladi. Quyidagi interfaol metodlar samarali hisoblanadi:

“Aqliy hujum” metodi

O‘qituvchi biror so‘z yoki mavzu beradi, o‘quvchilar esa shu so‘zga bog‘liq boshqa so‘zlarni aytadi. Bu usul orqali o‘quvchilarning so‘z boyligi kengayadi.

“Klaster” metodi

Bir asosiy so‘z beriladi va o‘quvchilar shu so‘z bilan bog‘liq boshqa so‘zlarni yozadi. Natijada so‘zlar o‘rtasidagi bog‘liqlik shakllanadi.

“Insert” metodi

O‘quvchilar matnni o‘qib, yangi so‘zlarni belgilaydi va ularning ma’nosini aniqlaydi. Bu metod mustaqil o‘rganishni rivojlantiradi.

“Sinkveyn” metodi

O‘quvchilar berilgan so‘z asosida qisqa she’riy shaklda gap tuzadi. Bu usul ijodiy fikrlashni rivojlantiradi.

7. Didaktik o‘yinlar orqali lug‘at ustida ishlash

Boshlang‘ich sinf o‘quvchilari uchun o‘yin orqali o‘rganish eng samarali usullardan biridir. Didaktik o‘yinlar darsni jonlantiradi va o‘quvchilarning qiziqishini oshiradi.

Quyidagi o‘yinlardan foydalanish mumkin:

“Kim ko‘p so‘z topadi?”

O‘quvchilarga bir harf beriladi va ular shu harf bilan boshlanuvchi so‘zlarni topadi.

“Ortiqchasini top”

Bir nechta so‘z beriladi va o‘quvchilar ortiqcha so‘zni aniqlaydi.

“Gap tuz”

Berilgan so‘zlar yordamida gap tuzish topshirig‘i beriladi.

“Sinonimini ayt”

O‘qituvchi so‘z aytadi, o‘quvchilar esa uning sinonimini topadi.

8. Axborot-kommunikatsiya texnologiyalaridan foydalanish

Bugungi kunda dars jarayonida AKTdan foydalanish katta ahamiyatga ega. Lug‘at ustida ishlashda quyidagilar samarali:

- multimedia taqdimotlar;
- interaktiv doskalar;
- videodarslar;
- mobil ilovalar orqali mashqlar.

Bu vositalar o‘quvchilarning darsga bo‘lgan qiziqishini oshiradi va bilimni mustahkamlaydi.

XULOSA

Xulosa qilib aytganda, boshlang‘ich sinf ona tili darslarida lug‘at ustida ishlash o‘quvchilarning nutqini rivojlantirish, so‘z boyligini oshirish hamda mustaqil fikrlash qobiliyatini shakllantirishda muhim omil hisoblanadi. Mazkur jarayon o‘quvchilarning nafaqat til bilimlarini, balki ularning tafakkuri va dunyoqarashini ham rivojlantiradi.

“O‘zbekiston taraqqiyot strategiyasi 2022–2026-yillar”da belgilangan vazifalardan kelib chiqib, ta’lim jarayoniga zamonaviy pedagogik texnologiyalarni joriy etish, interfaol metodlardan keng foydalanish hamda o‘quvchilarning faol ishtirokini ta’minlash dolzarb masalalardan biri hisoblanadi. Lug‘at ustida ishlash jarayonida an’anaviy va innovatsion metodlarning uyg‘unligi, didaktik o‘yinlardan

foydalanish, axborot-kommunikatsiya texnologiyalarini qo‘llash orqali dars samaradorligini yanada oshirish mumkin. Shu boisdan, boshlang‘ich sinf ona tili darslarida lug‘at ustida ishlash metodikasini takomillashtirish ta’lim sifatini oshirishga, o‘quvchilarning nutqiy kompetensiyasini rivojlantirishga va ularni har tomonlama barkamol shaxs sifatida shakllantirishga xizmat qiladi.

FOYDALANILGAN ADABIYOTLAR

1. O‘zbekiston Respublikasi Prezidentining “Yangi O‘zbekiston taraqqiyot strategiyasi 2022–2026-yillar”.
2. Boshlang‘ich ta’lim davlat ta’lim standarti.
3. Ona tili fanidan 1–4-sinf darsliklari
4. Pedagogika nazariyasi va metodikasi bo‘yicha adabiyotlar.
5. Zamonaviy pedagogik texnologiyalar bo‘yicha ilmiy manbalar.

SOCIOSEMANTIC CLASSIFICATION OF SOCIOLINGUISTIC TERMS

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Annotatsiya. *Ushbu maqolada ingliz va o‘zbek tillaridagi sotsiolingvistik terminlarning semantik munosabatlariga ko‘ra turlari tahlil qilinadi. Tadqiqot davomida lug‘atlardan olingan terminlarning qo‘llanish chastotasi va ularning o‘zaro ma’noviy bog‘lanish xususiyatlari ilmiy asosda ko‘rib chiqiladi. Terminlarni semantik guruhlarga ajratish sotsiolingvistik terminologiyaning tizimli tabiati va tarkibiy xususiyatlarini ochib beradi. Tadqiqot natijalari*

terminologiyani miqdoriy va sifat jihatdan baholash bilan birga sotsiolingvistik matnlarning ilmiy uslubini aniqlashda ham muhim ahamiyat kasb etadi.

***Kirish so'zlar**: terminotizim, sotsiolingvistika, terminologik maydon, semantik guruh, etnik ko'pchilik tili, sotsiolekt, monovalent, bivalent.*

***Аннотация**. В данной статье анализируются типы социолингвистических терминов английского и узбекского языков в соответствии с их семантическими отношениями. В исследовании на научной основе изучены частотность употребления терминов, взятых из социолингвистических словарей, и особенности их семантической взаимосвязи. Классификация терминов по семантическим группам раскрывает системный характер социолингвистической терминологии. Полученные результаты позволяют оценивать терминологию как количественно, так и качественно и играют важную роль в определении научного стиля социолингвистических текстов.*

***Ключевые слова**: терминосистема, социолингвистика, терминологическое поле, семантическая группа, язык этнического большинства, социолект, моновалентный, бивалентный.*

***Annotation.** This article analyzes the types of English and Uzbek sociolinguistic terms according to their semantic relations. The study investigates, on a scientific basis, the frequency of use of terms extracted from sociolinguistic dictionaries and the characteristics of their semantic interconnections. Classifying terms into semantic groups reveals the structural nature of sociolinguistic terminology. The results allow evaluating the terminology both quantitatively and qualitatively and play an important role in determining the scientific style and accurate classification of sociolinguistic texts.*

***Keywords**: term system, sociolinguistics, semantic group, terminological field, language of the ethnic majority, sociolect, monovalent, bivalent.*

INTRODUCTION

Sociolinguistics, the branch of linguistics that studies the relationship between language and society, is characterized by systematicity and variability. The formation of terms in this field arises from the mutual influence between linguistic processes and social structures. Because the sociolinguistic term system has a complex structure, it is difficult to fully capture within a single classification model. However, dividing terms into semantic groups helps reveal their social relevance and degree of usage within different communicative domains. Studying the

composition of thematic groups allows for the systematization of concepts and the identification of their interrelations, which contributes to the development of the conceptual apparatus and enriches theoretical representations of the lexical features of scientific style.

LITERATURE REVIEW AND METHODOLOGY.

Different approaches exist regarding the classification of sociolinguistic terms, as social conditions and social units vary across societies. Based on forms of social interaction and modes of linguistic functioning, communication domains may be grouped into nationwide, regional, and local spheres. These domains are interconnected and form integral parts of a unified socio-communicative system, making strict differentiation between them challenging.

Despite this, terms can still be grouped according to thematic and semantic relevance. Because sociolinguistic terminology has a highly complex structure, identifying a single classification model is difficult. Based on available material, this study analyzes semantic relations within several socially significant communication domains. Social relevance is defined here as the frequency with which terms are used within specific communicative contexts.

According to A.D. Shveitser, communication domains differ in scope and social coverage across different communities [1]. Vinogradov emphasizes that terminological grouping must take into account stability of meaning and internal semantic relations [2]. For example, terms like dialect, vernacular, and local language may be grouped together under the theme “language and nation.”

Uzbek sociolinguistic scholar Y. Odilov classifies sociolinguistic terms based on their relations with other disciplines, such as sociology (questionnaire, interview), ethnography, or political science (ethnic structure, language policy, ethnic majority language, ethnolect) [3]. This correlates with Kirilenko's broader classification model, which highlights that thematic orientation creates typological groups forming terminological fields [4].

Peter Trudgill divides sociolinguistic terminology into groups related to language and society and language and politics [5]. Among these models, Kirilenko's classification stands out for its precision and detailed subdivision into microdomains.

Some sociolinguistic terms belong simultaneously to multiple semantic groups and are therefore considered bivalent. These terms inherently possess multi-dimensional semantic relevance. For instance, the term ethnolect belongs to both "language and nation" and "language and social differentiation" due to its dual conceptual characteristics. Similarly, the term linguistic division applies across all microgroups and carries broad sociolinguistic significance.

Bivalency typically emerges between semantically close groups, such as "language and politics," "language and nation," or "language and conflicts." Kirilenko emphasizes that classifying a term requires considering not only its lexical meaning but also its usage context and intra-systemic relations. For example, the thematic group "language and politics" includes official languages, endangered languages, and terms describing language-power relations, such as language reform and linguistic migration.

This study analyzed 600 terms from Uzbek (Odilov) [6] and English (Swann et al.) [7] sociolinguistic dictionaries. The results confirm that many terms possess bivalency.

Type of Semantic Relation	English	Uzbek
Language and Politics	232 (58%)	178 (29%)
Language and Nation	126 (21%)	220 (37%)
Language and Conflicts	100 (17%)	98 (17%)
Language and Culture	62 (10%)	59 (9%)

These findings show that English contains more politically oriented terminology, while Uzbek contains more nationally-oriented terms. This reflects the different socio-cultural characteristics and historical development pathways of the two linguistic communities. The abundance of political terms in English correlates with the fact that language status, use, and regulation in many countries are legally and politically defined, leading to the emergence of terms such as official language, state language, language planning, and language policy.

CONCLUSION

The study demonstrates that determining monovalent and bivalent terms is complex but necessary for understanding the semantic structure of sociolinguistic terminology. Both English and Uzbek show similar tendencies in this regard. Classification requires a deep understanding of the thematic domains and their social relevance. The number of terms within each semantic group reflects the unique sociocultural structure and national traditions of the respective speech communities. The proportional similarity between some groups is largely due to standardization and transliteration processes that introduce international sociolinguistic terminology into Uzbek.

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FRAZEOLOGIK BIRLIKLARDA MILLIY-MADANIY SEMANTIKANING IN'IKOSI

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Annotatsiya: *Ushbu maqolada frazeologik birliklarning milliy-madaniy semantikasi madaniyatlararo muloqot prizmasida tadqiq etiladi. Iboralar shunchaki til birligi emas, balki xalqning dunyoqarashini aks ettiruvchi «madaniy kod» sifatida tahlil qilingan. Tadqiqot davomida o'zbek va ingliz tillaridagi realiyalar, somatik va animalistik obrazlar qiyoslanib, ularning muloqotdagi pragmatik xususiyatlari ochib berilgan. Natijalar shuni ko'rsatadiki, frazeologizmlarni to'g'ri anglash madaniyatlararo tushunmovchiliklarning oldini oladi va tarjima mahoratini oshiradi. Maqola lingvokulturologiya va tarjimashunoslik yo'nalishidagi mutaxassislar uchun mo'ljallangan.*

Kalit so'zlar: *frazeologiya, madaniyatlararo muloqot, milliy-madaniy semantika, lingvokulturologiya, pragmatik xato, madaniy kod, ekvivalentlik*

Annotation: *This article explores the national-cultural semantics of phraseological units through the lens of intercultural communication. Idioms are analyzed not merely as linguistic units but as «cultural codes» reflecting a nation's worldview. The research compares realia, somatic, and animalistic imagery in Uzbek and English, highlighting their pragmatic roles in discourse. Findings suggest that a deep understanding of phraseology prevents intercultural miscommunication and enhances translation proficiency. This study provides valuable insights for specialists in ethnolinguistics and translation studies, offering a systematic approach to cultural adaptation in language.*

Keywords: *phraseology, intercultural communication, national-cultural semantics, ethnolinguistics, pragmatic failure, cultural code, equivalence.*

KIRISH

Til shunchaki axborot almashish quroli emas, balki millatning asrlar davomida to‘plagan tajribasi, qadriyatlari va hissiyotlarini o‘zida saqlaydigan tirik xazinadir. Ushbu ulkan xazinaning eng jozibador va mazmunan zichlashgan qismi, shubhasiz, frazeologizmlardir. Ular xalqning dunyoqarashini obrazli shaklda ifodalovchi «madaniy genom» vazifasini o‘taydi.

Bugungi globallashuv sharoitida, turli madaniyat vakillari o‘zaro muloqotga kirishar ekan, til to‘siqlari faqatgina lug‘at boyligi bilan hal bo‘lmayotganiga guvoh bo‘lmoqdamiz. Madaniyatlararo muloqot diskursida frazeologik birliklar ko‘pincha kutilmagan «tushunmovchilik nuqtalari»ga aylanadi. Buning sababi shundaki, iboralarning tub ma’nosi ularni tashkil etgan so‘zlarning mexanik yig‘indisidan emas, balki o‘sha xalqqa xos bo‘lgan chuqur milliy assotsiatsiyalar va tarixiy xotiradan suv ichadi.

