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DEVELOPMENT POTENTIAL OF THE CONSTRUCTION MATERIALS INDUSTRY IN THE KASHKADARYA REGION (UZBEKISTAN)

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Abstract: This article examines the opportunities for developing construction materials production in the Kashkadarya region through the efficient use of local mineral raw materials and explores mechanisms for improving sectoral efficiency. The study analyzes key factors of regional industrial development using the value chain concept. Special attention is given to global and national trends, particularly the implementation of innovative and green technologies that enhance resource efficiency and economic performance. Based on statistical data, the industrial potential of the region is assessed and structural regional disparities are identified. As a result, practical recommendations are proposed to increase value added, deepen production chains, and strengthen the competitiveness of the construction materials sector. The findings have significant scientific and practical relevance for sustainable regional economic development.

Keywords: construction materials production, local resources, value added, value chain, regional industrial policy, innovation, green technologies, efficiency.

Introduction

The construction materials industry plays a crucial role in economic modernization and infrastructure development. In developing economies, this sector supports urbanization, housing construction, industrial facilities, and transport infrastructure. Its growth stimulates related sectors such as mining, energy, logistics, and manufacturing. The Kashkadarya region, located in southern Uzbekistan, possesses

significant reserves of limestone, gypsum, clay, sand, and gravel. These resources create favorable conditions for the production of cement, bricks, ceramic materials, and concrete products. However, despite this natural endowment, the industry's development remains below its full potential.

The industrial transformation policies implemented by the Government of Uzbekistan emphasize localization, modernization, and value-added production. In this context, assessing the development potential of regional industries becomes strategically important.

Literature Review

Industrial development and efficiency assessment increasingly rely on the concept of value added as a fundamental theoretical and practical framework. In particular, deepening production chains and generating higher value added based on local resources are considered essential conditions for ensuring sustainable regional economic development.

The value chain theory was first scientifically developed by Michael Porter, who proposed analyzing enterprise activities from the perspective of value creation. According to this approach, the product creation process encompasses all stages from raw material processing to the delivery of the final product to the consumer, with value added being generated at each stage. Subsequently, this concept began to be applied at the industry and national economy levels as well.

International organizations, including the Organisation for Economic Co-operation and Development (OECD), promote the Global Value Chains (GVC) approach in assessing industrial development, emphasizing the importance of technology, innovation, and logistics systems within production processes. Under this framework, industry competitiveness is determined not only by resource endowments but also by the efficiency of resource processing, the production of innovative goods,

and export capacity. Value added is defined as the difference between the value of output produced and the value of material inputs and external services consumed during the production process. Its dynamics reflect the contribution of an enterprise or industry to national wealth creation. Academic research identifies key drivers of value-added growth as technological modernization, the implementation of resource-efficient solutions, the strengthening of industrial cooperation, and the improvement of marketing and logistics systems.[1]

Table 1

Factors Affecting the Value-Added Chain

№	Area	Opportunities and Efficiency Enhancement Mechanisms
1	Plant operations	Automation, digital management systems, and resource-efficient technologies contribute to increasing production efficiency and reducing production costs.
2	Energy optimization	Reducing energy consumption, utilizing renewable energy sources, and generating energy from waste make it possible to achieve significant economic and environmental benefits.
3	Logistics	Digitalization of supply chains, optimization of transportation costs, and the establishment of production centers close to local markets create opportunities to increase value added.

The increase in efficiency in these areas provides companies not only with the opportunity to generate value added but also to meet the requirements of sustainable

[1] V. Ivlev, PhD in Technical Sciences; T. Popova, PhD in Economic Sciences // Value Creation Chain

development.

Research on the construction materials industry extensively highlights opportunities to enhance value added through the implementation of "green" technologies, improvement of energy efficiency, and recycling of waste. Within the framework of sustainable industrial development, environmental standards and resource-efficient production models are considered essential components of industry-wide efficiency.

From this perspective, analyzing construction materials production in the Kashkadarya region—based on local mineral and raw material resources—through the lens of the value chain concept, identifying "weak links" in the industry, and developing mechanisms to increase value added represents a pressing scientific task. This study is carried out precisely by relying on these theoretical approaches.

Analysis and Results

In 2024, the global market for construction materials is estimated at approximately USD 1.2 trillion, and it is projected to reach USD 1.8 trillion by 2033, growing at an annual rate of 5.5%. In many countries, demand for construction materials exhibits variable dynamics, with some regions experiencing growth while others see a decline.[2] For example, in Russia, the rate of price increase in the market slowed in 2024: after a 15% rise in 2023, prices increased by only 11% in 2024. This trend is attributed to a reduction in mortgage rates and the contraction of preferential loan programs.[3]

Current global market trends are driving the construction industry toward environmentally sustainable, safe, and energy-efficient technologies. These

[2] https://www.marketresearchintellect.com/ru/product/global-building-materials-market-size-and-forecast/
[3] https://glavportal.com/materials/industriya-strojmaterialov-2025-stagnaciya-ili-stabilnost

transformations are expected to have a significant impact on the future economic and social development of the construction sector.

In Uzbekistan, the construction materials industry has been developing rapidly in recent years. This growth reflects the ongoing reforms and initiatives implemented in the country, aiming to modernize the sector, expand domestic production capacity, and integrate advanced technologies.

In the Kashkadarya region, local mineral and raw material resources hold significant development potential. Expanding production volumes and increasing value added from these resources can contribute substantially to regional economic growth.

In 2024, Uzbekistan's construction materials production showed a notable increase compared to previous years. According to official statistics, by 2024, products in high demand within the construction sector were produced at record levels. For instance, Portland cement reached 16.0 million tons (75% higher than in 2017)[4], ceramic tiles production increased 5.4 times, and construction glass output grew 5.8 times. Overall, from 2017 to 2024, construction materials production in the country grew by approximately 60% compared to previous years.[5]

However, production volumes vary significantly across regions. While some areas have substantial production potential, underutilization of resources negatively impacts regional GDP and overall economic development. In recent years, special attention has been paid to comprehensive regional development, the assessment of existing potential, and the effective implementation of priority directions.

From this perspective, the present study analyzes the construction materials industry in the Kashkadarya region. The aim is to develop scientific and practical

[4] https://review.uz/post/infografika-razvitie-sektora-stroitelnx-materialov-uzbekistana-v-2017-2023
[5] According to analytical calculations

recommendations for increasing value added and fostering industrial development through the efficient use of local resources.

Kashkadarya is rich in natural mineral resources, and according to statistical data, effective utilization of available reserves can support the production of high-value, competitive construction materials. This region plays a key role in enhancing industrial capacity, establishing new production facilities, and meeting both local and national market needs. Furthermore, growth in industrial output stimulates job creation, contributing to social development.

Between 2017 and 2024, one of the primary directions of development in Kashkadarya was the efficient use of natural and economic potential, the creation of favorable living conditions for the population, and the maintenance of regional balance. As a result of reforms and investment activities during this period, the regional economy demonstrated stable growth trends.

In 2024, the Gross Regional Product (GRP) of the Kashkadarya region increased by 1.33 times compared to 2017, accounting for 5.5% of the national GDP. The sectoral structure of GRP comprises 17.1% from industry, 8.0% from construction, 41.6% from services, and 32.7% from agriculture. These indicators demonstrate the significant potential of construction materials production in the region and suggest opportunities to further accelerate industrial development through the efficient utilization of local resources.

From this perspective, expanding construction materials production and increasing value added based on local mineral and raw material reserves, as well as the existing industrial infrastructure, represents a key direction for the sustainable development of the regional economy. This approach not only enables the expansion of industrial capacity but also facilitates the creation of new jobs and meets the needs of both local and national markets.

Mineral and raw material resources in the Kashkadarya region play a crucial role in ensuring sustainable economic growth. These resources form the primary foundation of the regional economy, determining industrial potential, influencing production capacities, regional location advantages, and the efficient use of labor resources.

Regions that establish a strong mineral and raw material base and utilize it effectively gain a competitive advantage over other areas. In Kashkadarya, the extraction and processing of mineral resources are considered one of the priority directions for economic development.Currently, out of 381 deposits of useful minerals related to the construction materials industry in the country, 166 are located in the Kashkadarya region. Of these, 117 deposits are actively utilized, while the remaining reserves are preserved, providing opportunities for future production expansion.

Conclusions and Recommendations

The research results indicate that the Kashkadarya region is one of the areas rich in local mineral and raw material resources. Effective utilization of this potential provides a solid foundation for the development of the construction materials industry. However, at present, a significant portion of raw material reserves remains under-processed, resulting in relatively low value added formation.

It has been identified that, based on the available resources in the region, there are ample opportunities for producing innovative and export-oriented construction materials, including cement, ceramics, lime, bricks, and sand-gravel products. Organizing production through a cluster approach can significantly enhance value added.

In this context, the following scientific and practical recommendations have been developed:

Develop the construction materials industry in specific districts using a cluster approach, establishing a complete value chain from raw materials to finished products.

Reduce production costs and enhance product competitiveness by improving interregional logistics systems.

Implement energy-efficient and "green" technologies, including low-energy cement types, waste recycling, and the use of renewable energy sources.

Expand export geography and increase value added through modern marketing strategies and the development of national brands.

Establish production of innovative materials such as hydro-ceramics, recycled concrete, flexible concrete, and bio-carbon materials.

In conclusion, developing the construction materials industry in the Kashkadarya region based on local resources is of crucial importance for ensuring regional economic growth, creating new jobs, and improving population well-being. A strategic approach based on the value-added chain allows for the full utilization of the region's industrial potential.

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METHODS FOR DEVELOPING MUSICAL AND ARTISTIC TASTE

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Annotation. This thesis examines the issues of forming and developing the musical-artistic taste of students in piano classes at children's music and art schools. Based on the analysis of scientific and theoretical sources, the significance of using innovative pedagogical technologies and interactive methods in the modern educational process is highlighted. The study also identifies problems in transitioning students from mechanical performance to expressive and artistically meaningful interpretation, and proposes effective methods aimed at developing musical thinking, aesthetic outlook, and performance skills.

Keywords: musical education, musical-artistic taste, piano lessons, performance skills, innovative pedagogical technologies, interactive methods, musical thinking.

Introduction. One of the most important tasks of modern education, which is highly relevant today, is the comprehensive development of students as well-rounded and mature individuals. In this process, music education serves as a significant tool, helping to shape the aesthetic and artistic taste of the younger generation and fostering the preservation and appreciation of our national values.

Through musical training, students' musical-artistic taste is formed, and their musical perception and creative thinking are developed. On this subject, the President of Uzbekistan, Shavkat Mirziyoyev, stated: "Art and culture are the heart of the nation and a key factor in the upbringing of the younger generation" [1;277].

A modern educational approach requires that each lesson be conducted using innovative methods, technologies, and interactive approaches. These methods actively engage students in the learning process, moving them from passive participation to active involvement. They develop the ability to think independently, analyze musical works, and critically evaluate pieces based on personal perception.

In particular, piano students who study the works of national composers alongside those of world classical composers gain a broader cultural outlook and a deeper understanding of both global and local aesthetic values. Therefore, the formation of musical-artistic taste demands that teachers apply modern methodological approaches, demonstrate creativity, and always remain open to innovation [2;20].

Literature Review and Methodology. Analysis of scientific and methodological literature on the history of music and music pedagogy shows that musical-artistic taste occupies a central place in musical education. As B. Mustafoyev emphasizes in his book "*Estetik tarbiya"* (Aesthetic Education): "Taste is formed through the means of a person's effective activity" [3;52]. This indicates the necessity of developing musical-artistic taste through music education.

Researchers in music pedagogy, such as A.D. Aleksandrova, V.V. Medushevskiy, G.T. Ilyina, and A.V. Koreneva, highlight the importance of using individualized methods to develop students' musical hearing, rhythmic sense, and creative potential [4;44].

In foreign scientific and pedagogical sources, particular attention is paid to organizing music education based on a differential approach. This approach emphasizes the need to adapt teaching to students' individual psychological characteristics, musical abilities, interests, and creative potential. In particular, studies conducted by Peter Webster and Graham Welch provide scientific evidence that using musical-didactic games, interactive methods, and modern pedagogical technologies effectively develops musical abilities. According to their findings, individualizing the educational process promotes

not only students' performance skills but also the consistent development of their auditory perception, musical understanding, and thinking.

Applying advanced pedagogical technologies in the process of developing musical-artistic taste ensures the depth and stability of students' knowledge. Modern educational tools, innovative methods, and interactive approaches actively engage students in musical activity and expand opportunities to develop independent thinking and aesthetic perspectives. In this regard, scientific and methodological literature created by Uzbek pedagogical scholars also serves as an important theoretical and practical resource. For example, the work of J.G. Yuldoshev and S.A. Usmonov, *Pedagogical Technology Basics*, comprehensively covers the theoretical foundations, methodological principles, and practical mechanisms of technologizing the educational process. Similarly, R.J. Ishmuxammedov's manual *Ways to Improve Educational Effectiveness through Innovative Technologies* systematically presents methods for increasing learning efficiency via innovative approaches. N.N. Azizkhodjayeva, in her work *Pedagogical Technologies and Pedagogical Skills*, focuses on developing teachers' professional competencies and effectively applying technological approaches in teaching [6;6].

Among local scholars, M. Mahkamova, X. Abdunazarov, F. Jo'raev, Q. Mamirov, M. Nabieva, X. Nurmatov, Z. Rahimova, D. Ro'zieva, R. Qodirov, and A. Hasanov have conducted notable research aimed at developing students' creative potential, aesthetic culture, and artistic taste through art-based methods using a competency-based approach [5;96].

These scientific perspectives and methodological recommendations provide a crucial theoretical and methodological foundation for forming students' artistic-aesthetic taste, developing their musical thinking, and enhancing the overall effectiveness of music education.

Analysis and Results. The conducted research shows that most students studying in the piano classes of children's music and art schools perform musical pieces technically correctly but are unable to perceive their content, artistic imagery, or aesthetic value.

In this process, performance is often primarily mechanical, meaning that students focus on playing the notes accurately. However, failure to reveal the musical image, performing in a monotonous and emotionless manner, ignoring dynamic markings, and excessive reliance on technique—combined with prioritizing speed or error-free execution—hinders the development of musical-artistic taste. Unfortunately, this issue is observed not only in piano lessons but also in other performance classes.

To address the objectives of this research and solve these challenges, theoretical and practical-pedagogical methods were introduced in piano lessons to improve the formation and development of students' musical-artistic taste. The methods recommended below help cultivate students' musical-artistic abilities and provide guidance for teachers on how to conduct lessons in children's music and art schools. They are especially valuable for ensuring that students perform pieces in a meaningful and artistically expressive manner, thereby fostering musical thinking, aesthetic taste, and performance skills.

1. Comparative Method–This method involves comparing the student's performance with different interpretations, genres, tempos, and characters of the piece, developing conscious perception and aesthetic evaluation skills. It is particularly effective for advanced students capable of distinguishing genre-specific characteristics.

2. Musical Imagery Method–This approach helps transition from mechanical performance to expressive and meaningful interpretation. Students enrich their imagination by depicting the emotional content of a piece, giving it a title, or expressing it through storytelling or drawing. This method can be widely applied in grades 1–7.

3. Listening and Analysis Method–This method is crucial for developing musical hearing, thinking, and artistic taste. During listening sessions, students analyze and discuss the dynamics, phrasing, tempo, and expressive means of the piece in written form. It is especially effective for middle and advanced grades.

4. Heuristic (Question-and-Answer) Method–This approach encourages independent thinking and guides students toward conscious performance. Teacher-led guiding questions help students understand the character, tempo, and climax of the piece more deeply. This method can be applied across all age groups.

Conclusion. The results of the study indicate that students in piano classes at children's music and art schools often prioritize technical performance, while their skills in revealing the artistic content of a piece, perceiving its musical imagery, and making aesthetic evaluations are insufficiently developed. Mechanical performance and a lack of attention to dynamics and expressive means negatively affect the formation of musical-artistic taste.

In conclusion, the process of developing musical-artistic taste requires a high level of professional skill, innovative approaches, and creativity from the teacher. By organizing the educational process based on modern pedagogical technologies, students not only acquire technical skills but also develop their aesthetic sensibilities, artistic thinking, and conscious attitude toward both national and world musical heritage. As a result, the opportunity to nurture well-rounded individuals who deeply understand and value art is significantly enhanced.

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THE ROLE OF THE TEACHER IN DEVELOPING CHEMISTRY EDUCATION IN GENERAL SECONDARY SCHOOLS

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Abstract. This article discusses the role of the teacher in the development of chemistry education in general secondary schools. The issues of teachers' professional competence, methodological skills, and the use of innovative pedagogical technologies in effective chemistry teaching are analyzed. The paper also highlights important aspects of the pedagogical activity of a modern chemistry teacher and presents a teacher model that contributes to the development of students' scientific thinking and increases their interest in the subject.

Keywords: chemistry education, teacher's role, pedagogical skills, innovative technologies, interactive methods, professional competence, scientific thinking, educational effectiveness.

UMUMIY O‘RTA TA’LIM MAKTABLARIDA KIMYO TA’LIMINI RIVOJLANTIRISHDA O‘QITUVCHINING O‘RNI

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Annotatsiya. Mazkur maqolada umumiy o‘rta ta’lim maktablarida kimyo ta’limini rivojlantirishda o‘qituvchining o‘rni va ahamiyati yoritilgan. Kimyo fanini samarali o‘qitishda o‘qituvchining kasbiy kompetensiyasi, metodik mahorati hamda innovatsion pedagogik texnologiyalardan foydalanish masalalari tahlil qilingan. Shuningdek,

o‘quvchilarning ilmiy tafakkurini rivojlantirish, ularning fanga bo‘lgan qiziqishini oshirishda zamonaviy kimyo o‘qituvchisining modeli va pedagogik faoliyatining muhim jihatlari ko‘rib chiqilgan.

Kalit so‘zlar: kimyo ta’limi, o‘qituvchi roli, pedagogik mahorat, innovatsion texnologiyalar, interfaol metodlar, kasbiy kompetensiya, ilmiy tafakkur, ta’lim samaradorligi.

Аннотация. В данной статье рассматривается роль учителя в развитии химического образования в общеобразовательных школах. Проанализированы вопросы профессиональной компетентности учителя, его методического мастерства и использования инновационных педагогических технологий в эффективном преподавании химии. Также раскрываются важные аспекты педагогической деятельности современного учителя химии и модель учителя, способствующая развитию научного мышления учащихся и повышению их интереса к предмету.

Ключевые слова: химическое образование, роль учителя, педагогическое мастерство, инновационные технологии, интерактивные методы, профессиональная компетентность, научное мышление, эффективность образования.

Kirish. Bugungi kunda ta’lim tizimini modernizatsiya qilish, o‘quv jarayonining samaradorligini oshirish va o‘quvchilarda zamonaviy bilim hamda ko‘nikmalarni shakllantirish dolzarb vazifalardan biri hisoblanadi. Ayniqsa, tabiiy fanlar tarkibiga kiruvchi kimyo fanini o‘qitish jarayonini takomillashtirish umumiy o‘rta ta’lim maktablarida muhim ahamiyat kasb etadi. Kimyo fani o‘quvchilarda tabiat hodisalarini ilmiy asosda tushunish, mantiqiy fikrlash, tajriba o‘tkazish ko‘nikmalarini shakllantirish hamda kundalik hayotda uchraydigan kimyoviy jarayonlarni anglashga yordam beradi.

Shu sababli kimyo ta’limini samarali tashkil etish ta’lim sifatini oshirishning muhim omillaridan biri hisoblanadi.

Kimyo ta’limini rivojlantirish jarayonida o‘qituvchining roli alohida ahamiyatga ega. O‘qituvchi nafaqat bilim beruvchi, balki o‘quvchilarning ilmiy tafakkurini shakllantiruvchi, ularni izlanishga undovchi va mustaqil fikrlashga yo‘naltiruvchi shaxs sifatida namoyon bo‘ladi. Zamonaviy ta’lim jarayonida pedagogdan yuqori kasbiy mahorat, innovatsion pedagogik texnologiyalarni qo‘llash, interfaol metodlardan samarali foydalanish hamda o‘quvchilarning individual xususiyatlarini inobatga olgan holda darsni tashkil etish talab etiladi.

Shuningdek, kimyo fanini o‘qitishda tajribalar, amaliy mashg‘ulotlar, laboratoriya ishlari hamda hayotiy misollardan foydalanish o‘quvchilarning fan bo‘yicha qiziqishini oshirishga xizmat qiladi. Bu jarayonlarning samarali tashkil etilishi ko‘p jihatdan o‘qituvchining metodik tayyorgarligi va ijodkorligiga bog‘liqdir. Shu bois umumiy o‘rta ta’lim maktablarida kimyo ta’limini rivojlantirishda o‘qituvchining kasbiy kompetensiyasi, metodik yondashuvi va pedagogik faoliyati muhim omil sifatida qaraladi.

Asosiy qism. Umumiy o‘rta ta’lim maktablarida kimyo ta’limining samaradorligi ko‘p jihatdan o‘qituvchining kasbiy mahorati, pedagogik yondashuvi va innovatsion metodlarni qo‘llash darajasiga bog‘liqdir. Kimyo fanini o‘qitish jarayonida o‘qituvchi nafaqat bilim beruvchi, balki o‘quvchilarda ilmiy dunyoqarashni shakllantiruvchi, ularni mustaqil fikrlashga undovchi va izlanishga yo‘naltiruvchi yetakchi shaxs hisoblanadi. Shu bois zamonaviy kimyo o‘qituvchisi o‘z faoliyatida ilmiylik, tizimlilik, amaliy yo‘naltirilganlik va innovatsionlik tamoyillariga tayangan holda ish olib borishi zarur.

Zamonaviy kimyo o‘qituvchisining modeli bir nechta muhim komponentlardan iborat bo‘lib, ular pedagogik faoliyatning samarali tashkil etilishida muhim o‘rin tutadi.

Avvalo, o‘qituvchi chuqur fan bilimiga ega bo‘lishi kerak. Kimyo fanining nazariy asoslarini mukammal bilish, yangi ilmiy yutuqlar bilan muntazam tanishib borish va ularni dars jarayoniga tatbiq etish o‘qituvchining kasbiy kompetensiyasini belgilaydi. Bunday o‘qituvchi o‘quvchilarga murakkab kimyoviy jarayonlarni sodda va tushunarli tarzda yetkazib bera oladi hamda ularni amaliy misollar orqali izohlashga intiladi.

Ikkinchi muhim jihat – metodik mahoratdir. Zamonaviy kimyo o‘qituvchisi dars jarayonida turli pedagogik texnologiyalar, interfaol metodlar, muammoli ta’lim, loyihaviy faoliyat va tajribaviy mashg‘ulotlardan samarali foydalanishi zarur. Masalan, guruhli ishlash, muammoli savollar, tajribalar asosida o‘qitish yoki kichik ilmiy loyihalar tashkil etish o‘quvchilarning fanga bo‘lgan qiziqishini oshiradi va ularning mantiqiy hamda tanqidiy fikrlash ko‘nikmalarini rivojlantiradi. Bu jarayonda o‘qituvchi tashkilotchi, yo‘naltiruvchi va maslahat beruvchi rolini bajaradi. (1-rasm)

Shuningdek, kimyo o‘qituvchisining modeli pedagogik kommunikativlik bilan ham tavsiflanadi. O‘qituvchi o‘quvchilar bilan samarali muloqot o‘rnatishi, ularning qiziqishlari va individual xususiyatlarini hisobga olishi hamda ijobiy psixologik muhit yaratishi lozim. Bunday muhit o‘quvchilarning dars jarayonida faol ishtirok etishiga, o‘z fikrini erkin bayon qilishiga va yangi bilimlarni oson o‘zlashtirishiga yordam beradi.

1-rasm. O‘qituvchining modeli

Bundan tashqari, zamonaviy kimyo o‘qituvchisi axborot-kommunikatsiya texnologiyalaridan samarali foydalana olishi kerak. Multimediali taqdimotlar, virtual laboratoriyalar, interaktiv platformalar va elektron ta’lim resurslaridan foydalanish o‘quv jarayonini yanada qiziqarli va samarali qiladi. Bu esa o‘quvchilarning kimyo faniga bo‘lgan qiziqishini oshirish bilan birga, ularning ilmiy tafakkurini rivojlantirishga xizmat qiladi.

Shunday qilib, umumiy o‘rta ta’lim maktablarida kimyo ta’limini rivojlantirishda o‘qituvchi markaziy o‘rin egallaydi. Uning yuqori kasbiy tayyorgarligi, metodik mahorati, innovatsion yondashuvi hamda o‘quvchilar bilan samarali hamkorligi ta’lim jarayonining sifatini oshirishga xizmat qiladi. Zamonaviy kimyo o‘qituvchisi – bu bilim beruvchi pedagoggina emas, balki tadqiqotchi, tashkilotchi va motivator sifatida o‘quvchilarning ilmiy salohiyatini rivojlantiruvchi muhim shaxsdir.

Tavsiyalar

Kimyo o‘qituvchilarining kasbiy kompetensiyasini muntazam oshirib borish zarur. Buning uchun malaka oshirish kurslari, seminar-treninglar va ilmiy-amaliy konferensiyalarda faol ishtirok etish o‘qituvchilarning metodik mahoratini rivojlantirishga xizmat qiladi.

Dars jarayonida interfaol metodlar va innovatsion pedagogik texnologiyalardan keng foydalanish tavsiya etiladi. Muammoli ta’lim, guruhli ishlash, loyihaviy faoliyat va tajribalar asosida o‘qitish o‘quvchilarning kimyo faniga qiziqishini oshiradi hamda ularning mustaqil fikrlashini rivojlantiradi.

Laboratoriya mashg‘ulotlari va amaliy tajribalarni ko‘proq tashkil etish kimyo fanining mazmunini chuqurroq o‘zlashtirishga yordam beradi. O‘quvchilar nazariy bilimlarini amaliy jarayonlar bilan bog‘lagan holda mustahkamlash imkoniyatiga ega bo‘ladilar.

Axborot-kommunikatsiya texnologiyalaridan samarali foydalanish muhim ahamiyatga ega. Multimediali taqdimotlar, virtual laboratoriyalar, interaktiv platformalar hamda elektron ta’lim resurslari dars jarayonini yanada samarali va qiziqarli tashkil etishga yordam beradi.

O‘quvchilarda ilmiy-tadqiqot ko‘nikmalarini shakllantirish maqsadida kichik ilmiy loyihalar, tajriba ishlari va fan to‘garaklarini tashkil etish tavsiya etiladi. Bu jarayon o‘quvchilarning ijodiy fikrlashini rivojlantiradi va ularni ilmiy izlanishga undaydi.

O‘qituvchi va o‘quvchi o‘rtasida ijobiy pedagogik muhitni shakllantirish ta’lim samaradorligini oshiradi. O‘qituvchi o‘quvchilarning individual qobiliyatlarini hisobga olgan holda ularni qo‘llab-quvvatlashi va rag‘batlantirishi zarur.

Kimyo ta’limini hayot bilan bog‘lab o‘qitish muhimdir. Kundalik hayotda uchraydigan kimyoviy jarayonlar, ekologik muammolar va ishlab chiqarish bilan bog‘liq misollar orqali o‘quvchilarda fanga nisbatan qiziqish va amaliy tushunchalar shakllantiriladi.

Ushbu tavsiyalar umumiy o‘rta ta’lim maktablarida kimyo ta’limining samaradorligini oshirishga hamda o‘qituvchining pedagogik faoliyatini yanada takomillashtirishga xizmat qiladi.

Xulosa. Umumiy o‘rta ta’lim maktablarida kimyo ta’limini rivojlantirish ta’lim tizimining muhim yo‘nalishlaridan biri hisoblanadi. Kimyo fani o‘quvchilarda ilmiy dunyoqarashni shakllantirish, tabiat hodisalarini tushunish hamda mantiqiy fikrlash ko‘nikmalarini rivojlantirishda muhim ahamiyat kasb etadi. Shu sababli kimyo fanini samarali o‘qitish ta’lim sifatini oshirishning muhim omili sifatida qaraladi.

Mazkur jarayonda o‘qituvchi asosiy va yetakchi rolni bajaradi. O‘qituvchining chuqur fan bilimiga ega bo‘lishi, metodik mahorati, innovatsion yondashuvi hamda o‘quvchilar bilan samarali muloqot o‘rnata olishi kimyo ta’limining samaradorligini belgilaydi. Zamonaviy kimyo o‘qituvchisi nafaqat bilim beruvchi pedagog, balki o‘quvchilarni izlanishga undovchi, ularning ijodiy va tanqidiy fikrlashini rivojlantiruvchi shaxs sifatida namoyon bo‘ladi.

Shuningdek, dars jarayonida interfaol metodlar, tajribaviy mashg‘ulotlar va axborot-kommunikatsiya texnologiyalaridan samarali foydalanish o‘quvchilarning kimyo faniga bo‘lgan qiziqishini oshirishga xizmat qiladi. Bu esa o‘quvchilarning nazariy bilimlarini amaliy ko‘nikmalar bilan mustahkamlash imkonini yaratadi.

Shunday qilib, umumiy o‘rta ta’lim maktablarida kimyo ta’limini rivojlantirish ko‘p jihatdan o‘qituvchining kasbiy kompetensiyasi, ijodkorligi va pedagogik faoliyatiga bog‘liqdir. Zamonaviy talablarga javob beradigan, innovatsion fikrlaydigan va

o‘quvchilarni ilmiy izlanishga yo‘naltira oladigan o‘qituvchi kimyo ta’limining sifatini oshirishda muhim omil hisoblanadi.

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PEDAGOGICAL BASIS OF DEVELOPING COMMUNICATION SKILLS IN PRIMARY STUDENTS

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Abstract - this article discusses the theoretical and practical foundations of developing communication skills in primary school students. The role of communication in personal development, the factors of forming communicative competence, effective methods used in the lesson process, and the importance of teacher-parent cooperation are analyzed. The research used pedagogical observation, analysis, and generalization methods. The results show that interactive methods, game technologies, and a positive psychological environment are important factors in developing communication skills.

Keywords: primary education, communication, communicative competence, speech development, interactive method, pedagogical approach, socialization.

BOSHLANG'ICH SINF O'QUVCHILARIDA MULOQOT KO'NIKMALARINI RIVOJLANTIRISHNING PEDAGOGIK ASOSLARI

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Annotatsiya- ushbu maqolada boshlang'ich sinf o'quvchilarida muloqot ko'nikmalarini rivojlantirishning nazariy va amaliy asoslari yoritilgan. Muloqotning shaxs kamolotidagi o'rni, kommunikativ kompetensiyasini shakllantirish omillari, dars

jarayonida qo'llaniladigan samarali metodlar hamda o'qituvchi va ota-ona hamkorligining ahamiyati tahlil qilinadi. Tadqiqot davomida pedagogik kuzatish, tahlil va umumlashtirish usullaridan foydalanildi. Natijalar shuni ko'rsatadiki, interaktiv metodlar, o'yin texnologiyalari va ijobiy psixologik muhit muloqot ko'nikmalarini rivojlantirishda muhim omil hisoblanadi.

Kalit so'zlar: boshlang'ich ta'lim, muloqot, kommunikativ kompetensiya, nutq rivoji, interaktiv metod, pedagogik yondashuv, ijtimoiylashuv.