Tadqiqotning dolzarbligi: Hozirgi kunda chet tilini o‘rganish va o‘rgatishda shunchaki grammatik qoidalar yoki leksik birliklarni yodlash yetarli emas. Muloqotning muvaffaqiyati bevosita «madaniy konnotatsiya»ni — so‘z ortidagi yashirin ma’no va emotsional bo‘yoqni to‘g‘ri anglashga bog‘liq bo‘lib qolmoqda. Frazeologizmlarni tushunmaslik nafaqat so‘z o‘yinini boy berishga, balki muloqotdagi pragmatik xatolarga, hatto madaniy ziddiyatlarga olib kelishi mumkin.

Tadqiqotning maqsadi: Ushbu ishda frazeologik birliklar tarkibidagi milliy-madaniy komponentlarning shakllanish mexanizmlarini tahlil qilish hamda ularning jonli muloqot jarayonidagi (diskursiv) o‘ziga xosliklarini ochib berish ko‘zda tutilgan. Bizning vazifamiz — til birliklari ortida yashiringan madaniy kodlarni «o‘qish» orqali samarali madaniyatlararo muloqot modelini yaratishga hissa qo‘shishdir.

ASOSIY QISM

Ushbu tadqiqot doirasida frazeologik birliklarning murakkab va ko‘p qirrali tabiatini ochib berish maqsadida o‘zaro bir-birini to‘ldiruvchi quyidagi zamonaviy lingvistik metodlar majmuasidan foydalanildi:

2.1. Lingvokulturologik tahlil: Til va madaniyat sintezi

Ushbu metod yordamida frazeologizmlar shunchaki leksik birlik emas, balki milliy mentalitetning «arxivlangan» ko‘rinishi sifatida tadqiq etildi. Tahlil jarayonida iboralarning etimologiyasi, ularning xalq og‘zaki ijodi, urf-odat va an’analar bilan bog‘liqligi o‘rganildi. Bu bizga til birligi qatiga yashiringan «milliy ruh»ni va uning muloqotdagi ramziy ma’nolarini aniqlash imkonini berdi.

2.2. Qiyosiy-tipologik metod: Madaniyatlararo ko‘prik

Turli tizimli tillarni (o‘zbek va ingliz) solishtirish orqali frazeologik tizimlarning o‘xshash (universal) va farqli (milliy-spesifik) jihatlari klassifikatsiya qilindi. Bunda asosiy e’tibor quyidagilarga qaratildi:

Frazeologik ekvivalentlik: Bir tildagi obrazning ikkinchi tilda aynan saqlanishi.

Lakunalar (bo‘shliqlar): Muayyan madaniyatga xos bo‘lib, ikkinchi tilda muqobili bo‘lmagan birliklarni aniqlash va ularning madaniyatlararo muloqotdagi «to‘siq» darajasini baholash.

2.3. Kontekstual va diskursiv tahlil: Jonli muloqot dinamikasi

Frazeologizm lug‘atda o‘lik birlik bo‘lsa, nutqda u tiriladi. Ushbu metod orqali frazeologik birliklarning konkret nutqiy vaziyat (diskurs) ichidagi xatti-harakati tahlil qilindi. Tadqiqotda iboralarning matn ichida o‘zgarishi (transformatsiyasi), yangi ma’no qirralari kasb etishi hamda muloqot ishtirokchilarining emotsional holatiga ta’sir ko‘rsatish xususiyatlari kuzatildi.

2.4. Semantik komponentlar tahlili

Iboralar tarkibidagi ayrim so‘zlarning (masalan, rang, raqam yoki tana a'zolari) simvolik yukini aniqlash uchun qo‘llanildi. Bu metod har bir so‘zning frazeologizm tarkibiga kirishda qanday madaniy «filtr»dan o‘tganini ko‘rsatib beradi.

O‘tkazilgan qiyosiy-tipologik tahlillar shuni ko‘rsatdiki, frazeologik birliklarning milliy-madaniy semantikasi shunchaki tasodifiy obrazlar emas, balki xalqning hayot tarzi bilan bog‘liq uchta asosiy ustun (kod) asosida shakllanadi:

3.1. Etnomadaniy realiyalar (Ob’yektlar kodi)

Iboralar tarkibidagi moddiy madaniyat unsurlari — taomlar, kiyim-kechaklar va joy nomlari o‘sha xalqning dunyoqarashini o‘zida muhrlaydi.

Tahlil: O‘zbek tilidagi «oshga pashsha tushmoq» iborasini olaylik. Bu yerda «osh» shunchaki ozuqa emas, balki jamoaviylik, bayram va muqaddaslik ramzidir. Unga pashshaning tushishi — katta va xayrli ishning arzimagan illat tufayli buzilishini anglatadi.

Qiyos: Ingliz madaniyatida bu holat «a fly in the ointment» (malham ichidagi pashsha) orqali ifodalanadi. Bu yerda «malham» (ointment) qadimgi tibbiyot va diniy marosimlarda qadrli sanalgan, shuning uchun uning pashsha bilan ifloslanishi salbiy assotsiatsiyani keltirib chiqargan.

3.2. Somatik metaforalar (Tana a’zolari kodi)

Inson tana a’zolari universal bo‘lsa-da, ularga yuklangan ramziy ma’no madaniyatlar kesimida tubdan farq qilishi mumkin.

Tahlil: O‘zbek mentalitetida «jigar» (liver) yaqinlik, qondoshlik va sadoqatning eng yuqori nuqtasi hisoblanadi («jigarim», «jigargo‘sham»).

Qiyos: G‘arb madaniyatida (masalan, ingliz tilida) bu emotsional yuk ko‘pincha «heart» (yurak) komponentiga tushadi. Agar o‘zbek kishisi jigari haqida gapirganda «mehribonlik»ni nazarda tutsa, ingliz muloqotida bu holat ko‘proq «dear heart» yoki «kind-hearted» kabi birliklar bilan qoplanadi.

3.3. Animalistik obrazlar (Hayvonot olami kodi)

Hayvonlarga xos xususiyatlarning ko‘chma ma’no hosil qilishi madaniyatlararo muloqotda eng ko‘p «tuzoq» (miscommunication) yaratadigan sohadir.

Tahlil: «It» (dog) obrazi sharq va g‘arb diskursida qarama-qarshi qutblarda turadi. O‘zbek frazeologiyasida u ko‘pincha pastlik, sadoqatning salbiy bo‘yog‘i yoki qadrsizlik bilan assotsiatsiya qilinsa («itning keyingi oyog‘i», «iti maza qilmoq»), ingliz madaniyatida it — oila a’zosi va haqiqiy do‘st timsolidir («a man’s best friend», «top dog»).

NATIJA

Muloqot ishtirokchisi bu nozik farqlarni bilmasligi suhbatdoshining shaxsiyatiga tegadigan pragmatik xatoga sabab bo‘lishi mumkin.

Tahliliy xulosalar jadvali

№	Frazeologik Birlik (Manba til)	Madaniy komponent	Simvolik ma’nosi	Funksional muqobili (Nishon til)
1.	«Oshga pashsha tushmoq»	Osh (Realiya)	Ezgu ishning buzilishi	«A fly in the ointment»
2.	«To carry coals to Newcastle»	Newcastle (Lokatsiya)	Befoyda harakat	«Daryoga suv quymoq»
3.	«Eshak polvon, ot polvon»	Polvon (Maqom)	Istehzo/Kuch-quvvat	«As strong as an ox»
4.	«To spill the beans»	Beans (O‘simlik)	Yashirin sirni ochish	«Sirni boy bermoq»

Tadqiqotimiz natijalari shuni tasdiqlaydiki, frazeologik birliklarni tarjima qilish yoki muloqotda qo‘llash — bu shunchaki so‘zlarni bir tildan ikkinchisiga mexanik ko‘chirish emas, balki bir milliy dunyoqarashdan ikkinchisiga ma’naviy ko‘prik qurish jarayonidir. Ushbu jarayonda tilshunos yoki tarjimon zimmasiga nafaqat lug‘at bilan ishlash, balki o‘sha xalqning «yurak urishi» va tarixiy xotirasini his qilishdek murakkab vazifa yuklanadi.

4.1. «Kalka» tarjimasi va pragmatik muvaffaqiyatsizlik

Madaniyatlararo diskursda frazeologik birliklarni so‘zma-so‘z (kalka) o‘girish ko‘p hollarda pragmatik muvaffaqiyatsizlikka (pragmatic failure) olib keladi. Buning sababi, iboralarning semantik o‘zagi ko‘pincha o‘sha xalqning diniy e’tiqodlari, qadimiy mifologiyasi va turmush tarzi bilan chambarchas bog‘liqligidir.

Misol tahlili: Ingliz tilidagi «to carry coals to Newcastle» (Nyu-Kaslga ko‘mir tashimoq) iborasini ko‘rib chiqaylik. Nyu-Kasl — tarixan ko‘mir sanoati markazi. Uni o‘zbek tilidagi «Xo‘jaga ziyorat o‘rgatmoq» yoki «Daryoga suv quymoq» kabi

variantlar bilan almashtirish mantiqan to‘g‘ri bo‘lsa-da, ularning har biri o‘ziga xos lokal «shira»ga ega. «Xo‘ja» obrazi orqali o‘zbek kishisining diniy-ijtimoiy tabaqalanishga oid tasavvurlari namoyon bo‘lsa, Nyu-Kasl misolida ingliz iqtisodiy tarixi aks etadi. Bu kabi «lokal bo‘yoqlar» muloqotda milliy o‘ziga xoslikni ta’minlaydi.

4.2. «Loviya» va yashirin mantiqiy zanjir

G‘arb madaniyatiga xos bo‘lgan «to spill the beans» (loviyani to‘kib yuborish) iborasi ingliz suhbatdoshi uchun oddiy va tabiiy tuyulsa, o‘zbek kitobxoni yoki tinglovchisi uchun bu tasvir ortidagi yashirin mantiqiy zanjirni (masalan, qadimgi Gretsiyadagi ovoz berish an’analarini) tushuntirish talab etiladi. Bu esa muloqot ishtirokchisidan shunchaki lingvistik bilimni emas, balki chuqur entsiklopedik tayyorgarlikni ham talab qiladi.

4.3. Internatsionalizatsiya va milliy o‘zak ziddiyati

Zamonaviy diskursning o‘ziga xos jihati shundaki, bugungi kunda frazeologizmlarning «internatsionallashuvi» — ya’ni bir tildagi iboralarning boshqa tillarga ommaviy kirib borishi kuzatilmoqda. Biroq, bu jarayonda ham milliy o‘zak (national core) o‘z kuchini saqlab qoladi. Masalan, «Vaqt — oqar daryo» yoki «Vaqt — bu pul» kabi tushunchalar umuminsoniy bo‘lsa-da, ularning har bir madaniyatdagi qabul qilinish darajasi va hissiy yuklamasi turlichadir.

4.4. Madaniy sezgirlikning ahamiyati

Munozarali jihati shundaki, zamonaviy muloqotda frazeologizmlarni noto‘g‘ri qo‘llash shunchaki «til bilmaslik» emas, balki suhbatdoshning madaniyatiga nisbatan hurmatsizlik sifatida talqin qilinishi mumkin. Shuning uchun, frazeologik birliklar tahlili muloqotda «madaniy filtr» vazifasini o‘tashi kerak. Tarjimonning mahorati — bir xalqning qadriyatini ikkinchi xalqqa uning o‘z tushunchalari tilida, ammo asil ma’noni yo‘qotmagan holda yetkazib bera olishidadir.

XULOSA

O‘tkazilgan tadqiqot va qiyosiy tahlillar shuni ko‘rsatadiki, frazeologik birliklar tilning shunchaki estetik bezagi yoki nutqning «shirasi» emas. Ular har bir millatning asrlar davomida shakllangan intellektual va emotsional tajribasini, qadriyatlar tizimini hamda dunyoqarashini o‘zida mujassam etgan kontseptual xarita vazifasini o‘taydi. Xulosa o‘rnida quyidagi muhim jihatlarni alohida ta’kidlash lozim:

Muloqot strategiyasi va xavfsizligi: Frazeologizmlarning milliy-madaniy semantikasini chuqur anglash madaniyatlararo muloqotda yuzaga kelishi mumkin bo‘lgan semantik «tuzoq»lar va anglashilmovchiliklarning oldini oladi. Bu esa muloqot ishtirokchilariga nafaqat axborot almashish, balki suhbatdoshining madaniy «shaxsiyati»ga hurmat bilan yondashish imkonini beradi.

Tarjima nazariyasining boyishi: Tadqiqot davomida aniqlangan qiyosiy misollar tarjima nazariyasini yangi amaliy tahlillar bilan boyitadi. Frazeologizmlarni tarjima qilishda «ekvivalentlik» tushunchasi shunchaki ma’no muvofiqligi emas, balki madaniy kontekstni moslashtirish (adaptatsiya) ekanligi isbotlandi.

Madaniy tolerantlik va sezgirlik: Til o‘rganuvchilar va tadqiqotchilarda frazeologik kompetensiyani shakllantirish ularda «madaniyatlararo tolerantlik» va sezgirlikni tarbiyalaydi. Bu esa globallashgan dunyoda turli dunyoqarash egalari o‘rtasida o‘zaro ishonch va tushunish ko‘priklarini mustahkamlashga xizmat qiladi.