Аннотация – в данной статье рассматриваются теоретические и практические основы развития коммуникативных навыков у учащихся начальной школы. Анализируется роль коммуникации в личностном развитии, факторы формирования коммуникативной компетентности, эффективные методы, используемые в учебном процессе, и важность сотрудничества учителя и родителей. В исследовании использованы методы педагогического наблюдения, анализа и обобщения. Результаты показывают, что интерактивные методы, игровые технологии и позитивная психологическая среда являются важными факторами развития коммуникативных навыков.

Ключевые слова: начальное образование, коммуникация, коммуникативная компетентность, развитие речи, интерактивный метод, педагогический подход, социализация.

Boshlng'ich ta'lim tizimi bolaning shaxs sifatida shakllanishida poydevor vazifasini bajaradi. Aynan ushbu bosqichda o'quvchilarning nutqi, tafakkuri, ijtimoiy faolligi va muloqot madaniyati shakllanadi. Muloqot ko'nikmalari ta'lim jarayonining ajralmas qismi bo'lib, o'quvchilarning bilimni o'zlashtirishi, fikr almashishi va jamoada ishlashni ta'minlaydi. O'zbekiston Respublikasining " Ta'lim to'g'risida"gi Qonuni hamda davlat ta'lim standartlarida o'quvchilarning kommunikativ kompetensiyasini rivojlantirish ustuvor vazifa sifatida belgilangan. Zamonaviy ta'lim kompetensiyaviy

yondashuvga asoslanib, o'quvchilarning mustaqil fikrlashi, o'z nuqtai nazarini asoslay olishi va ijtimoiy faol bo'lishini talab etadi. Shu nuqtai nazardan, boshlang'ich sinf o'quvchilarida muloqot ko'nikmalarini rivojlantirish dolzarb pedagogik muammo hisoblanadi.

Muloqot ko'nikmalarining nazariy asoslari - pedagogika va psixologiya fanlarida muloqot shaxslararo munosabatlarning muhim shakli sifatida talqin etiladi. Boshlang'ich yosh davrida bola atrof - muhitni asosan nutq va muloqot orqali anglaydi. Nutq rivoji tafakkur rivoji bilan uzviy bog'liq bo'lib, bola o'z fikrini ifodalash orqali fikrlash jarayonini takomillashtiradi. Kommunikativ kompetensiya quyidagi tarkibiy qismlardan iborat: og'zaki va yozma nutq ravonligi, tinglash va tushunish qobiliyati, savol berish va javob qaytarish madaniyati, o'z fikrini dalillar asosida ifodalash, jamoada ishlash va hamkorlik qilish ko'nikmalari. Boshlang'ich sinf ushbu ko'nikmalarni shakllantirish bosqichma-bosqich amalga oshiriladi. Avvalo, o'quvchilarni erkin fikr bildirishga o'rgatish, keyinchalik esa fikrni asoslash va muloqot jarayonida madaniyatli muomala qilish ko'nikmasini mustahkamlash muhimdir.

Muloqot ko'nikmalari rivojlangan o'quvchilar dars jarayonida faol bo'ladi, o'z fikrini mustaqil bayon qiladi va bilimni chuqurroq o'zlashtiradi. Bunday o'quvchilar jamoada ishlashga moyil bo'lib tengdoshlari bilan hamkorlikda faoliyat yuritadi. Aksincha, muloqot ko'nikmalari sust rivojlangan bolalarda tortinchoqlik, o'ziga ishonchsizlik, nutqiy qiyinchiliklar kuzatiladi. Bu holat ularning o'quv faoliyatiga salbiy ta'sir ko'rsatishi mumkin. Shu bois boshlang'ich ta'lim jarayonida har bir o'quvchining muloqot faolligini oshirish pedagogning muhim vazifasidir.

Dars jarayonida muloqotni rivojlantirish metodlari- boshlang'ich sinflarda muloqotni rivojlantirish uchun samarali pedagogik metodlardan foydalanish zarur. Interaktiv metodlar o'quvchilarning faolligini oshiradi va ularni mustaqil fikrlashga undaydi. Savol-javob usuli o'quvchilarni o'z fikrini ifodalashga o'rgatadi. Kichik

guruhlarda ishlash esa hamkorlik va o'zaro muloqotni rivojlantiradi. Rolli o'yinlar orqali bolalar turli hayotiy vaziyatlarni tasavvur qilib, erkin nutq so'zlashga odatlanadi.

Didaktik o'yinlar boshlang'ich yoshdagi bolalar uchun ayniqsa samarali hisoblanadi. Chunki bu yoshda o'yin faoliyati yetakchi o'rinni egallaydi. O'yin jarayonida o'quvchilar tabiiy ravishda muloqotga kirishadi va nutqiy faollik namoyon etadi. Badiiy matnlar bilan ishlash ham muhim ahamiyatga ega. Matn yuzasidan savol-javoblar, voqealarni tahlil qilish, qahramonlarga tavsif berish o'quvchilarning fikrlash va muloqot qobiliyatini rivojlantiradi. Axborot-kommunikatsiya texnologiyalaridan foydalanish ham o'quvchilarning tinglab tushunish va fikr bildirish ko'nikmalarini mustahkamlaydi. Multimedia vositalari orqali tashkil etilgan mashg'ulotlar bolalarda qiziqish uyg'otadi va muloqot jarayonini jonlantiradi. O'qituvchi va ota - onaning hamkorligi. Muloqot ko'nikmalari faqat maktabda emas, balki oilada ham shakllanadi. Ota-onalar farzandlari bilan muntazam suhbat qurishi, ularning fikrini tinglashi va mustaqil fikr bildirishiga imkon yaratishi lozim. Uy sharoitida kitob o'qish, voqealarni muhokama qilish va erkin suhbat tashkil etish nutq rivojiga ijobiy ta'sir ko'rsatadi.

O'qituvchi esa dars jarayonida ijobiy psixologik muhit yaratishi zarur. Har bir o'quvchining fikri qadrlanishi, xatolar esa to'g'ri yo'l bilan tushuntirilishi kerak. Rag'batlantirish va qo'llab-quvvatlash o'quvchilarning o'ziga ishonchini oshiradi. Muammolar va yechimlar- amaliyotda quyidagi muammolar uchrashi mumkin: o'quvchilarning tortinchoqligi, lug'at boyligining kamligi, oilada muloqotning yetarli emasligi va darsda bir tomonlama o'qituvchi nutqining ustunligi. Ushbu muammolarni bartaraf etish uchun interaktiv metodlardan keng foydalanish, kichik guruhlar bilan ishlash, o'yin elementlarini joriy etish hamda ijobiy psixologik muhit yaratish zarur.

Baholash va rag'batlantirish- muloqot ko'nikmalarini shakllantirish jarayonida baholash tizimi ham muhim ahamiyatga ega. O'quvchilarning faolligi, qatnashishi va fikr bildirish darajasi baholanishi kerak. Biroq bu baholash tanqidiy emas,

rag'batlantiruvchi bo'lishi lozim. Masalan, " Bugun sen yaxshi fikr bildirding" yoki Ajoyib savol berding " kabi ijobiy fikrlar bolalarda ishonch hissini oshiradi.

Xulosa: Boshlang'ich sinf o'quvchilarida muloqot ko'nikmalarini rivojlantirish nafaqat dars jarayonining muhim qismi, balki shaxsiy va ijtimoiy rivojlanishning muhim omilidir. Nutq, tinglash, fikr bildirish, hamkorlik qilish va ijodiy faoliyat orqali o'quvchilar ijtimoiy moslashuvga ega, mustaqil va o'z fikrini erkin ifoda eta oladigan shaxs sifatida tarbiyalanadi. Pedagogik jarayonda interaktiv metodlar, o'yin texnologiyalari, ijodiy mashqlar va ijobiy rag'batlantirish tizimi samarali vositalar sifatida xizmat qiladi. Shu bilan birga, ota-ona va o'qituvchi hamkorligi muloqot ko'nikmalarini shakllantirish jarayonini yanada kuchaytiradi.

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MECHANISM OF GRAIN BOUNDARY SLIDING IN SUPERPLASTIC DEFORMATION

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Annotation. This article analyzes the mechanism of grain boundary sliding that occurs during deformation under superplastic conditions. The study explains scientifically how the movement along grain boundaries affects the general deformation properties of the material. The importance of interaction between grains under conditions of high temperature and low deformation rate is also considered. The effect of the grain boundary sliding process on the strength and plastic properties of the material is evaluated from theoretical and practical perspectives. As a result, the important role of the grain boundary mechanism in the process of superplastic deformation is substantiated.

Keywords: superplasticity, deformation, grain boundary, sliding, mechanism, material strength, high temperature, deformation rate, microstructure, interaction.

Annotatsiya. Ushbu maqolada o‘ta plastiklik sharoitida yuzaga keladigan deformatsiya jarayonida donalar chegarasida sodir bo‘ladigan sirpanish mexanizmi tahlil qilinadi. Tadqiqotda donalar chegarasi bo‘ylab siljish materialning umumiy deformatsiya xususiyatlariga qanday ta’sir ko‘rsatishi ilmiy jihatdan yoritilgan. Shuningdek, yuqori harorat va kichik deformatsiya tezligi sharoitida donalararo o‘zaro

ta’sirning ahamiyati ko‘rib chiqiladi. Donalar chegarasida praskalzyvaniye jarayonining material mustahkamligi va plastiklik xossalariga ta’siri nazariy hamda amaliy jihatdan baholanadi. Natijada, o‘ta plastiklik deformatsiya jarayonida donalar chegarasi mexanizmining muhim o‘rni mavjudligi asoslab beriladi.

Tayanch so‘zlar: o‘ta plastiklik, deformatsiya, donalar chegarasi, praskalzyvaniye, mexanizm, material mustahkamligi, yuqori harorat, deformatsiya tezligi, mikrostruktura, sirpanish.

Аннотация. В данной статье анализируется механизм проскальзывания по границам зерен, возникающий в процессе деформации при условиях сверхпластичности. В исследовании научно раскрывается влияние перемещения вдоль границ зерен на общие деформационные свойства материала. Также рассматривается значение взаимодействия между зернами при высоких температурах и малых скоростях деформации. Оценивается влияние процесса проскальзывания по границам зерен на прочность и пластические свойства материала с теоретической и практической точек зрения. В результате обосновывается важная роль механизма границ зерен в процессе сверхпластической деформации.

Ключевые слова: сверхпластичность, деформация, границы зерен, проскальзывание, механизм, прочность материала, высокая температура, скорость деформации, микроструктура, взаимодействие.

The characteristics of the GPR have been studied in many materials, but they are most clearly evident in model superplastic alloys deformed at low temperatures and not highly susceptible to oxidation. As a result of deformation, the GPR manifests itself in the spatial displacement of scratches and the appearance of steps on the surface of specimens polished before testing (Fig. 1).

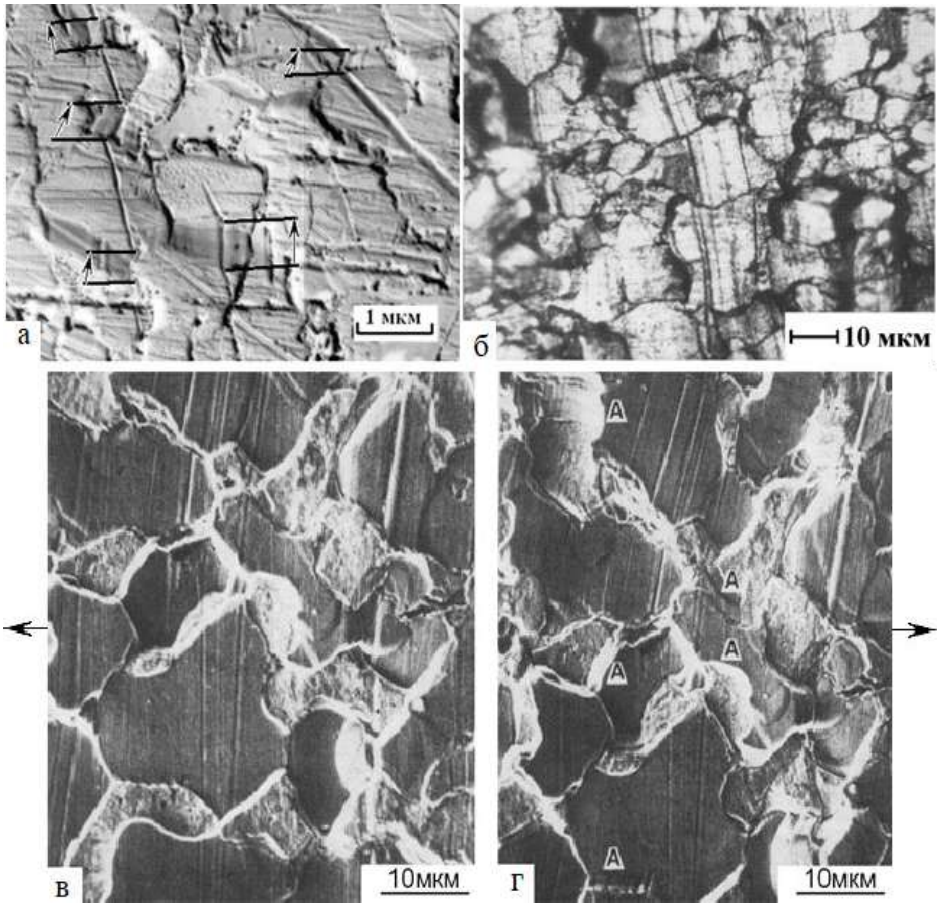

FIGURE 1. Deformation relief on the surface of samples after stretching in the second speed interval: a – Zn-0.4% Al alloy (replica method, photograph by the author); b – supral-type alloy deformed by ε = 100 + 15% (optical microscope); c and d – Pb – 62 wt. % Sn alloy, the same area, ε = (c) and ε = 100% (d) (SEM, in situ) [1, 2].

The regions where grains emerged on the sample surface are marked with the letter “A” The maximum value of γ = 40% was obtained at the optimal strain rate [3]. At different boundaries, the direction and magnitude of the GBP can vary significantly, even to the point of being completely absent.

Thus, the listed deformation mechanisms participate in the SPD of various materials to varying degrees. Figure 2 shows the contributions of the main mechanisms at different strain rates for the MA8 magnesium alloy. The largest contribution from the

GBP is observed in the second strain rate interval. The contribution of diffusion creep, determined from precipitate-free zones, is significant only in the first strain rate interval, while VDS dominates in the third interval. The ratio of these contributions largely depends on the material type and grain size. In ultrafine-grained two-phase alloys, the contribution from the GBP can approach 100% [4, 5].

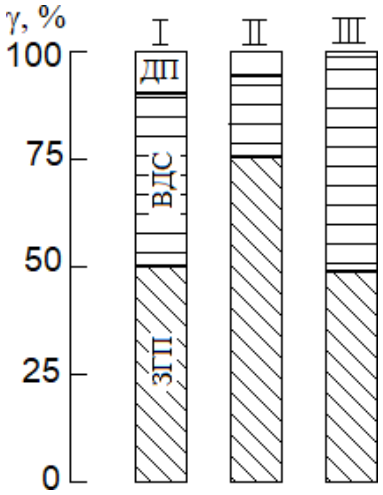

Fig. 2. Contribution of the ZGP, VDS and DP to the deformation of the MA8 alloy [3].

Another feature of the sgb is its association with the appearance of characteristic zones at actively sliding boundaries. these zones were studied in detail by i. i. novikov et al. on the zn-22% al alloy [68], and after the rejection of the diffusion creep hypothesis, they were called deformation zones (dz). the nature of dz formation has generated lively discussion in the literature, since it directly [6, 7].

The main phenomenological features of superplasticity are as follows:

– superplasticity (sp) is realized in materials with an equiaxed fine-grained structure (d < 10 μm), which remains virtually unchanged during deformation;

– elongations before failure δ under sp conditions reach several hundred and even thousands of percent (fig. 1);

– deformation temperature (0.4...0.8) tpl (tpl is the melting temperature of the material);

– the stresses required to deform superplastic materials are significantly lower than for the same materials in a coarse-grained state under the same external conditions;

– the maximum elongation of samples is achieved within a narrow range.

FIGURE 3. Sample of Zn-22%Al alloy before (a) and after (b) testing under superplasticity conditions

This dependence, in its simplest form, explains the stability of plastic flow, which is expressed by the equation $\sigma = A\ \varepsilon n\ \varepsilon m$ (A is an empirical constant; n and m are material parameters that determine the dependence of strain hardening on the degree and rate of deformation), when the strain hardening exponent m- is in the range $0.3 < m < 0.8$ [8, 9].

In logarithmic coordinates, the σ-ε dependence has a sigmoidal form (Fig. 3, a), allowing us to identify three characteristic strain rate regions: low (I), optimal (I), and optimal (I). The dependences of δ and m on the strain rate are similar, with both quantities reaching a maximum in the optimal strain rate range (Fig. 3, b).

The stability of SP flow can be explained as follows. If a random narrowing (neck) appears on a tensile specimen, the strain rate locally increases at this location. At high m-values, increasing velocity causes a significant increase in stress, which hinders deformation in the neck and redistributes it to other areas of the specimen. In other words, self-regulation of the flow occurs, which is more effective the higher the m-value [10, 11].

Zn-22% Al and Zn-0.4% Al alloys have proven useful for studying the physical nature of superplasticity [3]. The former, a typical two-phase alloy with a duplex structure, exhibits superplastic properties at 250°C, while the latter, a quasi-single-phase alloy, is superplastic at room temperature. Thus, together, they allow modeling the

behavior of two important classes of materials, and the superplasticity temperature significantly simplifies experimental observations.

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KINEMATIC STUDY OF A SIX-LINK MECHANISM FOR THE PURPOSE OF ITS USE IN THE DESIGN OF NEW MACHINES AND MECHANISMS

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Annotation. This article presents a kinematic analysis of a six-link mechanism aimed at its application in the design of new machines and mechanisms. Kinematic calculation, especially for multi-link mechanisms, is an essential stage in the development of modern mechanical systems. The study determines linear velocities, accelerations, angular velocities, and angular accelerations of the mechanism’s points and links. The relationships between motion parameters and kinematic characteristics are also analyzed. The obtained results provide a theoretical basis for designing efficient and reliable new machines and mechanisms.

Keywords: mechanism, kinematics, velocity, acceleration, rotation, linkage, calculation, parameter, design, dynamics

Annotatsiya. Ushbu maqolada olti zvenoli mexanizmning kinematik tadqiqi va uning yangi mashina hamda mexanizmlarni loyihalashdagi ahamiyati ko‘rib chiqiladi. Kinematik hisoblash, ayniqsa ko‘p zvenoli mexanizmlar uchun, yangi texnik qurilmalarni yaratishda zarur bosqich hisoblanadi. Tadqiqot jarayonida mexanizm nuqtalari va zvenolarining tezligi, tezlanishi, burchak tezligi hamda burchak tezlanishi

aniqlanadi. Shuningdek, harakat qonuniyatlari va parametrlarning o‘zaro bog‘liqligi tahlil qilinadi. Olingan natijalar yangi mashina va mexanizmlarni samarali hamda ishonchli loyihalash uchun nazariy asos bo‘lib xizmat qiladi.

Tayanch so‘zlar: mexanizm, kinematika, tezlik, tezlanish, aylanish, dinamika, zveno, parametr, loyiha, hisob

Аннотация. В статье рассматривается кинематическое исследование шестизвенного механизма с целью его использования при проектировании новых машин и механизмов. Кинематический расчет, особенно многозвенных механизмов, является необходимым этапом при создании современной техники. В процессе анализа определяются скорости, ускорения, угловые скорости и угловые ускорения точек и звеньев механизма. Также исследуются взаимосвязи кинематических параметров и закономерности движения системы. Полученные результаты могут быть использованы при разработке и совершенствовании новых машин и механизмов.

Ключевые слова: механизм, кинематика, скорость, ускорение, вращение, звено, расчет, параметр, проектирование, динамика

Kinematic calculations, especially of multi-link mechanisms, are essential when designing and creating new machines and mechanisms. Therefore, it is necessary to determine the speed, acceleration, angular velocity, angular acceleration, and other parameters of points, links, etc.

For this purpose, as an example, we perform a kinematic analysis of the planing machine mechanism shown in figure 1, a. The planing machine mechanism is designed in such a way that the radius of the driving link can be changed in order to change the stroke of the actuator link depending on the length of the workpiece. The following parameters are given to determine the kinematic parameters: $\varphi_1 = 300^o$, $l_{AB} = 0{,}06\,m$, $l_{AC} =$

$0{,}15\ m,\ l_{CD} = 0{,}22\ m,\ l_{DE} = 0{,}08\ m,\ H = 0{,}11\ m$. The angular velocity of the crank AB is constant and equal to $\omega_1 = 12\ c^{-1}$ [1, 2]

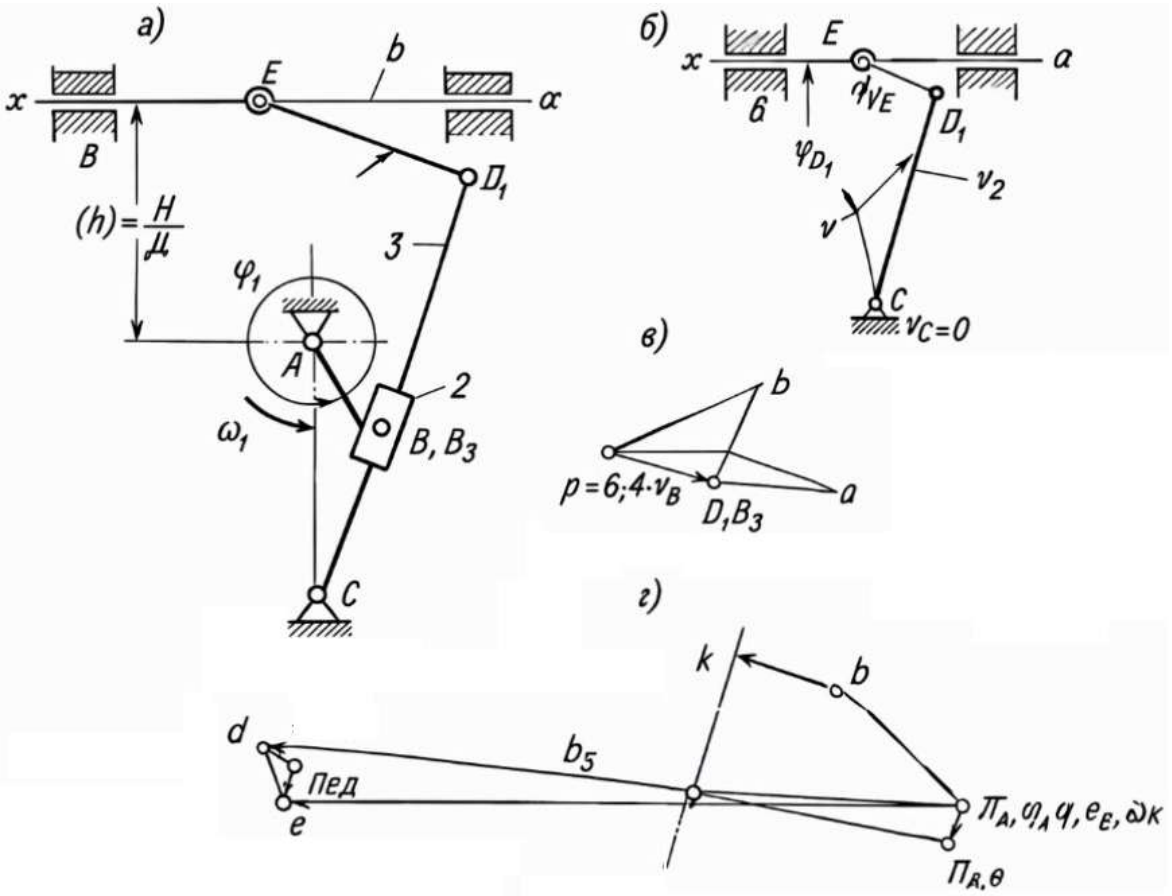

Figure 1. Kinematic analysis of the planing machine mechanism;

a) mechanism diagram, b) position plan, c) speed plan, d) acceleration plan

Solution. 1) We draw a plan of the mechanism's position. We choose the length of the segment (*AB*) equal to 30 *mm*, so the scale of the diagram will be [3]

$$\mu_l = \frac{l_{AB}}{(AB)} = \frac{0{,}06}{30} = 0{,}002\ \frac{m}{mm}$$

The lengths of the remaining segments in the drawing:

$$(AC) = \frac{l_{AC}}{\mu_l} = \frac{0{,}15}{0{,}002} = 75\ mm,$$

$$(CD) = \frac{l_{CD}}{\mu_l} = \frac{0{,}22}{0{,}002} = 110\ mm,$$

$$h = \frac{H}{\mu_l} = \frac{0{,}11}{0{,}002} = 55\ mm, \qquad (DE) = \frac{l_{DE}}{\mu_l} = \frac{0{,}08}{0{,}002} = 40\ mm$$

Using the obtained dimensions, we construct a plan of the mechanism's position (Fig. 1, b).

2) We construct a plan of the mechanism's speeds. We begin with the group consisting of links 2 and 3, since it is directly connected to the drive link and the rack. We construct the plan using the following vector equations [4, 5]:

$$v_{B_3} = v_B + v_{B_3B}, \qquad v_{B_3} = v_C + v_{B_3C}$$

where v_{B_3} – is the velocity of point B_3 of link 3, which lies above point B; v_B is the velocity of point B, equal in magnitude to $v_B = \omega_1 \cdot l_{AB} = 12 \cdot 0{,}06 = 0{,}72\ m/s$ and directed perpendicular to AB in accordance with the direction of the angular velocity ω_1; v_{B_3B} – is the velocity of point B_3 relative to point B, directed parallel to line BC; v_C – is the velocity of point C, equal to zero; v_{B_3C} – is the velocity of point B due to rotation of link 3 relative to point C, equal in magnitude to $v_{B_3C} = \omega_3 \cdot l_{B_3C}$ and directed perpendicular to BC (unknown to us yet) [6, 7].

We construct a solution to the first vector equation indicated above. From the pole p (Fig. 1, a) we set aside a segment (pb), depicting the velocity v_B of point B. The length of this segment is taken equal to (pb) = (AB) = 30 *mm*, *i.e.* the plan is constructed in the scale of the crank. Through point b we draw the direction of the velocity v_{B_3B} a line parallel to CB_3. We proceed to constructing a solution to the second vector equation indicated above. It is necessary to set aside the velocity vector of point C, but since its modulus is equal to zero, then we place its end c at the pole of the plan p and from point p we draw the direction of the velocity v_{B_3C} – a line perpendicular to CB. Its intersection with the previously drawn line parallel to CB gives the end of the velocity vector v_{B_3} – point b_3. Point d – the end of the velocity vector of point D – is found according to the similarity rule from the relation

$$\frac{(cd)}{(cb_3)} = \frac{(CD)}{(CB_3)},$$

where

$$(cd) = (cb_3)\frac{(CD)}{CB_3} = 18\frac{105}{42} = 45\ mm,$$

Let's move on to constructing the speed plan for group 4, 5. We construct this plan using the equations [8]

$$v_E = v_D + v_{ED}, \qquad v_E = v_{E_6} + v_{EE_6},$$

where v_E is the velocity of point E; v_D is the velocity of point D (its vector is plotted on the velocity plane as a segment (pd)); v_{ED} is the velocity of point E during rotation of link 4 relative to point D, equal in magnitude to $v_{ED} = \omega_4 \cdot l_{DE}$ and directed perpendicular to line DE (which is unknown to us at this point); v_{E_6} – is the velocity of point E_6 of link 6, which is coincident with point E (its modulus is zero since link 6 is motionless); v_{EE_6} – is the velocity of point E relative to point E_6, directed parallel to line xx. The construction is reduced to drawing through point d (according to the first equation) a line perpendicular to DE, *i.e.* to the direction of velocity v_{ED}, and drawing through point p (according to the second equation) a line parallel to xx. The point e of intersection of these lines is the end of the velocity vector v_E of point E. We place at points c, e_6, a and at this point we complete the construction of the velocity plan of the mechanism [9, 10].

The scale of the speed plan is

$$\mu_v = \frac{v_B}{(pb)} = \frac{\omega_1(AB)\mu_l}{(pb)} = \omega_1\mu_l = 12 \cdot 0{,}002 = 0{,}024\ \frac{m/s}{mm}$$

The scale of the plan of speed analogues is

$$\mu_{\varphi_v} = \frac{\mu_v}{\omega_1} = \mu_l = 0{,}002\ \frac{m}{mm},$$

The required speed of the support (speed of point E) is equal to

$$v_E = (pe)\mu_v = 48 \cdot 0{,}024 = 1{,}152\ \frac{m}{s},$$

3) We construct the acceleration plan for group 2, 3. We construct it using the following two vector equations [11, 12]

$$a_{B_3} = a_B + a^k_{B_3B} + a^r_{B_3B}, \quad a_{B_3} = a_C + a^n_{CB_3} + a^t_{CB_3},$$

where a_{B_3} – is the acceleration of point B_3, which belongs to link 3 and coincides with point B of link 1; a_B – is the normal (aka total) acceleration of point B, equal in magnitude to $a_B = \omega_1^2 \cdot l_{AB} = 12^2 \cdot 0{,}06 = 8{,}64\ m/s^2$ and directed parallel to AB from point B to point A; $a^k_{B_3B}$ – is the Coriolis acceleration in the motion of point B_3 relative to link 2, equal in magnitude to [13, 14]

$$a^k_{B_3B} = 2\omega_2 v_{B_3B} = 2\frac{v_{B_3C}}{l_{BC}} v_{B_3B}$$

(since $\omega_2 = \omega_3$ and $\omega_3 = \frac{v_{B_3C}}{l_{BC}}$) and having the direction of the relative velocity vector v_{B_3B}, rotated by 90° in the direction of the angular velocity ω_2 of the translational motion (motion of link 2); $a^r_{B_3B}$ – relative (relative) acceleration of point B_3 relative to point B, directed parallel to line CB; a_C – acceleration of point C (it is equal to zero); $a^n_{B_3C}$ – normal acceleration of point B_3 in the rotation of link 3 relative to point C, equal in magnitude [15, 16]

$$a^n_{B_3C} = \frac{v_{B_3^2C}}{l_{B_3C}}$$

directed parallel to line CB_3 from point B_3 to point C; $a^t_{B_3C}$ – is the tangential acceleration of point B_3 in the same motion of link 3, equal in magnitude to $a^t_{B_3C} = \varepsilon_3 l_{B_3C}$ (not yet known to us) and directed perpendicular to CB_3.

We construct the solution to the first vector equation indicated above (Fig. 1, d). We define the segment (πb) = (AB) = 30 mm, which depicts the acceleration a_B in the plan (since (πb) = (AB), the plan is constructed in the crank scale).

The scale of the acceleration plan is [17]

$$\mu_a = \frac{a_B}{(\pi b)} = \frac{\omega_1^2 (AB)\mu_l}{(\pi b)} = \omega_1^2 \cdot \mu_l = 12^2 \cdot 0{,}002 = 0{,}288 \ \frac{m/s^2}{mm}$$

The scale of the acceleration plan is

$$\mu_{\varphi_a} = \frac{\mu_a}{\omega_1^2} = \mu_l = 0{,}002 \ \frac{m}{mm}$$

We set aside the selected segment (πb) from the pole of the plane (π), then add to it the segment (bk) – the Coriolis acceleration vector – we find its length using the formula

$$(bk) = \frac{a^k_{B_3B} \cdot v_{B_3B}}{v_{B_3C}\mu_a} = \frac{2(b_3c) \cdot (bb_3)\mu_v^2}{(B_3C)\mu_l \cdot \mu_a} = \frac{2 \cdot 18 \cdot 21}{42{,}5} = 17{,}79 \ mm$$

The segments ($b_3\ c$) = 18 *mm* and (bb_3) = 21 *mm* are taken from the velocity plane, and the segment ($B_3\ C$) = 42.5 *mm* is taken from the position plane. Through point *k*, we draw a line parallel to *CB*, in the direction of acceleration $a^r_{B_3B}$ [18, 19].