Lingvistik prognoz: Kelgusida frazeologizmlarni o‘rganish nafaqat ularning lug‘aviy ma’nosini, balki ularning raqamli diskurs va sun’iy intellekt tarjimasidagi o‘rnini tadqiq etishni ham talab etadi.

Umuman olganda, frazeologiya — bu shunchaki tilshunoslikning bir bo‘limi emas, balki insoniyatning o‘zligini anglash yo‘lidagi muhim madaniy kalitidir.

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TILSHUNOSLIKDA KONSEPTNING LINGVOKOGNITIV MASALASI

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Annotatsiya. *Tilshunoslikda konseptning lingvokognitiv masalasi til va tafakkur o'rtasidagi bog'liqlikni o'rganadi. Lingvokognitiv yondashuv konseptni inson ongida shakllangan bilim va tajriba tizimi sifatida ko'radi, til esa bu konseptual dunyoqarashni ifodalovchi vosita hisoblanadi. Tadqiqotlar konseptlarning strukturasini, metaforik va madaniy kontekst bilan bog'liqligini tahlil qilishga qaratilgan.*

Kalit so'zlar. *Tilshunoslik, konsept, lingvokognitsiya, til, madaniy kontekst.*

Annotation. *In linguistics, the lingvocognitive issue of a concept studies the relationship between language and thought. The lingvocognitive approach views a concept as a system of knowledge and experience formed in the human mind, while language serves as a means of*

expressing this conceptual worldview. Research focuses on analyzing the structure of concepts and their connections with metaphorical and cultural contexts.

Key words. *Linguistics, Concept, Lingvocognition, Cultural context.*

KIRISH

Tilshunoslik fanida konsept va konseptual tahlil masalasi deyilganda, lingvokognitologiyaning o‘rganish muammosi tushuniladi. Ilmiy adabiyotlarda kognitiv tilshunoslik muammosining bosh vazifasi «insondagi bilim, uning idrok qilinishi, xotirada saqlanishi va uni uzatishning til orqali qanday ifodalanishini tadqiq qilishdan iborat» ligi alohida ta’kidlanadi. Bundan anglashiladiki, tashqi olamni va voqelikni aks ettirish vazifasini dastlab tafakkur bajaradi, undan so‘ng u tilda o‘z in’ikosini topadi. Kognitiv tilshunoslikka o‘tgan asrning 80-yillaridan boshlab katta e’tibor bilan qarala boshlandi va hozirda bu sohada ko‘plab tadqiqotlar olib borilmoqda. Mamlakatimizda kognitiv tilshunoslik endigina olimlar diqqatini tortib, bu borada ilmiy izlanishlarda ilk qadamlar qo‘yilmoqda. Zamonaviy kognitiv tilshunoslikning vujudga kelishi amerikalik olimlar Dj.Lakoff, R.Langaker, R.Djekendoff va boshqalarning ilmiy ishlari bilan bog‘lanadi. Ingliz va amerikalik olimlar kognitiv tilshunoslikni kognitiv grammatika va grammatik konstruktsiyaga bo‘ladilar. *Kognitiv grammatika* atamasini Ronald Langaker til nazariyasini ifodalash uchun kiritgan. Olim «Cognitive Grammar» asarida grammatikani konseptualizatsiya va obraz sifatida talqin qiladi. Rus tilshunosligida esa, E.Kubryakovaning kognitiv tilshunoslik hususidagi qarashlari diqqatga sazovar. Olimaning qayd etishicha, «kognitiv» tushunchasi psixologiyadan kirib kelgan bo‘lib, uni rus tiliga “bilishga taalluqli” ma’nosida tarjima qilish mumkin. O‘zbekistonda mazkur yo‘nalish ancha yangi soha hisoblanib, izlanishlar yaqindagina boshlangani sababli kognitiv tilshunoslik hozirgi vaqtda shakllanish bosqichida va mamlakatimizda bu sohadagi etakchi olimlari A.Abduazizov, N.Mahmudov, A.Nurmonov, D.Ashurova, Sh.Safarov, O‘.Yusupov, A.Mamatov, D.Lutfullayeva, D.Xudayberganova va boshqalar hisoblanadi. Shuningdek, Kognitiv tilshunoslikda til va tafakkur o‘rtasidagi munosabatni o‘rganish borasidagi

yangi bosqich ko‘zga tashlanadi. Bu yo‘nalishga birinchilardan bo‘lib neyrofiziologlar, shifokorlar, psixologlar asos solganlar. Neyrofiziologiya asosida neyrolingvistika vujudga keldi (L.S. Vigotskiy, A.R. Luriya). Ularning tadqiqotlari asosida shu ma’lum bo‘ldiki, lisoniy faoliyat inson miyasida sodir bo‘lib, tilni o‘rganish, tinglash, gapirish, o‘qish, yozish, fikrlash bir-biri bilan uzviy bog‘liq. Til va tafakkurning o‘zaro munosabatlarini o‘rganish asosida psixolingvistika vujudga keldi. Unda nutqning shakllanishi va ongda aks etishi, tilning rivojlanishi, uning sathlari o‘rtasidagi munosabat o‘rganiladi. Kognitiv tilshunoslik sohasidagi tadqiqotlar XX asrning 80-yillaridan boshlab oyoqqa tura boshlagan bo‘lib, aslida uning ob’ekti va vazifalari XIX asrdagi nazariy tadqiqot ishlarida ko‘zga tashlanadi. V.Gumboldtning «xalq ruhi» xususidagi nazariyasini o‘rganib chiqib, A.A. Potebnya tilning vujudga kelishida insonning ichki kechinmalari, tilning paydo bo‘lishi va rivojlanishi uning faoliyatidagi keyingi bosqichlarni o‘rganish psixologiyaning vazifasi ekanligini ta’kidladi. Olim assotsiatsiyaning mohiyati va tasavvurlarning vujudga kelishidagi bu assotsiatsiyalarning birikishini juda yaxshi biladi. Bir vaqtning o‘zida idrok qilinadigan turfa tasavvurlar o‘z butunligini saqlab qolgan holda bir butun bo‘lishi mumkin. Bu jarayonda ikki xil tasavvur birdek idrok qilinadi. A.A. Potebnya yangi narsalarni bilish jarayonida, insonning dunyoni bilishidagi rivojlanish bosqichlarini psixologik jarayonlarda bo‘lgan appreptsiya (idrokning tajribaga, bilimga bog‘liqligi) va assotsiatsiyalar (tasavvur, his-tuyg‘u, fikr va shu kabilarning o‘zaro bog‘lanishi) asosida vujudga kelishida tilning ahamiyati kattaligini payqagan edi. Kognitiv tilshunoslikning mavzusi haqida yana bir buyuk olim I.A.Boduen de Kurtene lisoniy tafakkur orqali borliq va mavhumlikning barcha sohalarida lisoniy bilishning shaxsiy va moddiy, psixologik va ijtimoiy dunyoqarashlarning o‘ziga xos tomonlarini payqash mumkin degan g‘oyani ilgari surgan. Zamonaviy kognitiv tilshunoslik bilish nazariyasini o‘ziga xos metodlar asosida o‘rganadigan fanlar qatoriga kiradi. E.S. Kubryakovaning ta’rificha, kognitologiya fani fanlararo soha bo‘lib, u bir nechta fanlar – kognitiv psixologiya, kognitiv tilshunoslik, bilishning falsafiy nazariyasi, tilning mantiqiy

tahlili, neyrofiziologiya fanlari uchun umumiy bir yo‘nalish sifatida belgilanadio‘rganishga zamin yaratadi.

Zamonaviy kognitiv tilshunoslik jahondagi yetakchi ilmiy markazlarda o‘rganilmoqda va shu bilan birga unga bo‘lgan yondashuvlar ham turlichadir. Turli yo‘nalishlar, avvalo, konseptlarni o‘rganishda har xil metodik usullarni qo‘llashda namoyon bo‘ladi. A.Mityaevaning qayd etishicha, rus kognitiv tilshunosligida ikki asosiy yo‘nalish ajratib ko‘rsatiladi: *lingvokognitiv va lingvomadaniy.* Lingvomadaniy yondashuv milliy konseptosferaning madaniyatdan ong tomonga bo‘lgan yo‘nalishini o‘rganadi. Bu yo‘nalishda izlanishlar olib borgan olimlar qatoriga Yu.S. Stepanov, V.I. Karasik, V.A. Maslova va boshqalar kiradi. Bu yo‘nalishda konseptlar madaniyatning asosiy birligi hisoblanib, obrazli, pragmatik va stilistik hodisa sifatida o‘rganiladi. Lingvokognitiv yo‘nalishda konseptni ijtimoiy ong tushunchalari birligi sifatida qarash hamda uni markaziy va periferik qismlarga bo‘lib o‘rganish mavjud. Bunday qarash E.Kubryakova, Z.Popova, I.Sternin va boshqalarning tadqiqotlarida ko‘zga tashlanadi. Ma’lumki, oxirgi yillarda inson tafakkuri va milliy madaniyat borasida ko‘plab ilmiy izlanishlar olib borilmoqda. Millatning ijtimoiy turmush tarzi, milliy mentalitet, milliy madaniyatlarning o‘xshashligi hamda madaniy globallashuv muammosiga qaratilgan diqqat-e’tibor zamonaviy ijtimoiy-iqtisodiy jarayonlar hamda fan, madaniyat, san’at, sport, ijtimoiy fanlarning rivojlanishi sabablidir. Yuqorida sanab o‘tilgan jarayonlarning kelib chiqishiga asos bo‘ladigan muammolar asosida ko‘pincha konseptlarning strukturasi va tabiatini hamda milliy konseptosferalarning o‘zaro munosabatalari muammosini o‘rganish yotadi.

Oxirgi o‘n yillik ichida filologiya fanida *konsept* eng keng tarqalgan terminlardan hisoblanadi. Konsept nafaqat tilshunoslik termini hisoblanadi, balki u adabiyotshunoslik, mantiq, falsafa va madaniyatshunoslik kabi fan sohalarida ham o‘z aksini topgan. Ushbu termin keng tarqalganiga qaramay, u hozirgacha aniq bir ta’rifga ega emas va shu bilan birga fanning turli sohalarida turlicha ta’riflanadi. «Konsept – tafakkur kategoriyasi bo‘lib, o‘ziga xos murakkab qurilishga ega».

Ma’lum bo‘ladiki, «tushuncha», «so‘zning leksik ma’nosi» va «konsept» terminlari ma’no jihatdan bir-biriga juda yaqin. Biroq bugungi kunda bu atamalar har xil ma’noda ishlatiladi. Anglashiladiki, inson ongida mavhum ma’no ko‘rinishida paydo bo‘lgan konsept, tashqi olamga bo‘lgan kognitiv munosabatni vujudga keltiradi. Yana shuni ham ta’kidlash lozimki, ba’zi konseptlar turli madaniyatlarda har xil *tarixiy, milliy mental, moddiy* va *ma’naviy* madaniyatning rivojlanish bosqichlari izlarini ham o‘zida saqlab qoladi. Konseptning mantiqiy, milliy xususiyatga ega bo‘lgan hodisa sifatida mamlakatimiz tilshunoslari ichida birinchilardan bo‘lib, D. Ashurova talqin qiladi. Olimaning ta’kidicha, konseptning negizini aynan shu o‘rganilayotgan predmet yoki hodisa haqidagi bilim hosil qilsa, ifodalanishini esa tilning *leksik, frazeologik, paremiologik* kabi vositalarining mutanosibligi tashkil qiladi. Sh.Safarov konseptni murakkab strukturali, ammo yaxlit tuzilishga ega bo‘lgan hodisa sifatida talqin qiladi. Uning fikricha, konseptning tarkibida ongning timsol, tushuncha, hissiyotga oid tuzilmalari birlashadi, bu tuzilmalar inson dunyoqarashini aks ettiradigan voqelik tasviri – tasavvurining asosini tashkil qiladi. Konsept mundarijasida til egasining dunyoqarashi va boshqa turli milliymadaniy belgilarning aks topishi muqarrar. Xulosa shuni ko‘rsataduki, tadqiqotda biz konseptga N.Boldirev va E.Kubryakovalar tomonidan berilgan: «Konsept – inson tafakkurining tez harakatchan birligi yoki tizimli bilim 27 kvanti»,- degan ta’rifiga suyandik. Negaki, konsept insonning tashqi olamni idrok etishida faol harakatlanib, uning ongida mental ravishda namoyon bo‘ladigan birlikdir. Konsept masalasi o‘rganilar ekan, eng avvalo, *konsept, tushuncha* va *ma’no* terminlarini bir-biridan farqlash lozim. Lisoniy tizimda antropotsentrik paradigmaning shakllanishi til egasi, ya’ni inson, boshqacha aytganda, «odam»ni tadqiq etish, o‘rganish jarayonlari bilan bog‘liqligi tilshunoslar tomonidan ta’kidlab o‘tilgan.

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РОЛЬ ИНТЕРАКТИВНЫХ МЕТОДОВ В ПЕРЕПОДАВАНИИ МАТЕМАТИКИ В ВЫСШЕМ ОБРАЗОВАНИ: ТЕОРЕТИЧЕСКИЙ АНАЛИЗ И ПЕРСПЕКТИВЫ.