We proceed to construct the second vector equation. We align point c with point π, since $a_C = 0$. From point π, we plot a segment (πn_{B_3C}), representing the normal acceleration $a^n_{B_3C}$, its length is

$$(\pi n_{B_3C}) = \frac{v^2_{B_3C}}{l_{B_3C}\mu_a} = \frac{(\pi b_3)^2\mu_v^2}{(B_3C)\mu_l \cdot \mu_a} = \frac{18^2}{42{,}5} = 7{,}62 \ mm$$

then, through the point n_{B_3C}, we draw the direction of acceleration $a^t_{B_3C}$ – a line perpendicular to *CB*, until it intersects with the line previously drawn through point *k*, parallel to *CB*. The intersection point b_3 represents the end of the acceleration vector a_{B_3}. We find the end of the acceleration vector of the hinge center *D* (point *d*) using the similarity rule from the relation

$$(\pi d) = (\pi b_3)\frac{(CD)}{(B_3C)} = 37 \cdot \frac{104}{42{,}5} = 90{,}54 \ mm,$$

Let's move on to constructing the acceleration plan for group 4, 5 using the equations

$$a_E = a_D + a_{ED}^n + a_{ED}^t, \qquad a_E = a_{E_6} + a_{EE_6}^k + a_{EE_6}^r$$

where a_E is the acceleration of point E; a_D is the acceleration of point D (it is determined by the previously constructed segment (πd)); $a_D = (\pi d)\mu_a = 90{,}54 \cdot 0{,}288 = 26{,}08$ м/с^2; $a_{ED}^n = \frac{v_{ED}^2}{l_{ED}} -$ is the normal acceleration of point E due to the rotation of link 4 relative to point D (it is directed parallel to the line ED from point E to point D); $a_{ED}^t = \varepsilon_4 l_{ED} -$ is the tangential acceleration of the same point in the same motion of link 4 (it is directed perpendicular to the line ED); $a_{E_6} -$ is the acceleration of point E_6, which belongs to link 6 and is coincident with point E (it is zero); $a_{EE_6}^k -$ is the Coriolis acceleration of point E in its motion relative to the support (point E_6; it is zero); $a_{EE_6}^r -$ is the relative acceleration of point E relative to the support (point E_6; it is directed parallel to the line xx).

According to the first vector equation, we plot a segment (dn_{ED}) from point d, representing the normal acceleration a_{ED}^n. Its length is

$$dn_{ED} = \frac{v_{ED}^2}{l_{ED}\mu_a} = \frac{(ed)^2\mu_v^2}{(ED)\mu_l \cdot \mu_a} = \frac{15^2}{42{,}5} = 5{,}29 \ mm,$$

Next, through the point n_{ED}, we draw the direction of acceleration a_{ED}^t (a line perpendicular to ED) and proceed to the constructions corresponding to the second vector equation indicated above. At the point π, we place the points e_6 and k', since the acceleration moduli a_{E_6} and $a_{EE_6}^k$ are equal to zero. From the point π, we draw the direction of acceleration $a_{EE_6}^r$ (a line parallel to xx) until it intersects with the line previously drawn from the point n_{ED}. The point of intersection e is the end of the acceleration vector of point E, i.e., the acceleration a_E. We place the point a at the pole of the plan and this completes the construction of the acceleration plan of the mechanism [20, 21].

The required acceleration of the support (point E) will be equal to

$$a_E = (\pi e)\mu_a = 87 \cdot 0{,}24 = 20{,}88 \ m/s^2$$

The completed kinematic calculation will be used in the design of new mechanisms and machines, and will also be useful to students, masters, and scientific researchers in completing coursework and research projects.

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EFFECT OF LACTOBACILLUS FERMENTUM ON THE PROTEIN AND AMINO ACID PROFILE OF MILK WHEY AND CURD

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Abstract. This study presents a comprehensive investigation of total protein, soluble protein fractions, and free amino acids in curd and whey obtained by biotechnological and acid methods of milk coagulation. The total protein content was determined using the Kjeldahl method, soluble protein fractions were analyzed by the Lowry method, and the molecular weight distribution of proteins was assessed using SDS- PAAG. The content of free amino acids was determined by high-performance liquid chromatography (HPLC) after derivatization with phenylisothiocyanate. The results demonstrated that fermentation using Lactobacillus fermentum leads to changes in the protein profile and an increase in the concentration of free amino acids in the studied samples.

Keywords: curd, whey, total protein, Kjeldahl method, Lowry method, SDS-PAAG, HPLC, amino acid composition.

ВЛИЯНИЕ *LACTOBACILLUS FERMENTUM* НА БЕЛКОВЫЙ И АМИНОКИСЛОТНЫЙ ПРОФИЛЬ МОЛОЧНОЙ СЫВОРОТКИ И ТВОРОГА

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Аннотация. В работе проведено комплексное исследование общего белка, растворимых белковых фракций и свободных аминокислот в твороге и сыворотке, полученных биотехнологическим и кислотным способами коагуляции молока.

Общее содержание белка определяли методом Кьельдаля, растворимые белковые фракции — методом Лоури, молекулярно-массовое распределение белков — методом SDS-PAAG, содержание свободных аминокислот — методом высокоэффективной жидкостной хроматографии (ВЭЖХ) после дериватизации фенилизотиоцианатом. Установлено, что ферментация с использованием *Lactobacillus fermentum* приводит к изменению белкового профиля и увеличению содержания свободных аминокислот в исследуемых образцах.

Ключевые слова: творог, сыворотка, общий белок, метод Кьельдаля, метод Лоури, SDS-PAAG, ВЭЖХ, аминокислотный состав.

Введение Белки молока являются одним из ключевых компонентов, определяющих пищевую и биологическую ценность молочных продуктов. Они служат источником незаменимых аминокислот и обладают высокой биологической доступностью. Известно, что способ коагуляции молока — ферментативный или кислотный — оказывает существенное влияние на структуру белков, их молекулярно-массовое распределение и содержание свободных аминокислот в конечном продукте.

В последние годы особый интерес вызывает использование молочнокислых бактерий в технологии производства функциональных молочных продуктов, поскольку их протеолитическая активность способствует частичному гидролизу белков и формированию биологически активных пептидов.

Цель исследования — сравнительная оценка белкового и аминокислотного состава творога и сыворотки, полученных с использованием молочнокислой бактерии *Lactobacillus fermentum* и лимонной кислоты.

Объекты исследования

Объектом исследования являлось молоко коровье питьевое пастеризованное (ТМ «Lactel») со следующими физико-химическими показателями:массовая доля жира

— 3,2%; массовая доля белка — 3,0% (стандартное значение для данного продукта); массовая доля углеводов — 4,7%.

В качестве коагулирующих агентов использовали:

1. Биотехнологический способ: чистая культура молочнокислых бактерий *Lactobacillus fermentum*.
2. Кислотный способ: раствор лимонной кислоты (пищевой) до достижения изоэлектрической точки казеина.
3. Сут зардоби (сыворотка молочная).
4. Қатиқ зардоби (сыворотка кисломолочная).

В работе проведена сравнительная оценка белкового и аминокислотного состава творога и молочной сыворотки, полученных биотехнологическим и кислотным способами коагуляции молока. В качестве биологического агента использовали чистую культуру молочнокислых бактерий Lactobacillus fermentum, а для кислотного метода — раствор лимонной кислоты.

Общее содержание белка определяли методом Кьельдаля, растворимые белковые фракции — методом Лоури, молекулярно-массовое распределение белков исследовали методом электрофореза в полиакриламидном геле (SDS-PAGE), содержание свободных аминокислот — методом высокоэффективной жидкостной хроматографии (ВЭЖХ) после дериватизации фенилизотиоцианатом.

Результаты показали, что контрольный образец творога характеризуется более высоким общим содержанием белка (8,75%), тогда как в кисломолочной сыворотке наблюдается повышенное содержание растворимых белков. Электрофоретический анализ выявил появление дополнительных белковых фракций в диапазоне 15–35 кДа в ферментированных образцах, что свидетельствует о более интенсивном протеолизе. Установлено увеличение содержания свободных аминокислот в ферментированных образцах, особенно

глутаминовой кислоты, пролина и гистидина. Суммарное содержание аминокислот увеличилось более чем в три раза по сравнению с исходным сырьем.

Полученные результаты подтверждают, что использование *Lactobacillus fermentum* способствует изменению белкового профиля и повышению биологической ценности молочных продуктов.

Заключение. Проведенное исследование показало, что способ коагуляции молока оказывает существенное влияние на белковый и аминокислотный состав получаемых продуктов. Ферментация с использованием *Lactobacillus fermentum* приводит к изменению молекулярно-массового распределения белков и повышению содержания растворимых белковых фракций. Установлено значительное увеличение свободных аминокислот, особенно глутаминовой кислоты, пролина и гистидина, что свидетельствует о выраженной протеолитической активности бактерий и повышении биологической доступности белков. Полученные результаты подтверждают перспективность применения *Lactobacillus fermentum* в технологии производства функциональных молочных продуктов.

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APPLICATION OF NOVEL LACTIC ACID BACTERIA STRAINS IN SOFT CHEESE PRODUCTION

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Abstract. The present study investigates the potential application of selected strains of lactic acid bacteria — Lactobacillus fermentum, Lactobacillus plantarum, and Lactobacillus brevis — isolated from natural sources in the technology of soft cheese production. Particular attention is given to their role in the development of cheese texture, formation of the aromatic profile, and improvement of microbiological safety. The study evaluates the influence of these microorganisms on biopreservation processes and the functional properties of soft cheeses, including the accumulation of biologically active metabolites. The obtained results indicate that the use of novel strains of lactic acid bacteria may contribute to improved product quality, enhanced sensory characteristics, and increased biological value of soft cheeses.

Keywords: soft cheese, lactic acid bacteria, *Lactobacillus fermentum*, *Lactobacillus plantarum*, *Lactobacillus brevis*, fermentation,

ИСПОЛЬЗОВАНИЕ НОВЫХ ШТАММОВ МОЛОЧНОКИСЛЫХ БАКТЕРИЙ В ПРОИЗВОДСТВЕ МЯГКИХ СЫРОВ

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Аннотация. В данной статье рассматривается потенциал использования специфических штаммов молочнокислых бактерий — *Lactobacillus fermentum*, *Lactobacillus plantarum* и *Lactobacillus brevis*, выделенных из природных источников, в технологии мягких сыров. Уделяется внимание их роли в

формировании текстуры, ароматического профиля и обеспечении микробиологической безопасности продукта. Исследуется влияние данных микроорганизмов на биоконсервацию и функциональные свойства сыров, включая накопление биологически активных метаболитов.

Ключевые слова: мягкие сыры, молочнокислые бактерии, *Lactobacillus fermentum*, *Lactobacillus plantarum*, *Lactobacillus brevis*, ферментация,

Введение. Современное сыроделие стремится к индивидуализации продукта. Использование «диких» или нововыделенных штаммов позволяет отойти от стандартизированных органолептических показателей. Особый интерес представляют факультативно-гетероферментативные лактобациллы, которые традиционно относят к дополнительным (адъюнктным) культурам.

Характеристика ключевых штаммов

Использование комбинации этих трех видов позволяет достичь синергетического эффекта:

1. *Lactobacillus plantarum*: Природный защитник.

Этот штамм известен своей способностью к биоконсервации. Он вырабатывает антимикробные пептиды (плантарицины), которые подавляют рост нежелательной микрофлоры (плесени и дрожжей) в мягких сырах с высокой влажностью.

Результат: Увеличение срока годности без химических консервантов.

2. *Lactobacillus fermentum*: Мастер текстуры

Обладает высокой устойчивостью к технологическим стрессам и активно участвует в расщеплении белков.

Результат: Формирование нежной, маслянистой консистенции, характерной для высококачественных мягких сыров.

3. *Lactobacillus brevis*: Архитектор аромата

Являясь гетероферментативным микроорганизмом, *L.brevis* производит не только молочную кислоту, но и уксусную кислоту, этанол и CO_2.

Результат: Сложный, слегка «острый» вкусовой букет и формирование специфического рисунка сыра.

Сравнительный анализ функциональности

Штамм	Главная функция	Влияние на органолептику
L.plantarum	Антимикробная активность	Чистый кисломолочный вкус
L.fermentum	Протеолиз (расщепление белков)	Сливочная текстура
L.brevis	Синтез летучих соединений	Пряные и фруктовые нотки

Результаты и их обсуждение

В ходе экспериментального производства мягкого сыра с использованием адъюнктных культур (*L. fermentum*, *L. plantarum*, *L. brevis*) были получены следующие данные:

1. Влияние на кислотность и микробиологию

Использование *L.plantarum* позволило стабилизировать активную кислотность (pH) на уровне 4.6–4.8 уже к 24 часам ферментации. Благодаря активному синтезу бактериоцинов данным штаммом, в опытных образцах содержание дрожжей и плесеней (посторонней микрофлоры) было в 2.5 раза ниже, чем в контрольной группе.

2. Формирование ароматического профиля

Методом газовой хроматографии было установлено, что L. brevis и L. fermentum способствуют накоплению летучих жирных кислот и эфиров.

L.brevis увеличил содержание диацетила, что придало сыру выраженный сливочно-масляный аромат.

L.fermentum стимулировал высвобождение свободных аминокислот (валина и лейцина), формируя «полноту» вкуса (umami).

3. Органолептическая оценка

Профильный анализ показал, что опытные образцы имели более пластичную и однородную консистенцию. В таблице ниже приведено сравнение балльных оценок:

Показатель (от 1 до 5)	Контроль (стандарт)	Опытный образец (с новыми штаммами)
Вкус и запах	4.1	4.8
Консистенция	3.9	4.7
Внешний вид	4.5	4.6
Общая оценка	4.16	4.7

Обсуждение.Полученные результаты подтверждают гипотезу о синергетическом эффекте выбранных штаммов. Высокая протеолитическая активность *L. fermentum* ускоряет созревание, что критично для мягких сыров с коротким сроком реализации. В то же время, гетероферментативный метаболизм *L. brevis* создает уникальный «рисунок» и аромат, выделяя продукт на фоне рыночных аналогов. Сочетание этих факторов позволяет нивелировать сезонные колебания качества сырья.

Вывод.Применение нововыделенных штаммов *Lactobacillus fermentum, Lactobacillus plantarum и Lactobacillus brevis* в технологии мягких сыров является биологически и экономически целесообразным. Это позволяет:

1. Повысить биологическую безопасность за счет подавления патогенов (функция *L.plantarum*).

2. Сократить технологический цикл созревания и улучшить текстуру (функция *L.fermentum*).

3.Сформировать премиальный органолептический профиль (функция *L.brevis*).

Заключение.Внедрение нововыделенных штаммов *L. fermentum, L. plantarum и L. brevis* в рецептуры мягких сыров позволяет не только улучшить вкусовые качества, но и придать продукту статус «функционального». Эти бактерии выступают в роли естественных стабилизаторов и пробиотиков, повышая биологическую ценность продукта.