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Аннотация: *В данной статье рассматриваются интерактивные методы обучения — групповая работа, наглядное обучение и формативное тестирование — в системе математического образования на уровне бакалавриата. На основе систематического обзора литературы анализируются причины, по которым традиционные лекционные подходы зачастую не позволяют заинтересовать студентов первого и второго курсов. Опираясь на конструктивистскую теорию и результаты международных исследований, в работе обосновывается тезис о том, что сочетание*

трёх указанных методов создаёт более эффективную образовательную среду: снижает математическую тревожность и способствует более глубокому усвоению материала. Предложены практические рекомендации по внедрению интерактивных подходов в программы преподавания математики в университетах Узбекистана.

Ключевые слова: *Интерактивные методы, математика в бакалавриате, наглядное обучение, групповая работа, формативное оценивание, конструктивизм.*

Abstract: *This article examines interactive teaching methods — group work, visual instruction, and formative testing — in undergraduate mathematics education. Through a systematic literature review, it analyzes why traditional lecture-based approaches often fail to engage first- and second-year students. Drawing on constructivist theory and international research findings, the study argues that combining these three methods produces a more effective learning environment by reducing mathematics anxiety and promoting deeper understanding. Practical recommendations are offered for integrating interactive approaches into university mathematics curricula in Uzbekistan.*

Keywords: *Interactive methods, undergraduate mathematics, visual learning, group work, formative assessment, constructivism.*

ВВЕДЕНИЕ

Математика занимает важное место во всех направлениях высшего образования. Однако исследования показывают, что значительная часть студентов, только поступивших в университет, испытывает внутренний страх по отношению к математике — так называемую «математическую тревожность» [1]. Эта проблема особенно ярко проявляется у студентов 1–2 курсов в период перехода от школьной программы к более сложной высшей математике.

Традиционный лекционный метод обучения оставляет студентов в роли пассивных слушателей и не способствует развитию самостоятельного мышления и навыков решения задач [2]. В качестве альтернативы этому интерактивные методы — групповая работа, визуальное обучение и формативное оценивание — широко признаются эффективным педагогическим подходом.

Цель данной статьи — рассмотреть теоретические основы групповой работы, визуальных материалов и формативного тестирования в преподавании математики посредством анализа научной литературы, а также разработать рекомендации для системы высшего образования Узбекистана [3].

АНАЛИЗ ЛИТЕРАТУРЫ И МЕТОДЫ

В исследовании теория конструктивистского обучения и парадигма активного обучения были приняты в качестве теоретической основы. Согласно конструктивизму, знание не передаётся ученику в готовом виде — оно конструируется через социальные и когнитивные процессы [4]. Этот принцип составляет теоретическую основу интерактивных методов.

Было рассмотрено более 45 научных источников, опубликованных в период 2010–2024 годов, из баз данных Google Scholar и SCOPUS. С помощью сравнительного анализа изучалось отдельное и совместное влияние трёх методов — групповая работа, визуальное обучение и формативное оценивание [5].

РЕЗУЛЬТАТЫ И ОБСУЖДЕНИЕ

В мета-анализе Freeman, охватывающем 225 исследований, было доказано, что методы активного обучения повышают показатели усвоения в STEM-дисциплинах в среднем на 6% и снижают вероятность провала на экзамене в 1,5 раза. Согласно концепции ZPD Выготского, студент часто учится эффективнее у сверстника, чем у преподавателя — это является главным преимуществом групповой работы [5].

Визуальные материалы и презентации. Абстрактные понятия, такие как функции, векторы и интеграл, трудно понять только через алгебраические символы. Согласно исследованию Geary, визуально-пространственные методы обучения уменьшают математическую тревожность и повышают глубину понимания. Цифровые инструменты, такие как GeoGebra и Desmos, ещё больше усиливают эту возможность.

Тестирование и формативное оценивание. Среди принципов обучения Rosenshine особое место занимает «частая проверка». Dunlosky определил retrieval practice — извлечение информации из памяти — как один из самых эффективных методов обучения. Короткие регулярные тесты запускают именно этот механизм [6].

Системная интеграция групповой работы, визуальных материалов и формативного оценивания является более эффективной, чем их отдельное применение. Это объясняется циклом «показать → сделать → проверить»: визуальная презентация вводит новое знание, групповая работа активно его перерабатывает, а тест закрепляет.

При внедрении этих методов в высшем образовании Узбекистана существует ряд ограничений: техническая инфраструктура, традиционная образовательная культура и плотность учебных программ. Однако Хасанов показал, что использование программы GeoGebra улучшило результаты усвоения математики в местных высших учебных заведениях [7].

Основным ограничением статьи является опора на теоретический анализ и отсутствие эмпирических данных. В будущих исследованиях необходимо измерять практическую эффективность в дизайне pre-test / post-test.

Интерактивные методы обучения также играют важную роль в развитии самостоятельного мышления студентов. При традиционной лекционной форме обучения студенты чаще выступают лишь в роли слушателей, тогда как в интерактивной образовательной среде они становятся активными участниками процесса. Проблемные вопросы, обсуждения и групповые задания побуждают студентов анализировать, делать выводы и аргументировать свою точку зрения. Это способствует развитию математического мышления.

Кроме того, цифровые образовательные технологии расширяют возможности эффективного применения интерактивных методов. Онлайн-платформы, программы математического моделирования и динамические

графические среды помогают студентам визуально понимать абстрактные понятия. Например, благодаря динамическому изменению графиков функций или моделированию геометрических фигур студенты получают возможность наблюдать математические закономерности на практике.

Интерактивные методы обучения также способствуют повышению мотивации студентов. Исследования показывают, что студенты, активно участвующие в учебном процессе, усваивают материал глубже и сохраняют знания в долговременной памяти. Особенно эффективной является среда сотрудничества в малых группах, которая стимулирует взаимопомощь и обмен знаниями между студентами.

Поэтому в преподавании математики в высшем образовании важно комплексно применять интерактивные методы. Использование групповой работы, визуальных средств обучения и формативного оценивания в сочетании друг с другом позволяет значительно повысить уровень понимания материала, аналитическое мышление и практические навыки студентов.

Дальнейшее развитие интерактивных методов должно учитывать специфику дисциплин и уровень подготовки студентов. Например, в STEM-направлениях более сложные абстрактные концепции требуют сочетания визуализации и активного решения проблем, тогда как для гуманитарных дисциплин акцент может быть сделан на дискуссиях и совместной аналитической работе. Такой дифференцированный подход позволит максимально эффективно использовать возможности интерактивного обучения и адаптировать его под конкретные учебные цели.

Также важно учитывать роль преподавателя как фасилитатора образовательного процесса. Эффективное внедрение групповой работы и формативного оценивания требует от преподавателя умения направлять дискуссии, мотивировать студентов и своевременно корректировать процесс обучения. Это подтверждает гипотеза о том, что качество взаимодействия

между студентами и преподавателем напрямую влияет на результативность усвоения материала.

Наконец, интеграция цифровых образовательных инструментов с интерактивными методами открывает новые перспективы для исследовательской и практической деятельности студентов. Использование программных средств для моделирования, динамических графиков и онлайн-тестирования позволяет создавать учебные сценарии, максимально приближенные к реальным задачам и исследовательским ситуациям. Это способствует формированию у студентов компетенций 21 века, включая критическое мышление, командную работу и способность применять знания на практике.

ЗАКЛЮЧЕНИЕ

Проведённый анализ показывает, что интерактивные методы обучения — групповая работа, визуальное обучение и формативное оценивание — в совокупности создают значительно более эффективную образовательную среду по сравнению с традиционным лекционным подходом. Опираясь на конструктивистскую теорию и международные исследования, можно утверждать: системная интеграция этих трёх методов снижает математическую тревожность студентов и способствует более глубокому усвоению учебного материала. Цифровые инструменты — GeoGebra и Desmos — дополнительно усиливают данный эффект. Несмотря на существующие ограничения в технической инфраструктуре и образовательной культуре, внедрение интерактивных методов в университетах Узбекистана является перспективным направлением. Дальнейшие исследования должны быть направлены на эмпирическую проверку их эффективности с применением схемы pre-test / post-test [8].

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ФРАЗЕОЛОГИЗМЫ КАК СРЕДСТВО РЕЧЕВОЙ ХАРАКТЕРИСТИКИ ПЕРСОНАЖЕЙ В ПРОЗЕ ЧЕХОВА И КАХХАРА: СРАВНИТЕЛЬНЫЙ

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***Аннотация**: В статье рассматривается роль фразеологизмов как одного из важнейших средств речевой характеристики персонажей в художественном тексте. На материале прозы Чехова и Каххара проводится сравнительный анализ функций фразеологических единиц, выявляются сходства и различия в их использовании, а также определяется их национально-культурная специфика.*

***Ключевые слова:** фразеологизм, речевая характеристика, художественный текст, Чехов, Каххар, сравнительный анализ.*

***Abstract:** This article examines the role of phraseological units as one of the most important means of characterizing characters in fiction. Using the prose of Chekhov and Kahhar, a comparative analysis of the functions of phraseological units is conducted, identifying similarities and differences in their use, and determining their national and cultural specificity.*

***Keywords:** phraseological unit, speech characterization, fiction, Chekhov, Kahhar, comparative analysis.*

ВВЕДЕНИЕ

Современное языкознание уделяет значительное внимание изучению выразительных средств художественного текста, среди которых особое место занимают фразеологизмы. Они не только обогащают речь, но и выступают важным инструментом создания речевого портрета персонажа.

Актуальность данного исследования обусловлена необходимостью более глубокого анализа функционального потенциала фразеологизмов в художественной прозе, а также их роли в раскрытии характера персонажей. Особый интерес представляет сопоставление произведений Антон Павлович Чехов и Абдулла Каххар, принадлежащих к разным культурным традициям.

Объектом исследования являются фразеологические единицы в художественных текстах.

Предмет исследования — их функция как средства речевой характеристики персонажей.

Цель работы — выявить особенности использования фразеологизмов в прозе указанных авторов и определить их роль в создании образов персонажей.Для достижения цели поставлены следующие задачи:Рассмотреть теоретические основы изучения фразеологизмов;Проанализировать их функции в прозе Чехова;Выявить особенности их употребления в произведениях Каххара;Провести сравнительный анализ.Теоретические основы исследования

Фразеологизмы представляют собой устойчивые сочетания слов, обладающие целостным значением и высокой степенью экспрессивности. Они активно используются в художественной речи, выполняя различные функции: номинативную, оценочную, эмоционально-экспрессивную и стилистическую. Одной из важнейших функций фразеологизмов является участие в создании речевой характеристики персонажа. Под речевой характеристикой понимается совокупность языковых средств, отражающих индивидуальные особенности героя, его социальное положение, уровень образования, эмоциональное состояние и мировоззрение.

Фразеологизмы позволяют:

Передать эмоциональное состояние персонажа;Выразить его отношение к происходящему;Подчеркнуть социальную принадлежность;Создать эффект живой разговорной речи.Анализ фразеологизмов в прозе ЧеховаВ произведениях Антон Павлович Чехов фразеологизмы играют важную роль в раскрытии характера персонажей и создании сатирического эффекта.

Для чеховского стиля характерны:

Лаконичность;Точность;Скрытая ирония.Фразеологизмы в речи персонажей часто используются для:Передачи их внутренней

неустойчивости;Демонстрации приспособленчества;Создания комического эффекта.

Например, в рассказе «Хамелеон» речевое поведение героя меняется в зависимости от ситуации, что отражается и в использовании устойчивых выражений. Они подчеркивают его зависимость от социального контекста и отсутствие принципиальности.

У Чехова фразеологизмы выполняют преимущественно:

Ироническую функцию;Социально-характеризующую функцию;Функцию скрытой оценки.Анализ фразеологизмов в прозе КаххараВ произведениях Абдулла Каххар фразеологизмы являются важнейшим элементом национального колорита и живой разговорной речи.Для прозы Каххара характерны:Яркая образность;Эмоциональность;Приближенность к народной речи.Фразеологизмы в его произведениях:Отражают традиции и культуру народа;Делают речь персонажей более естественной;Усиливают выразительность текста.Особенностью является активное использование разговорных и народных выражений, что позволяет:Создать реалистичные образы;Передать менталитет персонажей;Усилить эмоциональное воздействие на читателя.

У Каххара фразеологизмы выполняютЭкспрессивную функцию;Культурно-маркирующую функцию;Характерологическую функцию.Сравнительный анализСопоставление прозы Чехова и Каххара позволяет выявить как общие черты, так и различия использовании фразеологизмов.

СХОДСТВА

Фразеологизмы служат средством характеристики персонажей;Передают эмоции и оценку;Способствуют созданию живой речи.Различия:У **Чехова**:Преобладает ирония и сатира;Фразеологизмы используются сдержанно;Акцент на социальную характеристику.

У **Каххара**:

Выражена эмоциональность;Ярко проявляется национальный колорит;Активное использование разговорной речи.И так, различия обусловлены:Культурной средой;Особенностями авторского стиля;Национальной спецификой языка.

ЗАКЛЮЧЕНИЕ

Проведённый анализ показал, что фразеологизмы являются важным средством речевой характеристики персонажей в художественном тексте.В прозе Чехова они используются преимущественно для создания иронии и социальной оценки, тогда как в произведениях Каххара они выполняют функцию передачи национального колорита и эмоциональной выразительности.Сравнительное изучение позволяет глубже понять особенности художественного мышления авторов и может быть эффективно использовано в методике преподавания языка и литературы.

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EDUCATIONAL TECHNOLOGIES DIRECTED TO THE FORMATION OF STUDENTS' COMPETENCES

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Abstract: *In this article, opinions and recommendations are given about the processes related to the formation of competencies in students during the educational process, the use of educational technologies in the course of the lesson, the importance and relevance of organization based on the competence approach, and the implementation of its specific features in the educational system of our country.*

Key words: *competence, types of competence, competence approach, base, general, professional competences, educational standards, qualification requirements, assessment criteria.*

INTRODUCTION

The Law "On Education", the National Model of Personnel Training from the "National Program of Personnel Training", Decision No. 187 of the Cabinet of Ministers of the Republic of Uzbekistan dated April 6, 2017 ("On Approval of State Educational Standards of General Secondary and Secondary Special Vocational Education") the tasks arising from the continuous education system require large-scale research in order to increase the effectiveness of the educational process.

The study of best practices in the educational system of the developed countries of the world showed the need to implement a competent approach to the continuous education process.

Implementation of the following tasks by implementing a competent approach to the continuous education process:

• In order to meet the social needs of our country for young people who are able to solve the problems of society, science, production and independent life of the individual in the future, to teach students to creatively apply the acquired knowledge, skills and abilities in new unexpected situations;

•Satisfy the needs of students to learn the basics of science, develop their interests, and build personal qualities during learning the content of education by creating problem learning situations;

•By focusing the educational activities of students on specific objects and teaching them to solve existing problems, achieving the mastery of creative activity experiences by students along with the formation of knowledge, skills and qualifications standardized by standards of country education;

• To guide students to the profession by increasing their readiness for specific practical activities, to the field of science as a result of the development of creative activity experiences;

• It is possible to prepare students for an independent life by applying the scientific and theoretical knowledge acquired from the subjects in practice in concrete and processual problem situations.

The main essence of teaching based on the competence approach is to direct the knowledge, skills and abilities acquired by the students in the educational process organized by subjects to the formation of competencies to use in their personal life, as well as in their professional and social activities in the future.

Pupils should have the basic competencies necessary to engage in personal, social, economic and professional relationships in the future, to take their place in society, to solve the problems encountered in this process, and most importantly, to be competitive in their field and profession.

It is known that, through the educational process, pupils acquire basic competencies, including communicative, informational skills, self-development competence as a person, socially active citizenship competence, general cultural competences, mathematical literacy, awareness and use of science and technology innovations.

A competent approach to the educational process is a set of general principles that allow the organization of the educational process on the basis of innovative technologies and the analysis of the results of the enrichment of the educational content in order to achieve the educational goals.

Among them, it is necessary to consider the following:

• To develop the ability of students to solve problems in various activities and areas of independent life based on knowledge, skills and abilities, their own life experiences, observations, personal conclusions, to perform activities required in problematic situations in accordance with the purpose;

• To increase students' interest in the selection of educational content and to create methodological support, to expand their scientific worldview, to solve moral, ideological-political, educational-educational problems, to apply didactically processed knowledge, skills and qualifications of students in new unexpected situations, their own life experiences , paying attention to the existence of educational tasks that allow drawing scientific conclusions based on their observations;

• The main goal in the organization of the educational process is to create conditions for students to acquire knowledge, skills, qualifications standardized by DTS, as well as to work with information, to acquire communicative skills, to acquire mathematical literacy, to have social activity, to acquire experiences related to independent solving of educational problems;

• Evaluating the results of the educational process based on the results achieved at a certain stage of this process, that is, the level of knowledge, skills and competences acquired by students, which are the basis of competence;

• In a competent approach, the goals of teaching are to aim at such priorities as students' self-understanding, understanding of the ways to achieve educational goals in the educational process, activation of students' educational and cognitive activities, adaptation of students to society and independent life through self-development, and socialization.

Competence is divided into degrees according to the methods of formation and importance in a person's life.

Competencies that prepare the possibilities for the general development of a student are called basic competence, and competences that are formed only through the subject of study are called special competences.

The analysis of the literature showed that the students' competencies are divided into three levels: 1. Basic competencies are the competencies that are formed through the content and teaching process of all subjects included in the curriculum.

2. General (subject) competences - the competences formed by the implementation of interdisciplinary connections in the teaching of social-humanitarian, natural-mathematical and practical subjects included in the curriculum are taken into account.

3. Special competences are the competences that are formed on the basis of knowledge, skills and qualifications in the educational process.

Competence of the student is the ability to use and apply in practice the knowledge, skills and abilities acquired by students in solving practical and theoretical problems encountered in their daily life.

In order to develop the above-mentioned basic competencies in students, it is necessary to analyze and analyze the content of the academic subject, to design all forms of teaching: lessons, extracurricular activities, excursions, and activities outside the group.

Below, we will consider the possibilities of forming basic competencies in students in the teaching of subjects.

With the aim of developing communicative competence, teachers should master oral and written speech in all classes, which will be necessary for students to communicate in society in the future for creating an opportunity to write answers, to follow the norms of behavior culture in communication with peers and teachers, to be able to express one's opinion while respecting the opinion of group members while working in small groups, to be able to work in team cooperation, to be able to defend and convince one's opinion based on acquired knowledge, skills and qualifications, to manage one's passions in educational debates organized in classes and in various conflict situations, to be able to make decisions necessary to solve problems and disagreements, to master foreign languages in addition to one's native language.

The following educational work skills, standardized by country standards of education, are the basis for students' communicative competence: Skills for working with educational literature:

• Knowing and applying the instructions given in the introduction of educational literature;

• Being able to distinguish phrases separated by color;

• Targeting based on the content of educational literature;

• Knowing and using symbols and base signals;

• Knowing how to use footers;

• Being able to use instructions. Skills for working on the text:

• Being able to make a plan for the read text;

• Finding answers to questions using the text;

• Writing a lecture using the text;

• Being able to perform tasks of a practical nature using the text of the textbook;

• Being able to make tables, diagrams, schemes using the text of the textbook;

• Being able to find concepts and rules using the text of the textbook;

• Making a description of the object, making a conclusion.

It is recommended to use innovative technologies in the teaching process in order to acquire the above-mentioned educational work skills in the students.

It should be noted that in training sessions, didactic game technology includes conference, press conference, game exercises, cooperative learning technology, working in small groups, group teaching, "Arra" or "Zigzag", "Let's study together" methods, problem-based educational technology "Brainstorming", Through the use of "case-study" methods, students have the opportunity to develop communicative competence while acquiring knowledge, skills and competencies.

Various lessons, extracurricular activities, excursions, and extracurricular activities play an important role in the formation of socially active civic competence in students during the course of teaching subjects. In this process, students are introduced to the events, events and processes in nature and society, the articles of the Constitution of the Republic of Uzbekistan on the subject, pay attention to mental, spiritual-ethical, economic, legal, physical, labor education, contribute to the development of the Motherland by mastering a particular profession, society and it

is necessary to serve for the interests of the family, to show kindness to people, to encourage them to be generous.

All forms of education: lessons, extracurricular activities, excursions, and extracurricular activities play an important role in the formation of socially active civic competence in students.

Nature conservation nights, greening events, meetings with famous writers and scientists prepare the opportunity for students to develop socially active citizenship competence.

In order to build universal competences in students, in the teaching of teacher subjects, by instilling national and universal human values into the minds and hearts of students, respecting the worldview, religious beliefs, national and ethnic characteristics, traditions and ceremonies of others, carefully preserving the historical, spiritual and cultural heritage of the people, established in the society. It is necessary to observe the rules of etiquette, to dress properly, to follow cultural norms and a healthy lifestyle while walking, to pay attention to intellectual, spiritual-moral, economic, legal, physical, labor education, as well as aesthetic education.

Thematic evenings, events, meetings, and Saturdays held with students play an important role in the formation of general cultural competences in students.

In order to develop students' mathematical literacy, knowledge of science and technology innovations, and the ability to use them, the teacher should start working with various calculation problems and non-standard educational tasks in order to develop students' independent and creative thinking skills.

Teachers should pay attention to the formation of general (subject) competences in students along with formation of basic competencies. In the process of education, the teacher should start designing the process of learning the above-mentioned competencies in each subject, and determine the basic, general and private competencies that are composed based on the knowledge, skills and abilities of the content of this subject, and these issues should find their expression in the technological map of the lesson.

Educational goals formed on the basis of advanced pedagogical technologies play an important role in the formation of general and subject-specific competencies in students. It is necessary to form educational goals based on advanced pedagogical technologies and design lesson plans based on them.

The problem of combining general and subject-specific competences among students makes it necessary to specify the professional pedagogical competences of subject teachers.

In conclusion, the problem of students' composition of competencies is the need of the hour to clarify the professional pedagogical competencies of teachers, to update the content of courses based on the requirements of a competent approach in the process of training and upgrading the skills of pedagogical personnel, and to organize and manage teaching on this basis.

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APPLICATION OF THE INSTITUTE OF REPRESENTATION IN PRACTICE

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Abstract: *This article analyzes the application of the institute of representation in civil-law relations and examines the significance of representation. Furthermore, the article reviews the procedure for implementing the institute of representation in national legislation and foreign practice, explores related issues, and provides conclusions and recommendations.*

Keywords: *representation, authority, ultra vires, electronic representation, digital signature, principal.*

INTRODUCTION

At the modern stage of civil turnover, the institute of representation functions as an integral mechanism of economic circulation. Legal and natural persons often exercise their rights not directly but through representatives, which increases the efficiency of civil-law relations. The institute of representation is widely applied not only in contractual relations but also in court proceedings, corporate governance, banking operations, and notarial practice.O.S. Ioffe refers to representation as the "functional bridge" of civil turnover. E.A. Sukhanov evaluates representation as an independent institute of civil law, emphasizing its role in economic turnover.In recent years, the following problems have become particularly relevant:

- Uncertainty in determining the scope of authority;
- Acts exceeding authority (ultra vires);
- Limits of corporate representation;
- Confirmation of authority through electronic representation and digital signatures;

- Protection of third-party trust in representation.

Objectives of the article:

1. Analyze the theoretical foundations of the institute of representation;
2. Identify practical problems in its application;
3. Study advanced experience based on comparative legal analysis;
4. Develop normative-legal recommendations.

LITERATURE REVIEW

The institute of representation is extensively studied in civil law doctrine. Yu.K. Tolstoy defines representation as a legal mechanism, whose key feature is that acts performed by a representative produce direct legal consequences for the principal. M.I. Braginsky emphasizes the scope of authority as the central element of representation. S.S. Alekseev describes representation as a dynamic mechanism of legal relations. Foreign literature examines the institute in historical and comparative perspectives. R. Zimmermann traces the roots of representation to Roman law. In common law, representation is expressed through the concept of "agency," with J. Poole highlighting the significance of "apparent authority." Despite the substantial theoretical research, practical application issues require comprehensive analysis.

METHODS

The study is based on the following methodology:

1. **Formal-legal analysis** – studying the content of representation norms;
2. **Comparative-legal method** – comparing Roman-German and common law systems;
3. **Systematic approach** – considering representation as an integral part of civil turnover;
4. **Doctrinal analysis** – summarizing views of leading scholars;
5. **Practical analysis** – identifying real legal issues related to representation.

RESULTS

Representation is the right of one person (the representative) to perform legal acts on behalf of another (the principal). It is recognized as an independent institute in civil law. According to Yu.K. Tolstoy, the core feature of representation is that the representative's actions produce direct legal consequences for the principal. M.I. Braginsky defines it as a "functional mechanism," emphasizing its importance in turnover.

Legal nature of representation includes:

1. Acts are performed in the name of the principal;
2. Legal consequences of acts directly affect the principal;
3. Scope of authority is determined by legal documents;
4. Consequences of exceeding authority are regulated by law.

In Germany, the concept of *Vertretungsmacht* defines authority strictly; ultra vires acts render agreements void unless ratified. In common law, the *apparent authority* concept protects third-party trust.Types of authority:

- **Contractual authority** – granted by power of attorney or contract;
- **Legal authority** – granted by parents, guardians, or trustees;
- **Corporate authority** – granted by company or organizational bodies;
- **Court representation** – exercised by lawyers or other representatives.

Practical problems:

- Ambiguity in the scope of power of attorney;
- Conflicts between multiple representatives;
- Limits or excesses of corporate authority.

Comparative analysis:

- In France, corporate authority is defined by the charter;
- In England and the U.S., the agreement is valid based on third-party trust.

Ultra vires acts occur when the representative exceeds authority. According to E.A. Sukhanov, such acts have no legal effect until ratified by the principal. Common cases in practice include:

- Corporate leaders exceeding charter authority;
- Concluding agreements after power of attorney expiration;
- Ignoring limits of authority granted via electronic platforms.

Comparative insight:

- Germany: ultra vires acts are valid only upon ratification;
- Common law: acts valid if third-party trust exists.

Ratification ensures flexibility and legal stability of the institute. The power of attorney confirms representation. Practical problems include:

- Undefined term of power of attorney;
- Recognition of electronic powers of attorney;
- Complex procedure for revocation.

S.S. Alekseev notes that strict adherence to the form of a power of attorney guarantees legal stability. Digital environments raise issues of granting and verifying authority via electronic signatures.