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THE RELATIONSHIP BETWEEN HYPOTHYROIDISM AND CARDIOVASCULAR DISEASES

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ABSTRACT

Hypothyroidism is a common endocrine disorder characterized by a decrease in thyroid hormone levels, which significantly affects various body systems, including the cardiovascular system. This article examines the main mechanisms of the influence of hypothyroidism on the functioning of the heart and blood vessels. It has been established that thyroid hormone deficiency leads to decreased myocardial contractility, increased peripheral vascular resistance, and disturbances in lipid metabolism. These changes contribute to the development of atherosclerosis, arterial hypertension, and coronary heart disease. The analysis of scientific sources has shown that both overt and subclinical hypothyroidism may increase the risk of cardiovascular complications. Timely diagnosis and adequate hormone replacement therapy play an important role in preventing and reducing the risk of cardiovascular diseases in patients with hypothyroidism.

Keywords: hypothyroidism, thyroid hormones, cardiovascular diseases, atherosclerosis, arterial hypertension, lipid metabolism.

ВЗАИМОСВЯЗЬ ГИПОТИРЕОЗА И СЕРДЕЧНО-СОСУДИСТЫХ ЗАБОЛЕВАНИЙ

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АННОТАЦИЯ

Гипотиреоз является распространённым эндокринным заболеванием, сопровождающимся снижением уровня тиреоидных гормонов, что оказывает значительное влияние на различные системы организма, включая сердечно-сосудистую систему. В статье рассматриваются основные механизмы влияния гипотиреоза на функционирование сердца и сосудов. Установлено, что дефицит тиреоидных гормонов приводит к снижению сократительной способности миокарда, увеличению периферического сосудистого сопротивления и нарушению липидного обмена. Данные изменения способствуют развитию атеросклероза, артериальной гипертензии и ишемической болезни сердца. Анализ научных источников показал, что как манифестный, так и субклинический гипотиреоз могут повышать риск сердечно-сосудистых осложнений. Своевременная диагностика и адекватная гормональная терапия играют важную роль

в профилактике и снижении риска развития сердечно-сосудистых заболеваний у пациентов с гипотиреозом.

Ключевые слова: гипотиреоз, тиреоидные гормоны, сердечно-сосудистые заболевания, атеросклероз, артериальная гипертензия, липидный обмен.

GIPOTIREOZ VA YURAK-QON TOMIR KASALLIKLARI O‘RTASIDAGI O‘ZARO BOG‘LIQLIK

Farg‘ona shahar Farg‘ona jamoat salomatligi tibbiyot instituti.

Terapevtik yo‘nalish fanlar kafedrasi assistenti

Axmadulina Galiya Marsovna

ANNOTATSIYA

Gipotireoz qalqonsimon bez gormonlari darajasining pasayishi bilan tavsiflanadigan keng tarqalgan endokrin kasallik bo‘lib, u organizmning turli tizimlariga, jumladan yurak-qon tomir tizimiga sezilarli ta’sir ko‘rsatadi. Mazkur maqolada gipotireozning yurak va qon tomirlar faoliyatiga ta’sir mexanizmlari tahlil qilinadi. Tadqiqotlar shuni ko‘rsatadiki, qalqonsimon bez gormonlari yetishmovchiligi miokard qisqarish qobiliyatining pasayishiga, periferik qon tomir qarshiligining oshishiga hamda lipid almashinuvi buzilishiga olib keladi. Ushbu o‘zgarishlar ateroskleroz, arterial gipertenziya va yurak ishemik kasalligi rivojlanish xavfini oshiradi. Ilmiy manbalar tahlili ochiq hamda subklinik gipotireoz yurak-qon tomir asoratlari xavfini oshirishi mumkinligini ko‘rsatdi. Gipotireozni o‘z vaqtida aniqlash va to‘g‘ri gormonal terapiya yurak-qon tomir kasalliklari rivojlanishining oldini olishda muhim ahamiyatga ega.

Kalit so‘zlar: gipotireoz, qalqonsimon bez gormonlari, yurak-qon tomir kasalliklari, ateroskleroz, arterial gipertenziya, lipid almashinuvi.

Гипотиреоз является одним из наиболее распространённых эндокринных нарушений и характеризуется снижением продукции тиреоидных гормонов щитовидной железой. Эти гормоны играют ключевую роль в регуляции метаболических процессов, функционировании нервной системы, а также в поддержании нормальной работы сердечно-сосудистой системы. Нарушение их уровня приводит к комплексным изменениям в организме, затрагивающим различные органы и системы [1].

Сердечно-сосудистая система особенно чувствительна к изменениям тиреоидного статуса. Трийодтиронин и тироксин регулируют частоту сердечных сокращений, сократимость миокарда, системное сосудистое сопротивление и

липидный обмен. При гипотиреозе отмечается замедление метаболических процессов, что может приводить к развитию дислипидемии, повышению периферического сосудистого сопротивления и снижению сердечного выброса [2].

В последние годы увеличилось число исследований, посвящённых изучению связи между гипотиреозом и развитием сердечно-сосудистых заболеваний. Установлено, что как манифестный, так и субклинический гипотиреоз могут способствовать формированию атеросклероза, ишемической болезни сердца, артериальной гипертензии и сердечной недостаточности [3]. Целью данной работы является анализ современных представлений о влиянии гипотиреоза на сердечно-сосудистую систему и выявление механизмов, лежащих в основе развития сердечно-сосудистых осложнений при данном эндокринном нарушении.

Материал и методы.

Настоящее исследование носит обзорно-аналитический характер и основано на изучении и систематизации современных научных публикаций, посвящённых взаимосвязи гипотиреоза и сердечно-сосудистых заболеваний. Поиск научной информации проводился в отечественных и зарубежных источниках медицинской литературы. В анализ были включены публикации, размещённые в рецензируемых научных журналах по эндокринологии, кардиологии и внутренним болезням. Особое внимание уделялось исследованиям, посвящённым патофизиологическим механизмам влияния дефицита тиреоидных гормонов на сердечно-сосудистую систему [1].

Собственное исследование.

В рамках собственного небольшого исследования в условиях семейной поликлиники 3 города Фергана, было проведено наблюдение за 20 пациентами с подтверждённым гипотиреозом (женщины — 12, мужчины — 8, возраст 35–65 лет). Диагноз гипотиреоза устанавливался на основании повышенного уровня тиреотропного гормона (ТТГ) и сниженного уровня свободного тироксина (Т4).

У всех пациентов оценивались основные факторы сердечно-сосудистого риска:

- липидный профиль (общий холестерин, ЛПНП, ЛПВП, триглицериды),
- артериальное давление,
- индекс массы тела (ИМТ),
- уровень глюкозы натощак.

Методология исследования включала клинический осмотр, лабораторные анализы и сбор анамнеза. Для анализа данных использовались методы описательной статистики — расчёт частоты встречаемости факторов риска и средних значений показателей.

Результаты

Полученные результаты представлены в таблице 1. и рисунке 1.

№	Пациент	Пол	Возраст	Дислипидемия	Артериальная гипертензия	Избыточная масса тела (ИМТ ≥25)	Нарушение глюкозы натощак
1	П1	Ж	42	+	-	+	-
2	П2	М	50	+	+	+	-
3	П3	Ж	38	-	-	-	-
4	П4	М	60	+	+	+	+
5	П5	Ж	47	+	-	+	-
6	П6	М	55	+	+	+	+
7	П7	Ж	36	-	-	-	-
8	П8	Ж	62	+	+	+	+
9	П9	М	41	+	-	+	-
10	П10	Ж	49	+	+	+	+
11	П11	М	44	-	-	-	-
12	П12	Ж	53	+	+	+	+
13	П13	Ж	39	+	-	+	-
14	П14	М	57	+	+	+	+
15	П15	Ж	48	-	-	-	-
16	П16	М	52	+	+	+	+
17	П17	Ж	46	+	-	+	-
18	П18	М	61	+	+	+	+
19	П19	Ж	50	+	-	+	-
20	П20	М	58	+	+	+	+

Рисунок 1. Распространённость факторов сердечно-сосудистого риска у пациентов с гипотиреозом (n=20)

Фактор сердечно-сосудистого риска	Кол-во пациентов (n=20)	Процент (%)
Дислипидемия	14	70%
Избыточная масса тела (ИМТ ≥25)	14	70%
Артериальная гипертензия	10	50%

Описание графика:

График наглядно демонстрирует высокую распространённость факторов сердечно-сосудистого риска у пациентов с гипотиреозом. Наибольшее влияние оказывают дислипидемия и избыточная масса тела — у 70 % пациентов наблюдались данные нарушения. Артериальная гипертензия выявлена у 50 % обследованных, а нарушение глюкозы натощак — у 40 %.

Эти данные подтверждают необходимость регулярного мониторинга метаболических и гемодинамических показателей у пациентов с гипотиреозом, а также раннего вмешательства для профилактики сердечно-сосудистых осложнений.

Анализ данных

- Дислипидемия встречалась у 14 из 20 пациентов (70 %),
- Артериальная гипертензия — у 10 пациентов (50 %),
- Избыточная масса тела (ИМТ ≥25) — у 14 пациентов (70 %),
- Нарушение глюкозы натощак — у 8 пациентов (40 %).

Результаты демонстрируют высокую распространённость факторов сердечно-сосудистого риска у пациентов с гипотиреозом, что согласуется с данными литературы [1–4].

В процессе анализа были рассмотрены клинические исследования, систематические обзоры и метаанализы, посвящённые изучению влияния гипотиреоза на гемодинамические показатели и метаболические процессы. Особое внимание уделялось данным о влиянии тиреоидной недостаточности на частоту сердечных сокращений, сократительную способность миокарда, показатели системного сосудистого сопротивления и параметры липидного обмена [3].

Методологической основой работы послужили методы сравнительного анализа, обобщения и интерпретации научных данных. Полученные сведения были систематизированы с целью выявления основных механизмов развития сердечно-сосудистых нарушений при гипотиреозе. Также проводилось сопоставление результатов различных исследований для определения наиболее значимых факторов риска развития сердечно-сосудистой патологии при дефиците тиреоидных гормонов [4].

Результаты.

Анализ научных данных показал, что гипотиреоз оказывает значительное влияние на функционирование сердечно-сосудистой системы. Одним из наиболее характерных изменений является снижение частоты сердечных сокращений и уменьшение сократительной способности миокарда. Это приводит к снижению сердечного выброса и ухудшению гемодинамики [2].

Кроме того, при гипотиреозе наблюдается повышение периферического сосудистого сопротивления, что связано с уменьшением вазодилатирующего действия тиреоидных гормонов. Данное состояние может способствовать развитию диастолической артериальной гипертензии [4].

Важную роль играет влияние гипотиреоза на липидный обмен. У пациентов часто отмечается повышение уровня общего холестерина и липопротеинов низкой плотности. Подобные изменения создают благоприятные условия для развития атеросклеротического поражения сосудов и увеличивают риск ишемической болезни сердца [3]. Также установлено, что гипотиреоз может вызывать структурные изменения миокарда, включая развитие диастолической дисфункции левого желудочка. В некоторых случаях отмечается накопление

жидкости
в перикардиальной полости, что проявляется перикардиальным выпотом [1].

Обсуждение.

Полученные данные подтверждают, что гипотиреоз является важным фактором формирования сердечно-сосудистого риска. Высокая частота дислипидемии и ожирения у обследованных пациентов указывает на необходимость регулярного мониторинга липидного обмена и массы тела, а также своевременной коррекции гипотиреоза.

Анализ факторов риска у небольшой выборки пациентов позволяет наглядно продемонстрировать влияние дефицита тиреоидных гормонов на метаболические и гемодинамические параметры, что подтверждает значимость ранней диагностики и терапии для профилактики сердечно-сосудистых осложнений.

Одним из ключевых механизмов развития сердечно-сосудистых осложнений при гипотиреозе является нарушение липидного обмена. Повышение уровня атерогенных липопротеинов способствует формированию атеросклеротических бляшек и увеличивает риск развития коронарной патологии [3]. Другим важным фактором является влияние гипотиреоза на сосудистый тонус. Снижение уровня тиреоидных гормонов приводит к уменьшению продукции вазодилатирующих веществ
и повышению сосудистого сопротивления, что создаёт дополнительную нагрузку на сердце и может способствовать развитию артериальной гипертензии [4].

Также следует учитывать влияние гипотиреоза на структуру и функцию миокарда. Дефицит тиреоидных гормонов приводит к снижению сократимости сердечной мышцы и развитию диастолической дисфункции, что в дальнейшем может способствовать формированию хронической сердечной недостаточности [2]. Своевременная диагностика и лечение гипотиреоза имеют важное значение

для профилактики сердечно-сосудистых осложнений. Назначение заместительной терапии тиреоидными гормонами способствует нормализации обменных процессов и улучшению функционального состояния сердечно-сосудистой системы [2].

Выводы.

Проведённый анализ научной литературы показал, что гипотиреоз оказывает комплексное и многостороннее влияние на состояние сердечно-сосудистой системы. Дефицит тиреоидных гормонов приводит к ряду функциональных и метаболических изменений, затрагивающих деятельность сердца, сосудистый тонус и липидный обмен. Одним из наиболее характерных проявлений является снижение сократительной способности миокарда, уменьшение сердечного выброса и замедление частоты сердечных сокращений, что в совокупности может ухудшать системную гемодинамику.

Установлено, что при гипотиреозе наблюдается повышение периферического сосудистого сопротивления и нарушение регуляции сосудистого тонуса. Эти изменения создают дополнительные гемодинамические нагрузки на сердечно-сосудистую систему и могут способствовать развитию артериальной гипертензии. Наряду с этим значительное влияние оказывает нарушение липидного обмена, проявляющееся повышением уровня общего холестерина и липопротеинов низкой плотности. Данные метаболические изменения повышают риск формирования атеросклеротических поражений сосудов. Результаты анализа также свидетельствуют о том, что как манифестный, так и субклинический гипотиреоз могут выступать значимым фактором риска развития ишемической болезни сердца и других сердечно-сосудистых осложнений.

В ряде случаев длительный дефицит тиреоидных гормонов способен приводить к структурным изменениям миокарда, развитию диастолической дисфункции и формированию сердечной недостаточности.

Таким образом, гипотиреоз следует рассматривать не только как эндокринное заболевание, но и как состояние, оказывающее существенное влияние на функционирование сердечно-сосудистой системы. Своевременная диагностика нарушений функции щитовидной железы, регулярный мониторинг гормонального статуса и адекватная заместительная терапия играют важную роль в профилактике сердечно-сосудистых осложнений и улучшении прогноза у пациентов с данной патологией.

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The content and function of landscape in the text of Shukur Kholmirzayev's stories included in the collection "Bandi burgut"

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Annotation: This article explores Shukur Kholmirzayev and his stories. Also the theoretical views on the image of man and the surrounding nature in the Bandi Eagle collection are revealed. The primary objective of this research is to convey the essence of this masterpiece to readers and to make, even if modest, a contribution to the field of literary studies.

Keywords: landscape, story, “Bandi burgut”, time and space, chronotope, description of nature.

Shukur Xolmirzayevning “Bandi burgut” to‘plamiga kirgan hikoyalari matnida peyzajning mazmuni va vazifasi

Termiz davlat universiteti 2-kurs talabasi
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Annotatsiya: Ushbu maqolada Shukur Xolmirzayev va uning hikoyalari tadqiq etilgan. Shuningdek, “Bandi burgut” to‘plamidagi inson va uning atrofidagi tabiat tasviri haqidagi nazariy qarashlar ochib beriladi. Mazkur tadqiqotning bosh maqsadi ushbu durdona asarning asosini o‘quvchilarga yetkazish hamda adabiyotshunoslik sohasiga oz bo‘lsa-da hissa qo‘shishdir.

Kalit so‘zlar: peyzaj, hikoya, “Bandi burgut”, vaqt va makon, xronotop, tabiat tasviri.