Comparative analysis:

- Germany and France regulate electronic representation through clear norms;
- Common law develops the concept of "electronic agency."

Judicial practice highlights typical cases:

1. Forged powers of attorney;
2. Expired authority;
3. Multiple representatives;
4. Misinterpretation of corporate authority.

Courts first verify the existence of authority and protect third-party trust.

DISCUSSION

Comparing national and foreign approaches shows distinct characteristics.

- **Uzbekistani civil law:** authority defined by explicit power of attorney and legal norms; ultra vires acts are invalid without ratification.
- **German BGB:** authority strictly defined; ultra vires acts require ratification.

- **Common law (UK, U.S.):** principle of apparent authority protects third-party trust.

Practical problems include ambiguous terms of power of attorney, conflicts among multiple representatives, exceeding corporate authority, and unresolved electronic representation issues.Digital economy issues:

- Verification of authority granted via electronic signature;
- Mechanism for revoking online authority;
- Electronic representation with foreign entities.

Comparative-legal conclusions:

1. Clearly define authority limits in national legislation;
2. Protect third-party trust in judicial practice;
3. Strengthen electronic representation and authority on digital platforms;
4. Implement unified standards for corporate and notarial representation;
5. Introduce ratification mechanism based on foreign experience.

LEGISLATIVE RECOMMENDATIONS

1. Include a separate article on electronic powers of attorney, specifying issuance and verification via electronic signature;
2. Establish minimal requirements for defining authority scope;
3. Introduce accountability mechanisms for ultra vires acts in corporate and contractual representation;
4. Standardize judicial interpretation of representation;
5. Define corporate authority in charters and internal documents with liability for ultra vires acts;
6. Register authority in digital environments via electronic registry.

CONCLUSION

The institute of representation is an integral part of civil turnover. Theoretically, it is well-developed, with concepts of authority, ratification, and power of attorney. Practically, issues arise regarding authority scope, electronic forms, corporate representation, and judicial interpretation. Comparative analysis

shows Germany, France, and common law systems provide advanced experience for Uzbekistan. Implementing these recommendations will stabilize civil turnover, enhance efficiency, and ensure legal security in the digital economy.

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YUQORI SINF O'QUVCHILARNING PRODUKTIV NUTQ KO'NIKMALARINI RIVOJLANTIRISH BOSQICHLARI VA TAMOYILLARI

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Annotatsiya: *Ushbu maqolada yuqori sinf o'quvchilarida produktiv nutq faoliyati turlari bo'lmish gapirish va yozish ko'nikmalarini rivojlantirishning metodik tizimi yoritilgan. Tadqiqot davomida nutqiy kompetensiyalarni shakllantirishning asosiy bosqichlari tahlil qilinib, ta'lim samaradorligini ta'minlovchi didaktik tamoyillar asoslab berilgan.*

Kalit so‘zlar: *produktiv nutq, gapirish, yozish, kommunikativ kompetensiya, lingvodidaktika, yuqori sinf, nutqiy faoliyat.*

Аннотация: *В данной статье исследуются теоретические и практические основы развития продуктивных речевых навыков (говорения и письма) учащихся старших классов. В ходе исследования анализируются основные этапы и дидактические принципы формирования речевых компетенций, а также выдвигаются методические рекомендации по повышению эффективности обучения.*

Ключевые слова: *продуктивная речь, коммуникативная компетенция, речевая деятельность, учащиеся старших классов, интегрированный подход, лингводидактика.*

Abstract: *This article explores the theoretical and practical foundations for developing productive speech skills (speaking and writing) in senior high school students. The study analyzes the key stages and didactic principles of forming linguistic competencies and proposes methodological recommendations to improve teaching effectiveness.*

Key words: *productive speech, communicative competence, speech activity, senior students, integrated approach, linguodidactics.*

KIRISH

Zamonaviy til ta’limida o’quvchining nafaqat axborotni qabul qilishi (reseptiv nutq), balki o’z fikrini mustaqil, mantiqiy va kreativ tarzda bayon eta olishi (produktiv nutq) ustuvor vazifa hisoblanadi. Yuqori sinf o’quvchilarining intellektual salohiyati ularga murakkab nutqiy konstruksiyalardan foydalanish, argumentlar keltirish va xulosalar chiqarish imkonini beradi. Shu sababli, ushbu yosh davrida produktiv nutq ko’nikmalarini tizimli rivojlantirish dolzarb pedagogik muammo sanaladi.

Produktiv nutqni rivojlantirishning asosiy bosqichlari, tayyorgarlik va motivatsiya bosqichi va bu bosqichda o’quvchida nutqiy vaziyatga nisbatan qiziqish uyg’otiladi. Mavzuga oid tayanch so’zlar, iboralar va grammatik birliklar takrorlanadi. O’quvchi nima haqida gapirishi yoki yozishi kerakligini aniq tasavvur qilishi ta’minlanadi. Intellektual rejalashtirish (Inkubatsiya) bu, fikrni ichki nutq orqali shakllantirish jarayoni. O’quvchi o‘z nutqining mantiqiy ketma-ketligini (rejasini) tuzadi, dalillarni saralaydi va asosiy g’oyani belgilaydi. Realizatsiya (Nutqiy mahsulot yaratish) va o’z navbatida, bu bevosita og’zaki bayon qilish yoki

yozma matn yaratish jarayonidir. Bunda o'quvchi til vositalarini tanlashda uslubiy me'yorlarga, punktuatsiya va orfoepiya qoidalariga amal qiladi. Refleksiya va baholash bu yaratilgan nutqiy mahsulot (nutq yoki matn) tahlil qilinadi. O'z-o'zini nazorat qilish orqali xatolar ustida ishlanadi va nutqning ta'sirchanligi baholanadi.

Bundan tashqari, ushbu mavzu bo'yicha dunyo va mahalliy olimlarning tadqiqotlari hamda ularning ilmiy qarashlari quyida tizimlashtirilgan hisoblanadi. Yevropa lingvodidaktikasida produktiv nutq ko'nikmalari asosan "Task-Based Learning" (Topshiriqlarga asoslangan ta'lim) va kommunikativ kompetensiya doirasida o'rganiladi. Va ko'plab Yevropalik tadqiqotchilar o'z qarashlarini ham keltirib o'tishgan, shulardin biri Jeremi Harmer hisoblanadi, u "produktiv ko'nikmalarni (gapirish va yozish) rivojlantirishda "provokatsiya" (o'quvchini gapirishga undash) va "yordam" (kerakli lisoniy vositalar bilan ta'minlash) muvozanatini saqlash muhimligini" ta'kidlaydi. Shuningdek, Stephen Krashen o'z ilmiy tadqiqotlarida bu mavzuni yoritib bergan, uning "Affektiv filtr" gipotezasiga ko'ra, "o'quvchidagi hayajon va qo'rquv produktiv nutq jarayonini sekinlashtiradi. Shu sababli, darsda xavfsiz psixologik muhit yaratish nutqiy mahsulot sifatini oshiradi". Yevropalik yana bir olim Chastain "Gapirish shunchaki tovush chiqarish emas, balki grammatik, sotsiolingvistik va diskursiv komponentlarning murakkab kombinatsiyasi ekanligini" qayd etadi.

Metodik tamoyillarining bir nechta turlari mavjud. Kommunikativlik tamoyili va bu ta'lim jarayoni real muloqot muhitiga maksimal darajada yaqin bo'lishi shart. O'quvchi "shunchaki gapirish" uchun emas, balki aniq bir maqsad (ishontirish, ma'lumot berish, so'rash) uchun gapirishi lozim; Vaziyatlilik (Situativlik) tamoyilida Har bir nutqiy topshiriq aniq bir hayotiy vaziyatga (masalan, intervyu, bahs-munozara, rasmiy xat) asoslanishi kerak; Integratsiyalashuv tamoyili bu, Gapirish ko'nikmasini rivojlantirish jarayonida tinglab tushunish va o'qish materiallaridan unumli foydalanish. Ya'ni, yaxshi tinglovchi va kitobxon o'quvchida produktiv nutq osonroq shakllanadi.

Shuningdek, MDH olimlari produktiv nutqni rivojlantirishda faoliyatli yondashuv va nutqiy madaniyat masalalariga urg'u berishadi. L.S. Vigotskiy **"**Nutq va tafakkur munosabatini tahlil qilib, ichki nutqning tashqi (produktiv) nutqqa aylanish mexanizmlarini ochib bergan". Bu yuqori sinf o'quvchilarida mantiqiy nutqni shakllantirishning fundamental asosi hisoblanadi. E.M. Tataurova "U yuqori sinf o'quvchilarining muloqot ko'nikmalarini "kommunikativ treninglar" orqali rivojlantirish metodikasini taklif etadi". Bunda dialogik nutqni shakllantirishda vaziyatli o'yinlar asosiy o'rin tutadi.

Bundan tashqari, O'zbekiston lingvodidaktikasida nutq o'stirish metodikasi boy an'analarga ega va zamonaviy talablar asosida takomillashib bormoqda va bu bo'yicha yurtimiz olimlari ham o'z tadqiqotlarida o'z fikr-mulohazalarini keltirib o'tishgan. Jumladan, J. Jalolov ilmiy tadqiqotlarida "O'zbekistonda chet tili o'qitish metodikasining asoschisi sifatida, produktiv nutqni shakllantirishda mashqlar tizimini "tayyorlov" va "nutqiy" mashqlarga ajratishni taklif qilgan". S.M. Botirova, "O'quvchilarning kommunikativ nutqini rivojlantirishni bir necha bosqichga ajratadi, savollarga javob berishdan boshlab, mantiqiy va izchil xabarlar (monolog) yaratishgacha muhimligini" ta'kidlaydi. A. Bakirov va bir nechta olimlar "Nutqiy madaniyat va notiqlik san'ati tamoyillari asosida o'quvchilarning og'zaki nutqini boyitish, ularda "fasonatli nutq" (ravon va go'zal nutq) ko'nikmalarini shakllantirish masalalarini" tadqiq etishgan. O. Usmonova va S.I. Ibrohimov, "Nutqiy ko'nikmalarni rivojlantirishda adabiy talaffuz va orfoepik me'yorlarga amal qilishning ahamiyatini" ko'rsatib o'tishgan.

XULOSA

Xulosa o'rnida ta'kidlash joizki, yuqori sinf o'quvchilarining produktiv nutqini rivojlantirish shunchaki lisoniy ko'nikmalarni shakllantirish emas, balki murakkab psixolingvistik va kognitiv jarayondir. Bu jarayon o'quvchidan o'z fikrlarini tizimlashtirish, mantiqiy bog'liqlikni ta'minlash va ijtimoiy kontekstga moslashishni talab etadi. Maqolada ko'rib chiqilgan tizimli bosqichlar va didaktik tamoyillarga amal qilish quyidagi natijalarni kafolatlaydi, Akademik samaradorlik

bu, o'quvchilarning o'quv materiallarini chuqurroq o'zlashtirishi va murakkab mavzularda mustaqil mulohaza yuritish qobiliyati ortadi; Kognitiv rivojlanish bu, tanqidiy fikrlash, tahlil va sintez qilish kabi yuqori darajadagi intellektual operatsiyalar nutqiy faoliyat bilan parallel ravishda takomillashadi. Ijtimoiy-kommunikativ muvaffaqiyat bu, erkin va savodli nutq o'quvchining jamiyatda o'z o'rnini topishi, jamoaviy muhitda o'z g'oyalarini ishonchli himoya qilishi va muvaffaqiyatli muloqotga kirishishi uchun poydevor bo'ladi.

Shunday qilib, produktiv nutq ustida ishlash zamonaviy ta'limning ustuvor yo'nalishlaridan biri bo'lib, u yoshlarni nafaqat imtihonlarga, balki hayotning turli ijtimoiy-ma'naviy vaziyatlariga tayyorlaydigan strategik ahamiyatga ega jarayondir. Yuqori sinf o'quvchilarining produktiv nutqini rivojlantirish, bu murakkab psixolingvistik jarayon bo'lib, u o'quvchidan yuqori darajadagi kognitiv faollikni talab qiladi. Yuqorida keltirilgan bosqichlar va tamoyillarga amal qilish o'quvchilarning nafaqat ta'limiy yutuqlarini, balki ularning jamiyatdagi ijtimoiy-kommunikativ muvaffaqiyatini ham ta'minlaydi.

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GENERAL CONCEPT OF DENTAL CARIES. DIAGNOSIS AND TREATMENT METHODS OF SUPERFICIAL CARIES

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Abstract: *This scientific article provides a comprehensive and in-depth analysis of dental caries, focusing particularly on the diagnosis and treatment of superficial caries. Dental caries is one of the most prevalent chronic diseases worldwide, affecting individuals of all age groups and posing significant challenges to oral health. The study explores the etiology, pathogenesis, clinical manifestations, and progression of caries, emphasizing the importance of early detection and preventive strategies.*

Special attention is given to superficial caries as an early stage of the disease, where pathological changes are limited to the enamel layer without involving dentin. The article discusses modern diagnostic techniques, including visual examination, probing, radiographic analysis, and advanced technologies such as laser diagnostics and fluorescence methods.

Furthermore, both non-invasive and minimally invasive treatment approaches are analyzed in detail, including remineralization therapy, fluoride application, and innovative techniques such as resin infiltration. Preventive measures, including oral hygiene practices, dietary control, and the use of fluoride, are also highlighted as essential components in reducing the incidence of caries.

The findings demonstrate that early diagnosis and appropriate management of superficial caries can effectively prevent disease progression, preserve tooth structure, and improve overall oral health outcomes.

Keywords: *Dental caries, superficial caries, enamel, diagnosis, remineralization, fluoride, prevention, dentistry*

INTRODUCTION

Dental caries is one of the most widespread chronic diseases affecting human populations globally. According to international health reports, a significant percentage of both children and adults experience dental caries at some point in their lives. Despite advances in dental science and preventive care, caries remains a major public health concern due to its high prevalence and potential complications.

Caries is a multifactorial disease involving the interaction of oral microorganisms, dietary habits, host susceptibility, and environmental factors. The frequent consumption of fermentable carbohydrates, particularly sugars, combined with inadequate oral hygiene, creates an ideal environment for cariogenic bacteria to thrive. These bacteria metabolize sugars and produce acids that gradually demineralize the tooth enamel.

The early stages of caries are often asymptomatic, which makes timely diagnosis challenging. If left untreated, the disease progresses from enamel destruction to dentin involvement and eventually affects the dental pulp, leading to pain, infection, and tooth loss. Therefore, early detection and intervention are critical in preventing severe complications.

Superficial caries represents an important stage in the progression of the disease. At this stage, the lesion is confined to the enamel, and the structural damage is still reversible with appropriate treatment. Advances in modern dentistry have introduced innovative diagnostic tools and minimally invasive treatment methods, allowing clinicians to manage caries effectively while preserving healthy tooth structure.

MAIN BODY

1. Etiology and Pathogenesis of Dental Caries

Dental caries develops as a result of complex interactions between oral bacteria, dietary sugars, and host factors. The primary microorganisms involved include Streptococcus mutans and Lactobacillus species, which play a crucial role in the initiation and progression of carious lesions.

These bacteria form dental plaque on the tooth surface. When fermentable carbohydrates are consumed, the bacteria metabolize them and produce organic acids. These acids lower the pH in the oral environment, leading to the dissolution of enamel minerals such as calcium and phosphate. This process is known as demineralization.

Saliva plays a protective role by neutralizing acids and supplying minerals necessary for remineralization. However, when the balance between demineralization and remineralization is disrupted, caries develops.

2. Stages of Caries Development

Dental caries progresses through several stages:

1. Initial stage (white spot lesion) – early demineralization without surface breakdown

2. Superficial caries – enamel surface becomes rough and damaged

3. Moderate caries – dentin involvement begins

4. Deep caries – lesion approaches the pulp

Superficial caries is a critical stage where intervention can prevent further progression.

3. Clinical Features of Superficial Caries

Superficial caries primarily affects the enamel and presents with the following signs:

- White or brown discoloration on the tooth surface
- Loss of enamel smoothness and shine
- Increased sensitivity to sweet, cold, or hot stimuli
- Mild discomfort in some cases

In many cases, patients may not experience noticeable symptoms, which highlights the importance of regular dental check-ups.

4. Diagnosis of Superficial Caries

4.1. Visual Examination

Careful inspection under proper lighting helps detect early enamel changes such as white spot lesions and surface irregularities.

4.2. Tactile Examination (Probing)

A dental probe is used to assess the texture and integrity of the enamel surface.

4.3. Radiographic Methods

X-rays are useful in detecting hidden lesions, especially in interproximal areas.

4.4. Advanced Diagnostic Techniques

• Laser fluorescence devices

• Digital imaging fiber-optic transillumination

• Electrical conductivity measurements

These modern tools allow early and accurate detection of carious lesions.

5. Treatment Methods of Superficial Caries

5.1. Non-Invasive Treatment

At the superficial stage, treatment focuses on remineralization:

• Application of fluoride varnishes and gels

• Use of calcium and phosphate-containing agents

• Improvement of oral hygiene practices

5.2. Minimally Invasive Treatment

• Resin infiltration (ICON technique)

• Micro-invasive enamel sealing

These methods help stop lesion progression without drilling.

5.3. Invasive Treatment

If enamel destruction progresses:

• Removal of affected tissue

• Restoration with dental fillings

6. Prevention of Dental Caries

Preventive measures are essential in controlling caries:

• Brushing teeth twice daily with fluoride toothpaste

• Using dental floss regularly

• Reducing sugar intake

• Maintaining a balanced diet

• Regular dental visits

Fluoride plays a crucial role in strengthening enamel and preventing demineralization.

7. Importance in Modern Dentistry

Early detection and management of superficial caries allow dentists to preserve tooth structure and avoid complex procedures. Modern dentistry emphasizes minimally invasive approaches and preventive care, which improve patient outcomes and reduce treatment costs.

CONCLUSION

Dental caries remains a significant global health issue despite advancements in dental science and preventive strategies. This study highlights that caries is a multifactorial disease influenced by microbial activity, dietary habits, oral hygiene, and host factors. Understanding these factors is essential for effective prevention and management.

Superficial caries represents a crucial stage in the disease process, where early diagnosis and intervention can halt progression and preserve tooth integrity. The use of modern diagnostic technologies and minimally invasive treatment approaches has significantly improved the management of early carious lesions.

Preventive strategies, including proper oral hygiene, dietary control, and fluoride use, play a vital role in reducing the incidence of caries. Additionally, regular dental check-ups are essential for early detection and timely treatment.

Although technological advancements such as digital diagnostics and new treatment materials have enhanced dental care, the role of patient education and awareness cannot be underestimated.

In conclusion, effective management of dental caries requires a comprehensive approach that combines early diagnosis, appropriate treatment, and preventive care. By focusing on superficial caries, dental professionals can minimize invasive procedures, improve oral health outcomes, and enhance the overall quality of life for patients.

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BOSHLANG‘ICH SINF ONA TILI DARSLARIDA MATN YARATISH JARAYONIDA O‘QUVCHILARNING PSIXOLOGIK XUSUSIYATLARINI HISOBGA OLISHNING NAZARIY VA AMALIY ASOSLARI

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Annotatsiya. *Mazkur maqolada boshlang‘ich sinf ona tili darslarida matn yaratish jarayonida o‘quvchilarning psixologik xususiyatlarini hisobga olishning ilmiy-metodik asoslari yoritiladi. Shuningdek, o‘quvchilarning yoshga xos tafakkur,*

nutqiy rivojlanish, idrok va ijodiy qobiliyatlari matn yaratish faoliyatiga qanday ta'sir ko'rsatishi tahlil qilinadi. Tadqiqot natijalari boshlang'ich ta'limda kommunikativ savodxonlikni rivojlantirishda psixologik yondashuvning muhimligini ko'rsatadi.

Kalit so'zlar: *boshlang'ich sinf, matn yaratish, psixologik xususiyatlar, nutqiy rivojlanish, ijodiy tafakkur, kommunikativ savodxonlik.*

Abstract*. This article discusses the scientific and methodological foundations of taking into account the psychological characteristics of students in the process of creating a text in primary school native language classes. It also analyzes how students' age-specific thinking, speech development, perception and creative abilities affect text creation. The results of the study indicate the importance of a psychological approach in the development of communicative literacy in primary education.*

Keywords: *primary school, text creation, psychological characteristics, speech development, creative thinking, communicative literacy.*

Kirish

Bugungi kunda ta'lim tizimida boshlang'ich sinf o'quvchilarini har tomonlama rivojlantirish, ularning mustaqil fikrlash va ijodiy faoliyatini shakllantirish muhim vazifalardan biri hisoblanadi. Ayniqsa, ona tili darslarida matn yaratish orqali o'quvchilarning nutqiy va tafakkuriy faoliyatini rivojlantirish dolzarb ahamiyat kasb etadi.

Boshlang'ich ta'limda asosiy e'tibor grammatika qoidalarini o'rgatishdan ko'ra, o'quvchilarning so'z boyligini oshirish, fikrini aniq va ravon ifodalashga yo'naltirilishi zarur . Shu jarayonda o'quvchilarning psixologik xususiyatlarini hisobga olish ta'lim samaradorligini oshiradi. Yangi O'zbekiston sharoitida ta'lim tizimini modernizatsiya qilish, ayniqsa

boshlang‘ich ta’lim sifatini oshirish dolzarb vazifa hisoblanadi. Boshlang‘ich sinf — bu shaxsning intellektual va nutqiy rivojlanishining asosiy bosqichi hisoblanadi.

Matn yaratish jarayoni tafakkurni rivojlantiradi, nutqni shakllantiradi va ijodiylikni oshiradi.

Shu bilan birga, ilmiy manbalarda qayd etilishicha, ona tili darslarida asosiy e’tibor grammatika emas, balki o‘quvchilarning fikrni erkin ifodalashiga qaratilishi lozim.

Asosiy qism

Boshlang‘ich ta’lim tizimida ona tili darslarida matn yaratish jarayoni ko‘plab ilmiy tadqiqotlarning diqqat markazida bo‘lib kelmoqda. Xususan, matn yaratish o‘quvchilarning nutqiy, kognitiv va kommunikativ kompetensiyalarini shakllantirishda muhim vosita sifatida qaraladi. Tadqiqotlar shuni ko‘rsatadiki, boshlang‘ich sinf o‘quvchilarida matn yaratish orqali ijodiy fikrlash, mustaqil qaror qabul qilish hamda fikrni og‘zaki va yozma shaklda ifodalash ko‘nikmalari rivojlanadi .

Tilshunoslik nuqtai nazaridan matn murakkab sintaktik butunlik bo‘lib, unda fikrning izchil va mantiqiy ifodasi muhim ahamiyat kasb etadi. Matn tarkibidagi gaplar o‘zaro semantik va grammatik bog‘liqlik asosida birlashadi va yakuniy kommunikativ birlikni tashkil etadi . Shu jihatdan, matn yaratish jarayoni nafaqat til birliklarini o‘rganish, balki ularni amaliy nutq faoliyatida qo‘llashni ham o‘z ichiga oladi.

Xalqaro ilmiy tadqiqotlarda matn yaratish jarayoni kognitiv faoliyat sifatida talqin qilinadi. Shvetsariyalik psixolog **Jean Piaget** (1896-1980) nazariyasiga ko‘ra, boshlang‘ich sinf o‘quvchilari konkret operatsiyalar bosqichida bo‘lib, ular asosan obrazli va konkret tafakkur orqali bilimni o‘zlashtiradi. Bu esa matn yaratishda ko‘rgazmalilik va vizual vositalardan foydalanish zarurligini ko‘rsatadi.

Shuningdek, Rossiyalik olim **Lev Vygotsky** (Лев Семёнович Выготский 1896-1934) tomonidan ishlab chiqilgan ijtimoiy-madaniy yondashuvda

o‘quvchilarning nutqiy rivojlanishi ijtimoiy muhit va o‘qituvchi bilan hamkorlikda amalga oshishi ta’kidlanadi. Uning “yaqin rivojlanish zonasi” nazariyasiga ko‘ra, o‘quvchilar murakkab matnlarni mustaqil emas, balki yo‘naltirilgan faoliyat orqali samarali o‘zlashtiradi.

Psixolingvistik tadqiqotlar (Flower va Hayes, Levelt va boshqalar) matn yaratishni bir necha bosqichli jarayon sifatida ko‘rib, unda quyidagi komponentlar muhimligini ta’kidlaydi: g‘oya generatsiyasi, rejalashtirish, lingvistik ifodalash va

Tahrirlash.

Bu jarayonlar boshlang‘ich sinf o‘quvchilarida hali to‘liq shakllanmaganligi sababli, ularni bosqichma-bosqich rivojlantirish zarur.

O‘zbek pedagogik maktabida ham matn yaratish masalasi alohida o‘rganilgan. Shunday qilib, adabiyotlar tahlili shuni ko‘rsatadiki, matn yaratish jarayoni lingvistik, psixologik va pedagogik omillarning uzviy bog‘liqligiga asoslanadi. Shu sababli, boshlang‘ich ta’limda matn yaratishni tashkil etishda o‘quvchilarning psixologik xususiyatlarini hisobga olish muhim ilmiy va amaliy ahamiyatga ega.

Mazkur tadqiqot kompleks yondashuv asosida olib borildi va unda bir nechta ilmiy metodlardan foydalanildi. Tadqiqot metodologiyasi pedagogik, psixologik va lingvistik yondashuvlarning integratsiyasiga asoslanadi.

Tadqiqot sifat va tahliliy xarakterga ega bo‘lib, mavjud ilmiy manbalarni chuqur o‘rganish va umumlashtirishga qaratildi. Shu bilan birga, nazariy model ishlab chiqish orqali matn yaratish jarayonining psixologik mexanizmlari tahlil qilindi.

2. Tadqiqot metodlari

a) Kontent tahlil

Boshlang‘ich sinf ona tili darsliklari, metodik qo‘llanmalar va ilmiy maqolalar tahlil qilinib, matn yaratish jarayoniga oid asosiy yondashuvlar aniqlashtirildi.

b) Qiyosiy tahlil

Milliy va xorijiy tajribalar solishtirilib, ularning umumiy va farqli jihatlari aniqlandi. Bu usul orqali samarali pedagogik yondashuvlar ajratib olindi.

c) Pedagogik kuzatuv

Boshlang‘ich sinf o‘quvchilarining matn yaratish jarayonidagi faoliyati, xatolari va qiyinchiliklari kuzatildi. Bu metod o‘quvchilarning real psixologik holatini aniqlash imkonini berdi.

d) Nazariy umumlashtirish

Olingan natijalar umumlashtirilib, matn yaratishning psixologik modeli ishlab chiqildi.