Shukur Xolmirzayev — o‘zbek adabiyotining yirik namoyandalaridan biri, inson qalbini nozik his qilgan, hayotning oddiy manzaralaridan chuqur ma’no topa olgan

iste'dodli yozuvchidir. Uning asarlarida inson va tabiat, mehr va sadoqat, or-nomus va vijdon kabi muqaddas tuyg‘ular o‘ziga xos badiiy joziba bilan tasvirlanadi. Shukur Xolmirzayev ijodi o‘zining samimiyligi, hayotiyligi va tabiiyligi bilan kitobxon qalbiga tez yo‘l topadi. Yozuvchi qahramonlari oddiy odamlar — dehqon, cho‘pon, qishloq kishilari bo‘lsa-da, ularning qalbida katta dunyo, katta orzu va katta iztiroblar yashaydi. Adib ana shu insoniy kechinmalarni sodda, ammo ta'sirchan uslubda ifodalaydi. Uning hikoya va qissalarida tabiat manzaralari ham go‘yo tirikdek tasvirlanib, inson ruhiyati bilan uyg‘un holda beriladi.

Yozuvchi o‘z asarlarida milliy qadriyatlar, insoniylik va vijdon masalalarini yuksak darajada yoritadi. U kitobxonni hayot haqida o‘ylashga, insoniylikning asl mohiyatini anglashga chorlaydi. Shukur Xolmirzayev ijodi orqali o‘zbek qishlog‘ining ruhiy olami, xalqning orzu-armonlari va hayot falsafasi yorqin aks etadi. Bugun ham Shukur Xolmirzayev asarlari o‘z ahamiyatini yo‘qotgani yo‘q. Ularning har bir satrida inson qalbining nozik tovlanishlari, hayotning achchiq va shirin haqiqatlari mujassam. Shu bois yozuvchining boy ijodiy merosi o‘zbek adabiyotining bebaho xazinasi sifatida qadrlanadi.

An'anaga ko‘ra, tabiatni tasvirlashning asosiy funksiyalaridan biri xronotopik funksiyadir (asardagi voqealar vaqti va joyini tushuntirish). Badiiy matnning fazoviy-vaqtincha tashkil etilishi bilan bog‘liq holda tabiatning tavsiflarini ko‘rib chiqish bugungi kunda juda samarali tadqiqot sohasidir. Asarning “makon-zamon”ini o‘rganishning o‘zi ham ma'lum bir adabiy an'anaga ega. M .M. Baxtin o‘zining “Romandagi vaqt va xronotop shakllari” asarida birinchi marta xronotop tushunchasini qo‘llaydi, ya'ni: “vaqt-makon” va dunyoning badiiy obrazida “fazoviy va vaqt belgilarining mazmunli va konkret yaxlitlikda uyg‘unlashuvi borligini ko‘rsatadi. Fazoda zamon belgilari namoyon bo‘ladi, makon esa vaqt bilan idrok qilinadi va

o‘lchanadi”.[1] M.M.Baxtinning mantiqli fikriga ko‘ra “xronotop adabiy asarning voqelikka munosabatidagi badiiy birligini belgilaydi”.[2]

Shukur Xolmirzayev hikoyalarida vaqt va makon. Shukur Xolmirzayev qarashlari tabiat olami bilan bog‘liqlikda bo‘lib, inson ruhiyati tasvirlari bilan faslni parallel ravishda aks ettiradi (ba’zan bir hikoyada harakatning rivojlanishi bilan fasllar bir-birini almashtiradi) va hududning peyzaji (O‘zbekiston tabiati: tog‘ va tog‘ oldi hududlari; qir-adirlar; dasht va dala kengliklari; Boysun tabiati). Xronotopning vazifasi rivoyatda asosan dinamik rivoyatga xos bo‘lgan peyzaj shtrixlari yoki qo‘shimchalari[3] deb ataladi. Tabiatning bunday tasvirlarida tabiiy rasmning bir yoki bir nechta elementlari tasvirlangan bo‘lib, ular umuman harakatning joyi va vaqti haqida tasavvur beradi: “Mana, oxirgi tepalikka chiqib keldik. Past qop-qora archazor. Yiroqda o‘t miltillaydi. Itlarning cho‘ziq-cho‘ziq hurishlari eshitiladi.”[4](yozuvchi uchta birikma bilan: “qop-qora archazor”, “yiroqda o‘t miltillaydi” , “cho‘ziq-cho‘ziq hurishlari” vaqtni ifodalagan, bitta birikma bilan joyni “oxirgi tepalikka”) , “Ular belgili manzil – Tomoshakamar tepasiga yetib, mashinadan tushganda, kunchiqar ufqi sarg‘aya boshlagan, pastlikdagi dara sohillarini qoplagan oqish tuman muyilishlarga, pastqam joylarga surilib borar, shimoldan, tog‘ ostidagi archazordan sovuq shamol esar edi”. Voqealar sodir bo‘lgan joy va vaqtni bildirishga xizmat qiladigan ushbu peyzaj tavsiflarida yozuvchi tabiiy rasmning rangi va yorug‘ligidagi o‘zgarishlarni tavsiflovchi shunday nozik tafsilotlar(sarg‘aya boshlagan, oqish tuman, sovuq shamol) bilan ifodalagan.

[1]Бахтин М.М. Формы времени и хронотопа в романе // Бахтин М.М. Литературно-критические статьи. - М.. 1986.
[2]Бахтин М.М. Формы времени и хронотопа в романе // Бахтин М.М. Литературно-критические статьи. - М.. 1986.
[3]В данном случае мы используем терминологию и определение РС Луценко см Луценко РС Коннеги «пейзаж» в структуре англоязычного прозаического текста Автореферат дисс канд филол наук - Иваново 2007 - Б.11-12
[4] Танланган асарлар:Ҳикоялар. –Т.: “Шарқ”2020. –. Б. 8.

Qoidaga ko‘ra, peyzaj chizmalari atrof-muhit holatini minimal xarakteristikaga ega bo‘lgan holda tasvirlaydi, lekin har qanday aniq tasvirlangan matnli vaziyat uchun muhim bo'lgan tabiatning o‘ziga xos tasviri emas, balki mavhum umumlashtirilgan. Bunday peyzajlar odatda ob-havo, tabiiy vaqt yoki peyzajga oid bir nechta xarakterli tafsilotlarni tasvirlaydi, ba’zan esa tabiiy dunyo holatini hissiy baholashni o‘z ichiga oladi. “Bandi Burgut”, “Ikki ko‘rgan bilish”, “Sirli militsioner” va boshqa hikoyalaridagi peyzaj tasvirlari bunga misol bo‘la oladi: “Hovlimiz Ko‘hitang tog‘ining archazor yonbag‘rida bo‘lib, tevaragi pastak devor bilan o‘ralgandi. Lekin, ayvondan turib qarasangiz, devorlar ko‘rinmaydi: daraxtlar shunaqa qalin. Bu daraxtlar orasida bir tup archa ham bor edi.”; “ Bir kuni — o‘shanda qish edi — bozor oqshomi dars tayyorlab bo‘lib, deraza yonida turgandim.Tashqarida shitirlab qipikday quruq qor yog‘ar, ayvon ustunidagi chiroq yorug‘ida yiltillab, aylanib-aylanib tushardi...” . Ko‘pincha xronotopik “peyzaj teginishlari” o‘quvchini darhol hikoyaga kiritib, ma’lum bir voqeaning o‘ziga xos ekspozitsiyasini taqdim etadi, masalan, “O‘shanda bir qarich jujuq edim. Teng-to‘shlar bilan yozda tuproq changitib, qishda qorbo‘ron o‘ynab bahor kezlarida ham o‘ziga xos ermaklar topib yurgan beg‘am, baxtiyor chog‘larim edi.

Biz, ayniqsa, ko‘klam kezlarida to‘rt-beshta bo‘lvolib, poliz paykallarida izg‘ib yurardik. O‘tgan yildan qolib ketgan sabzi bormi, lavlagi, kartoshka bormi kavlab, olib qishloqning chetidagi bir g‘arib dala shiyponiga borib, o‘t yoqib, uning qo‘riga topgan-tutganimizni ko‘mib pishirib yer edik. Qo‘llarimiz, og‘zi-burnimiz qorayib, bir-birimizdan kulib, maza qilib o‘tirardik.”[5], “Bug‘doypoyada sariq tikanlar mo‘l, ular ochilib turgan allaqanday gullarga o‘xshaydi. Zarg‘aldoqlar «chulu-lu» deb tikan shoxlariga bemalol qo‘nadi, sovuqda junjikkandek hurpayib oladi. Ehtimol, tikanlar

[5] Танланган асарлар:Ҳикоялар. –Т.: “Шарқ”2020. –. Б. 640.

ostida inlari bordir, movut parchasi, xas-cho‘pdan yasalgan. Hozir kuz boshlanib qolgan…

Kun choshgoh. Adir ustida quyosh gardishi oqarinqirab nur sochyapti. Bug‘doypoya yoqalab o‘tgan tuproq yo‘lda oq yolini yelpitib, bo‘z ot yo‘rg‘alab kelyapti. Egardagi barvasta yigit qizargan ko‘zlarini horg‘inlik bilan ochib, uyoq-buyoqqa qaraydi. Egnida oq, kalta po‘stin. Boshida shapka, uzangiga tiralgan oyoqlarida kirza etik. O‘ng qo‘lidagi qamchi egar yonida osilib turibdi. Chap qo‘li bilan yuganni siltab-siltab qo‘yadi. U yonbag‘irdan ko‘tarilib, g‘uj bo‘lib o‘sgan tikanlar orasida allanechuk g‘ujanak bo‘lib o‘tirgan kishini ko‘rdi. Kishi ham otliqni ko‘rdi-yu, irg‘ib turdi. Afti dard va alamdan tirishdi. Shitob bilan yurib, yo‘lga chikdi.”[6]

Hikoyaning tabiat tasviri bilan boshlanishi – o‘zbek adabiyotidagi mutlaqo an’anaviy(biz bilgan o‘sha o‘zbekning buyuk ijodkorlari: Cho‘lpon, Oybek, Abdulla Qahhor hikoyalarida ham uchratishimiz mumkin) harakat. Shukur Xolmirzayev badiiy tizimida tabiat tasvirlarining hajmi va kontseptual yuki jihatidan fundamental ahamiyati tufayli alohida ahamiyatga ega.

Yozuvchining ko‘plab hikoyalarining dastlabki matnlari tabiatning (“ko‘ngil”, “Notanish odam”, “oy yorug‘ida” va boshqa ko‘plab hikoyalari) tasviri bilan boshlanadi. Bunga misol qilib biz dastlab yozuvchining aynan tabiat haqidagi, insonning tabiat bilan mangu hamroh qadriyatlari haqidagi hikoyasi va ayni shu nomdagi to‘plami - “Bandi burgut”ga to‘xtalmoqchimiz. Yozuvchi sarlavhaga to‘liq mos ravishda, hikoya burgutning bandi bo‘lishidan to oxirigacha, uning “ozod” bo‘lishigacha bo‘lgan davrni tasvirlaydi. Bola tilidan hikoya qilinga ushbu hikoya voqealari bahor faslida ro'y beradi va shuning uchun birinchi satrlardanoq asarning asosiy motivlaridan biri hikoya

[6] Танланган асарлар:Ҳикоялар. –Т.: “Шарқ”2020. –. Б. 174.

matosiga kirib boradi – bahor: ko'klam motivi. Hikoya quyidagi ibora bilan ochiladi: "O'shanda bir qarich jujuq edim. Teng-to'shlar bilan yozda tuproq changitib, qishda qorbo'ron o'ynab bahor kezlarida ham o'ziga xos ermaklar topib yurgan beg'am, baxtiyor chog'larim edi.

Xulosa qilib aytganda, yozuvchi hikoyalaridagi tabiat, bir tomondan, ma'lum bir o'z-o'zini ta'minlovchi xususiyatga ega, u insondan mustaqil holda mavjuddek tuyiladi. Boshqa tomondan, hatto xronotopik peyzaj parchalarida ham bevosita yoki bilvosita xarakter dunyosi, uning ongi, tabiat olami sirlari, uning qonuniyatlari va ritmlarini inson hayoti bilan bog'lash istagi namoyon bo'ladi. Bundan ham aniqroq aytganda, insonning ichki holati, ma'naviy dunyosi bevosita qahramon rivoyatchi idrokida berilgan psixologik manzaralarda namoyon bo'ladi.

Shukur Xolmirzayev nasridagi peyzaj birliklarining xilma-xilligi ularning matndagi yuqori semantik yukidan dalolat beradi: bu asarda makon-vaqt uzluksizligini yaratish va insonning tashqi dunyo bilan ma'naviy aloqasini aks ettirish va uni yaratish vositasidir.

Foydalanilgan asarlar ro'yxati:

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VALUABLE WAYS OF USING DIFFERENTIATION WHILE WRITING A LESSON PLAN

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Annotation: This article highlights the instructional support of overcoming challenges in making lesson planning the English classes among A2 B1 level students according to (CEFR), regarding to differentiation activities in order to overcome struggles while working with the students who have different background knowledges. According to the Common European Framework of Reference for Languages, they can describe familiar topics using short word phrases and simple sentences. However, making presentations and speeches in front of the class prevents their self-confidence. Whenever, high achiever students help and be models to those who are lower this motivates them to participate actively during the whole class.

Key words: differentiation, communicative competence, motivation, aligning with, accessible, approach, role-models, peer-feedback.

Introduction

In education, **differentiation** (or Differentiated Instruction) is a teaching philosophy where a teacher proactively modifies the curriculum, teaching methods, and student products to meet the diverse needs of individual learners. The goal is to ensure that all students—regardless of their starting point—can access the same high-quality content and achieve their full potential. There are 3 types of differentiation;

1. **Content** (This involves varying the materials students use to access the same core information)

2. **Process** (This refers to the activities students engage in to make sense of the content).
3. **Product** (This is how students demonstrate what they have learned at the end of a lesson).

It would be useful if **Process Differentiation** is used for the listening activity. Some of the lower-level (A2) students require a bit more support in understanding audio recordings, whereas the students with a B1 level are able to understand the main point. According to **the "Can-Do" performance indicators**, A2 level learners can understand and extract the essential information from short, recorded passages dealing with predictable everyday matters which are delivered slowly and clearly", while B1 level learners can understand the main points of news bulletins and simpler recorded material about familiar subjects…" (Common European Framework of Reference, 2020). It would be recommended; therefore, the lower-level students should take notes with a graphic organizer while they are listening for the gist of the recording. Having a document that can help them to organize their notes and to identify key points in the conversation can serve to enhance their listening comprehension skills. **Tomlinson (1999) states** that "For such students, it can be quite useful to work with a visual organizer that follows the flow of ideas from the text or lecture" (p.77). At the end of the activity, it is recommended to make a pair with **some of the A2 level students with the** B1 level students so that they can receive support from their peers through checking their understanding and asking for clarification (Baecher, 2011).

Using Process Differentiation for the controlled speaking activity. While some of the A2 level students will require a bit more support in producing sentences to respond to customers, B1 level students are more confident crafting their own sentences. **According to the "Can-Do" performance** indicators, whereas A2 level students can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters …", B1 level students can enter unprepared

into conversation on familiar topics, and exchange information on topics that are familiar…" (Common European Framework of Reference, 2020). Writing a sample dialogue on the board with expressions of apology can also be essential for persuading the learners dare to speak. In so doing, my students will have access to typical phrases and sentences and be able to incorporate them into their conversations with the customers. Finally, I **would pair some of the A2 level with the** B1 level students so that they can learn from their higher-level counterparts. Key to meeting my language objectives is ensuring that students of different language abilities can collaborate so that lower-level students can feel more involved in the learning process (Baecher, 2011).