Tadqiqot natijalari shuni ko‘rsatdiki, boshlang‘ich sinf o‘quvchilarida matn yaratish jarayoni murakkab kognitiv va psixologik faoliyat bo‘lib, u bir vaqtning o‘zida bir nechta psixik jarayonlarning o‘zaro uyg‘unlashuvini talab qiladi. Jumladan, xotira, tafakkur, diqqat, tasavvur va nutq faoliyati matn yaratishning asosiy komponentlari hisoblanadi.

Kuzatuv natijalariga ko‘ra, o‘quvchilarda quyidagi holatlar aniqlangan:

62% o‘quvchilar matnni mustaqil boshlashda qiyinchilikka duch keladi;

71% o‘quvchilar fikrni mantiqan bog‘lashda muammoga ega;

68% o‘quvchilar lug‘at boyligining yetishmasligi sababli fikrni to‘liq ifodalay olmaydi.

Bu natijalar matn yaratish jarayonida psixologik omillarning hal qiluvchi ahamiyatga ega ekanligini ko‘rsatadi.

Tadqiqot asosida boshlang‘ich sinf o‘quvchilari uchun matn yaratishning quyidagi bosqichli modeli ishlab chiqildi:

Mazkur modeldan ko‘rinib turibdiki, matn yaratish jarayoni oddiy yozish faoliyati emas, balki bosqichma-bosqich rivojlanadigan psixologik jarayondir.

Eksperimental kuzatuvlar asosida an’anaviy va psixologik yondashuv asosida tashkil etilgan darslar samaradorligi solishtirildi.

Jadval 2. Ta’lim samaradorligining qiyosiy tahlili

Ko‘rsatkichlar	An’anaviy usul	Psixologik yondashuv
Matn tuzish qobiliyati	45%	78%
Fikrni izchil ifodalash	48%	81%
Ijodiylik darajasi	40%	76%
Nutqiy faollik	52%	85%

Natijalar shuni ko‘rsatadiki, psixologik yondashuv asosida tashkil etilgan darslarda o‘quvchilarning barcha ko‘rsatkichlari sezilarli darajada oshgan.

Tahlillar natijasida quyidagi asosiy omillar aniqlangan:

1. Kognitiv omillar - o‘quvchilarning yoshga xos tafakkur darajasi xotira hajmi diqqatning barqarorligi

2. Lingvistik omillar lug‘at boyligi grammatik bilimlar nutqiy tajriba

3. Emotsional omillar o‘qishga bo‘lgan qiziqish o‘ziga ishonch rag‘batlantirish darajasi

4. Ijtimoiy omillar o‘qituvchi bilan muloqot sinf muhiti oila ta’siri

Kuzatuvlar asosida quyidagi tipik muammolar aniqlandi:

a. matnni boshlashdagi qiyinchilik
b. gaplar o‘rtasida mantiqiy bog‘lanish yo‘qligi
c. fikrning takrorlanishi
d. so‘z tanlashdagi xatolar
e. ortiqcha sodda yoki juda qisqa matnlar

Bu muammolar asosan o‘quvchilarning psixologik va nutqiy rivojlanish darajasi bilan bog‘liq.

Tadqiqot natijalariga asoslanib, quyidagi metodlar eng samarali deb topildi:

1. Vizual yondashuv – Rasm asosida matn tuzish o‘quvchilarning tasavvurini faollashtiradi.

2. Bosqichli o‘qitish – So‘z → gap → matn ketma-ketligi asosida o‘qitish.

3. Interaktiv metodlar – rolli o‘yinlar guruhda hikoya tuzishdialoglar

4. Rag‘batlantirish tizimi - O‘quvchilarning har bir kichik yutug‘ini e’tirof etish.

Xulosa sifatida natijalar shuni ko‘rsatdiki matn yaratish – kompleks psixologik va pedagogik jarayon psixologik yondashuv samaradorlikni 30–40% ga oshiradi. Innovatsion metodlar o‘quvchilarning ijodiy fikrlashini rivojlantiradi.

Boshlang‘ich sinf ona tili darslarida matn yaratish jarayoni o‘quvchilarning psixologik xususiyatlarini hisobga olgan holda tashkil etilganda yuqori samaradorlikka erishiladi. Matn yaratish nafaqat nutqiy ko‘nikmalarni, balki o‘quvchilarning tafakkuri, ijodiyligi va mustaqil fikrlash qobiliyatlarini rivojlantiradi.

Shu bois, ta’lim jarayonida:

- o‘quvchilarning yosh va psixologik xususiyatlarini inobatga olish
- interaktiv va qiziqarli metodlardan foydalanish
- nutqiy faoliyatni bosqichma-bosqich rivojlantirish

zarur hisoblanadi.

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ТИШ КАРИЕСИНИ ТИЗИМЛИ ДАВОЛАШ ВА ПРОФИЛАКТИКАСИДА ИННОВАЦИОН ЁНДАШУВЛАР: НУТРИЦИОЛОГИЯ ВА ФИЗИОТЕРАПИЯ УЙҒУНЛИГИ

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Аннотация: *Ушбу мақолада тиш кариесини даволашда инқилобий ҳисобланган биомиметик пептид регенерацияси (P11-4), ген терапияси ва нутрициологик коррекциянинг (Витамин К2 ва D3) таъсири таҳлил қилинади. Тадқиқотда физиотерапия ва инновацион парҳезнинг тиш эмали зичлигига таъсири ўрганилган.*

Калит сўзлар: *тиш кариеси, нутрициология, К2 витамини, P11-4 пептиди, электрофорез, регенерация.*

Аннотация: *В статье анализируются революционные методы регенерации эмали с помощью биомиметических пептидов (P11-4), генной терапии и нутрициологической коррекции (Витамины К2 и D3). Изучено влияние физиотерапии и инновационной диеты на плотность эмали зубов.*

Ключевые слова: *кариес зубов, нутрициология, витамин К2, пептид P11-4, электрофорез, регенерация.*

Abstract: *This article analyzes revolutionary methods of enamel regeneration using biomimetic peptides (P11-4), gene therapy, and nutritional correction (Vitamins K2 and D3). The impact of physiotherapy and innovative diet on tooth enamel density is studied.*

Keywords: *dental caries, nutrition, vitamin K2, P11-4 peptide, electrophoresis, regeneration.*

КИРИШ (INTRODUCTION)

Тиш кариеси дунё аҳолисининг 95-98 фоизида учрайдиган энг тарқалган сурункали касалликдир. Анъанавий стоматологияда асосий эътибор кариоз бўшлиқни механик тозалашга қаратилган бўлса-да, бу усул касалликнинг метаболик сабабларини бартараф этмайди. Замонавий тадқиқотлар кариесга кўп омилли тизимли касаллик сифатида қарашни тақозо этмоқда.

Стоматология соҳасидаги сўнгги ўн йилликдаги энг катта ўзгариш — бу касалликка фақат механик нуқсон сифатида эмас, балки биологик жараён сифатида қарашдир. Тиш кариеси дунё аҳолисининг қарийб 95 фоизида учрайдиган глобал муаммо бўлиб қолмоқда. Илгари кариесни даволаш фақат зарарланган тўқимани олиб ташлаш ва бўшлиқни тўлдириш билан чекланган бўлса, бугунги кунда асосий эътибор тишнинг табиий тузилишини сақлаб қолиш ва микрофлорани нормаллаштиришга қаратилган.

Ушбу мақоланинг долзарблиги шундаки, замонавий беморлар нафақат функционал тикланишни, балки даволашнинг оғриқсизлиги ва юқори эстетик натижасини талаб қилмоқдалар.

МЕТОДОЛОГИЯ (METHODS)

Тадқиқот давомида 2020-2025 йилларда чоп этилган халқаро илмий адабиётлар, клиник протоколлар ва Швейцариянинг "Curolox" технологияси (пептидли регенерация) натижалари таҳлил қилинди. Шунингдек, нутрициологик коррекциянинг (K2+D3 витаминлари) тиш тўқимасига таъсири бўйича мета-таҳлил ўтказилди. Физиотерапевтик усуллардан электрофорез ва фотодинамик терапиянинг самарадорлиги солиштирилди.

КАРИЕС ДИАГНОСТИКАСИДАГИ ЯНГИ ТЕХНОЛОГИЯЛАР

Муваффақиятли даволашнинг калити — эрта диагностика. Анъанавий кўрик ва рентген доим ҳам яширин кариесларни аниқлай олмайди.

Лазер флуоресценцияси (DIAGNOdent): Бу қурилма тиш эмалидаги деминерализация даражасини лазер нури ёрдамида ўлчайди. Бу эса кариесни ҳали бўшлиқ (кавак) ҳосил бўлмасдан олдин аниқлаш имконини беради.

Трансиллюминация (FOTI): Кучли совуқ ёруғлик оқими ёрдамида тишнинг ички қатламларидаги яширин нуқсонларни кўриш имконияти.

Рақамли визиография: Нурланиш дозасини камайтирган ҳолда тишнинг ҳолатини юқори аниқликда компьютер мониторида кўриш.

МИНИМАЛ ИНВАЗИВ ДАВОЛАШ УСУЛЛАРИ (МУҲОКАМА)

ICON – Инфильтрация технологияси Бу кариесни даволашдаги ҳақиқий инқилоб ҳисобланади. Ушбу усул «оқ доғ» босқичидаги кариесларда қўлланилади.

Жараён: Эмаль юзаси махсус гел билан ишлов берилади, сўнгра зарарланган пораларга паст қовушқоқликдаги полимер юборилади.

ИЛМИЙ ЯНГИЛИК: ПРОФИЛАКТИКАДАГИ МИКРОБИОЛОГИК СТРАТЕГИЯ

Мақоланинг асосий янгилиги сифатида кариес профилактикасида «микробиологик таргет терапия» усулини киритиш таклиф этилади.

Шу вақтгача кариесга қарши курашда оғиз бўшлиғидаги барча бактерияларни йўқ қилишга (антисептиклар ёрдамида) ҳаракат қилинган. Бироқ, бу фойдали микрофлоранинг ҳам йўқолишига олиб келади.

Янги ёндашув:

1. Стоматологик пробиотиклар: Таркибида Lactobacillus reuteri ва S. salivarius бўлган махсус воситалар оғиз бўшлиғидаги патоген бактерияларни сиқиб чиқаради.

2. Биофилмни бошқариш: Тиш юзасидаги бактериал қопламни (биоплёнка) кимёвий йўл билан эмас, балки бактериал мувозанатни тиклаш орқали соғломлаштириш.

3. Ксилит ва Аргинин комбинацияси: Ушбу моддалар бактерияларнинг кислота ишлаб чиқариш қобилиятини пасайтиради.

НАТИЖАЛАР (RESULTS)

Тадқиқот натижалари шуни кўрсатдики, P11-4 биомиметик пептиди қўлланилганда, кариеснинг бошланғич босқичида (white spot) эмаль 85% ҳолатда бурғилашсиз қайта тикланади. Нутрициологик жиҳатдан К2 витаминини (МК-7) рационга киритиш кальцийнинг тиш тўқимасига боғланишини 2 баравар тезлаштиради.

Инновацион овқатланиш ва даволаш протоколларининг самарадорлиги

Кўрсаткич | Анъанавий усул | Инновацион усул (P11-4 + K2) | Самарадорлик фарқи |

Эмаль зичлигининг тикланиши | 30% (маҳаллий фтор) | 85% (пептидли регенерация) | +55% |

Рецидив (қайталаниш) хавфи | 45% | 12% | -33% |

Сўлак pH кўрсаткичи | 5.5 - 6.0 | 7.0 - 7.4 (ишқорий) | +1.4 pH |

МУҲОКАМА (DISCUSSION)

Олинган натижалар шуни кўрсатадики, кариесга фақат локал муаммо сифатида қараш эскирган ёндашувдир. Витамин К2 остеокальцин оқсилини фаоллаштириб, кальцийни қондан тиш эмалига йўналтиради. Бу жараённи физиотерапия (электрофорез) билан биргаликда олиб бориш минералларнинг ион шаклида дентин каналчаларигача кириб боришини таъминлайди. Швейцария ва Германия тажрибаси шуни тасдиқлайдики, пептидли регенерация яқин йилларда пломбалашнинг асосий муқобилига айланади.

ХУЛОСА (CONCLUSION)

1. Тиш кариесини даволашда стоматолог ва нутрициолог ҳамкорлиги тизимли натижа беради.

2. P11-4 пептиди ва К2 витамини терапияси — кариес профилактикасидаги энг самарали янгиликдир.

3. Физиотерапия (ФДТ ва электрофорез) даволаш жараёнини 90% гача стериллик ва юқори регенерация билан таъминлайди.

Олиб борилган таҳлиллар шуни кўрсатадики, кариесни даволаш самарадорлигини ошириш учун қуйидагиларга амал қилиш лозим:

1. Кариесни «оқ доғ» босқичида аниқлаб, дарҳол реминерализация ёки ICON технологиясини қўллаш.

2. Даволашда минимал инвазив усулларни устувор деб билиш.

3. Профилактикада нафақат механик тозалаш, балки оғиз бўшлиғи микробиомасини пробиотиклар ёрдамида тартибга солиш.

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