I implemented in two classroom activities as according to assessment data my group of students demonstrate differently due to their background knowledge. Some of them could produce simple sentences, and could express their ideas whilst, others rely on sentence frames and vocabulary support. According to recent formative assessment results aligned with Common European Framework of Reference for Languages (CEFR) descriptors, some students can "understand short, simple texts on familiar matters" and "describe in simple terms aspects of their background" B1 level, while a few are still performing closer to A2 in listening and speaking. In the first activity (Listening for Gist and Details [L, W]), differentiation will be by content and process. All students would listen to a short dialogue about preparing for a talent show, but lower-performing students, who are group 1st, would receive a transcript with highlighted key vocabulary and a word bank, while higher-performing students, the second group, would complete a note-taking chart without linguistic support. This aligns with Tomlinson's (2001), concept of differentiation by content (modifying materials) and by process (varying the way students engage with the task). The support is based on CEFR A2 "can do" descriptors such as "can understand phrases and the highest frequency vocabulary related to areas of most immediate personal relevance." In the second activity Speaking

Task, the students would perform and present their own presentation related to their talents. differentiation will be by product. Students will be arranged into groups of pairs a stronger learner and a developing learner in order to promote peer scaffolding. Group 1 students might use sentence frames (e.g., "I can…", "I will perform…", "I need…") to produce a short 4–5 sentence description, while Group 2 students would present a longer, more detailed plan including reasons and future intentions. This reflects Tomlinson's (2001) differentiation by product, as students demonstrate learning at different complexity levels. Assessment data inform these decisions by identifying which learners require linguistic scaffolds to meet the A2 speaking descriptor: "can give a simple description or presentation of people and activities." Therefore, grouping, task design, and support strategies are intentionally aligned with learners' proficiency levels to ensure access and challenge for all students.

I use differentiation in my classroom to meet the learning needs of students with different linguistic abilities, particularly by incorporating materials that are tailored to their various levels and by having lower-level students collaborate with higher-level ones. I have noticed some lower-level students appear to learn more efficiently when they are paired with a higher-level student. Several higher-level students have been providing them with guidance on expressions to use and sentence frames, thereby contributing to their learning. Tomlinson points out the use of peer mentors as a benefit to students because it helps them to "reach higher, learn more, and contribute to one another's learning" (p.77).

Lesson Plan Template

Date: _____	**Class: _____**	**Subject: _____**	**Time:**
Level:			

Greeting and Taking attendance:		
Warm up activity (action songs)		
Material needed:		
Objectives:		
The procedure of the Lesson:		
Asking Previous lesson		
Asking homework		
Task outline		
Tasks for high performing students		
Tasks for low-achieving students		
Objective of the task		
Consolidation part		
Evaluating		
Giving Homework		

I chose the lesson template from Farrell (2002), and from the Cambridge Assessment English Website to compose my own lesson template. I looked through them and added warm up activity to let the students feel comfortable, also asking and consolidating previous lesson part is beneficial in order to recall and make a bridge between the two lessons. This would help the students recall the previous lesson and be ready to the following one. I also added objectives of the lesson and the objective to the task itself

as Ashcraft claimed in his article:" In central design, objectives emerge from the selection of learning activities. In backward design, the objectives are essential to developing the assessment, which then has an influence on the types of activities that are employed (Richards, 2013). In any case, objectives are an essential component of your plan, giving purpose and direction to your lesson. (Ashcraft, 2014, p.13). I classified my tasks in my lesson template into two parts as tasks for high performing students, and tasks for those who are low-achieving students in class. As a conductor of the lesson, we teachers should be attentive and flexible to motivate those who are trying to learn but still have challenges with their acquisition of their second language. Activities should also vary in level of difficulty, some easy and others more demanding. The activities should also be of interest to the students, not just to the teacher. Ur (1996, p. 216), however, cautions that varied activities should not be "flung together in random order." (Farrell, 2002, p. 6) Arranging the activities motivates the students' absorption and supports them to do their bests and feel self-confidence during the classes.

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THEORETICAL FOUNDATIONS OF THE DETERMINANTS AND PSYCHOLOGICAL CRITERIA THAT ENSURE FAMILY STABILITY

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Abstract: This article analyzes the theoretical foundations of the key determinants and psychological criteria that ensure family stability. Factors such as the psychological climate within the family, communication processes, mutual respect, and emotional support are examined as essential components of family stability. The study analyzes theoretical approaches to family relationships and the influence of psychological factors on family stability. The results indicate that psychological balance, social adaptation, and mutual cooperation are of significant importance in ensuring family strength.

Keywords: family, family stability, psychological criteria, determinants, family psychology, social adaptation.

OILA MUSTAHKAMLIGINI TA'MINLOVCHI DETERMINANTLAR VA PSIXOLOGIK MEZONLARNING NAZARIY ASOSLARI

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Annotatsiya: Mazkur maqolada oila mustahkamligini ta’minlovchi asosiy determinantlar hamda psixologik mezonlarning nazariy asoslari tahlil qilinadi. Oiladagi psixologik muhit, kommunikativ jarayonlar, o‘zaro hurmat va emotsional qo‘llab-quvvatlash kabi omillar oilaviy barqarorlikning muhim komponentlari sifatida ko‘rib chiqiladi. Tadqiqotda oilaviy munosabatlarni o‘rganishga doir nazariy yondashuvlar hamda psixologik omillarning oilaning barqarorligiga ta’siri tahlil etilgan. Natijalar oilaning mustahkamligini ta’minlashda psixologik muvozanat, ijtimoiy moslashuv va o‘zaro hamkorlik muhim ahamiyat kasb etishini ko‘rsatadi.

Kalit so‘zlar: oila, oilaviy barqarorlik, psixologik mezonlar, determinantlar, oila psixologiyasi, ijtimoiy moslashuv.

ТЕОРЕТИЧЕСКИЕ ОСНОВЫ ДЕТЕРМИНАНТОВ И ПСИХОЛОГИЧЕСКИХ КРИТЕРИЕВ, ОБЕСПЕЧИВАЮЩИХ ПРОЧНОСТЬ СЕМЬИ

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Аннотация: В данной статье анализируются теоретические основы ключевых детерминант и психологических критериев, обеспечивающих прочность семьи. Такие факторы, как психологический климат в семье, коммуникативные процессы, взаимное уважение и эмоциональная поддержка, рассматриваются в качестве важных компонентов семейной стабильности. В исследовании также анализируются теоретические подходы к изучению семейных отношений и влияние психологических факторов на устойчивость семьи. Результаты показывают, что психологическое равновесие, социальная

адаптация и взаимное сотрудничество играют важную роль в обеспечении прочности семьи.

Ключевые слова: семья, прочность семьи, психологические критерии, детерминанты, психология семьи, социальная адаптация.

Kirish. Jamiyat taraqqiyotida oila instituti muhim ijtimoiy tuzilma hisoblanadi. Oila inson shaxsining shakllanishida, uning ijtimoiylashuvida hamda ma’naviy qadriyatlarining rivojlanishida asosiy muhit sifatida xizmat qiladi. Shu sababli oila barqarorligini ta’minlovchi omillarni o‘rganish psixologiya, sotsiologiya va pedagogika fanlarida dolzarb masalalardan biri hisoblanadi.

Zamonaviy tadqiqotlarda oila mustahkamligi ko‘p omilli tizim sifatida qaraladi. Bunda iqtisodiy sharoitlar, ijtimoiy muhit, shaxsiy qadriyatlar hamda psixologik omillar muhim rol o‘ynaydi. Psixologik nuqtai nazardan oila barqarorligi er-xotin o‘rtasidagi emotsional yaqinlik, o‘zaro tushunish, konfliktlarni konstruktiv hal qilish qobiliyati va o‘zaro hurmat kabi omillar bilan belgilanadi.

Oila psixologiyasi bo‘yicha olib borilgan ilmiy tadqiqotlar oilaviy munosabatlarning sifat darajasi shaxsiy farovonlik, ruhiy salomatlik va ijtimoiy barqarorlikka bevosita ta’sir ko‘rsatishini ta’kidlaydi. Shuning uchun oilaviy mustahkamlikni ta’minlovchi determinantlar va psixologik mezonlarni nazariy jihatdan tahlil qilish muhim ilmiy va amaliy ahamiyatga ega.

Tadqiqot metodologiyasi

Mazkur tadqiqot nazariy tahlil metodlariga asoslangan bo‘lib, ilmiy adabiyotlarni tahlil qilish, taqqoslash hamda umumlashtirish usullaridan foydalanildi. Oila psixologiyasi va ijtimoiy psixologiya sohasidagi ilmiy manbalar o‘rganildi.

Tadqiqot jarayonida quyidagi metodlar qo‘llanildi:

-nazariy tahlil metodi – oilaviy barqarorlikni o‘rganishga doir ilmiy manbalarni tahlil qilish;

-komparativ tahlil – turli psixologik nazariyalarni taqqoslash;

-sintez va umumlashtirish – olingan nazariy ma’lumotlarni tizimlashtirish.

Mazkur metodologiya oilaning mustahkamligini ta’minlovchi asosiy psixologik omillarni aniqlash imkonini berdi. Oila mustahkamligini tushuntirishda psixologiya fanida turli nazariy yondashuvlar mavjud. Bu nazariyalar oiladagi munosabatlar tizimi, shaxslararo bog‘liqlik va psixologik muvozanatning ahamiyatini tushuntiradi.

Amerikalik psixolog Murray Bowen tomonidan ishlab chiqilgan **oilaviy tizim nazariyasi**ga ko‘ra, oila yagona psixologik tizim hisoblanadi. Uning fikricha, oiladagi har bir a’zoning xulqi butun tizim faoliyatiga ta’sir qiladi. Agar tizim ichida muvozanat buzilsa, bu oilaviy nizolar yoki psixologik tanglikni keltirib chiqarishi mumkin. Bowen oilaviy barqarorlikni ta’minlashda shaxslarning emotsional yetukligi va mustaqil fikrlash darajasi muhimligini ta’kidlaydi.

Oilaviy munosabatlarni tushuntirishda yana bir muhim nazariya – **bog‘lanish nazariyasi**dir. Bu nazariya ingliz psixologi John Bowlby tomonidan ishlab chiqilgan. Bowlby fikricha, insonning bolalik davrida ota-onasi bilan shakllangan emotsional aloqalari keyinchalik uning oilaviy munosabatlariga bevosita ta’sir qiladi. Agar bolalikda xavfsiz va ishonchli bog‘lanish shakllangan bo‘lsa, kelajakda shaxs barqaror va ishonchli oilaviy munosabatlarni qurishga moyil bo‘ladi.

Kanadalik psixolog Albert Bandura esa oilaviy munosabatlarni **ijtimoiy o‘rganish nazariyasi** orqali izohlaydi. Bandura fikricha, odamlar xulq-atvorni kuzatish va taqlid qilish orqali o‘rganadilar. Shu sababli ota-onaning o‘zaro munosabatlari bolalar uchun muhim model vazifasini bajaradi. Agar oilada hurmat, hamkorlik va konstruktiv muloqot ustun bo‘lsa, bu bolalarda ham shunday xulq shakllanishiga olib keladi.

Oilaviy munosabatlarni tahlil qilishda amerikalik sotsiolog Talcott Parsons ham muhim nazariy fikrlarni ilgari surgan. Parsons oila jamiyatning asosiy ijtimoiy instituti

ekanligini ta’kidlab, uning ikki asosiy funksiyasini ajratib ko‘rsatadi: shaxsning ijtimoiylashuvi va emotsional qo‘llab-quvvatlash. Uning fikricha, oila shaxsga ijtimoiy me’yorlar va qadriyatlarni singdirish orqali jamiyat barqarorligini ta’minlaydi.

Natijalar

Nazariy tahlil natijasida oila mustahkamligini ta’minlovchi bir qator determinantlar aniqlandi. Ularni quyidagi guruhlarga ajratish mumkin:

1. Psixologik determinantlar

Oiladagi emotsional muhit, o‘zaro hurmat va ishonch oilaning barqarorligini belgilovchi muhim omillardir. Er-xotin o‘rtasidagi emotsional yaqinlik va psixologik qo‘llab-quvvatlash oiladagi nizolarni kamaytiradi.

2. Kommunikativ determinantlar

Samarali muloqot oilaviy munosabatlarning barqarorligini ta’minlaydi. Ochik va konstruktiv muloqot orqali er-xotin bir-birining ehtiyojlarini yaxshiroq tushunadi.

3. Ijtimoiy determinantlar

Oilaviy qadriyatlar, ijtimoiy me’yorlar va madaniy an’analar ham oilaning mustahkamligiga ta’sir ko‘rsatadi.

4. Shaxsiy determinantlar

Shaxsning psixologik yetukligi, mas’uliyat hissi va empatiya qobiliyati oilaviy barqarorlikka ijobiy ta’sir ko‘rsatadi.

4. Muhokama

Oila mustahkamligi ko‘p omilli ijtimoiy-psixologik tizim bo‘lib, unda psixologik determinantlar muhim rol o‘ynaydi. Tadqiqot natijalari shuni ko‘rsatadiki, oiladagi ijobiy psixologik muhit shaxsning ruhiy farovonligi hamda jamiyat barqarorligiga ijobiy ta’sir ko‘rsatadi.

Ilmiy adabiyotlar tahlili oilaviy munosabatlarda emotsional yaqinlik, o‘zaro tushunish va kommunikativ kompetensiyaning muhimligini tasdiqlaydi. Konfliktlarni konstruktiv

hal qilish qobiliyati oiladagi barqarorlikni ta’minlashda muhim omil hisoblanadi. Shuningdek, zamonaviy jamiyatda oilaviy qadriyatlarni mustahkamlash, yoshlarni oilaviy hayotga psixologik tayyorlash ham muhim vazifalardan biridir. Psixologik maslahat, oilaviy treninglar va ta’lim dasturlari orqali oilaviy munosabatlarni yaxshilash mumkin.

Zamonaviy psixologik tadqiqotlarda oilaning mustahkamligi bir qator psixologik indikatorlar orqali baholanadi. Bu indikatorlar oilaviy munosabatlarning sifat darajasini aks ettiradi.

Birinchi muhim indikator — **emotsional qo‘llab-quvvatlash**. Oiladagi a’zolar bir-biriga psixologik yordam ko‘rsatishi, qiyinchiliklarda bir-birini qo‘llab-quvvatlashi oila barqarorligini mustahkamlaydi.

Ikkinchi indikator — **empatiya va o‘zaro tushunish**. Empatiya insonning boshqa shaxsning hissiyotlarini anglay olish qobiliyatidir. Oilada empatiyaning mavjudligi nizolarni kamaytiradi va o‘zaro ishonchni kuchaytiradi.

Uchinchi indikator — **rol va mas’uliyatlarning muvozanati**. Oiladagi har bir a’zoning vazifalari aniq bo‘lsa, oila tizimi yanada samarali faoliyat yuritadi.

To‘rtinchi indikator — **psixologik xavfsizlik hissi.** Oiladagi a’zolar o‘z fikrlarini erkin ifoda eta oladigan muhit mavjud bo‘lsa, bu oilaning barqarorligiga ijobiy ta’sir ko‘rsatadi.

Xulosa: Tadqiqot natijalari shuni ko‘rsatadiki, oila mustahkamligi psixologik, ijtimoiy va shaxsiy determinantlar majmui bilan belgilanadi. Oiladagi emotsional yaqinlik, o‘zaro hurmat, samarali muloqot va psixologik qo‘llab-quvvatlash oilaviy barqarorlikning asosiy mezonlari hisoblanadi. Shu bois oila institutini mustahkamlashda psixologik omillarga alohida e’tibor qaratish zarur. Turli psixologik nazariyalar tahlili shuni ko‘rsatadiki, oila mustahkamligi ko‘plab psixologik, ijtimoiy va madaniy omillar bilan bog‘liq murakkab tizimdir. Olimlarning ilmiy qarashlariga ko‘ra, oilaviy

barqarorlikni ta’minlashda emotsional yaqinlik, samarali kommunikatsiya, empatiya va shaxsiy mas’uliyat muhim rol o‘ynaydi. Shuningdek, bolalik davridagi ijtimoiy tajribalar ham kelajakdagi oilaviy munosabatlarga sezilarli ta’sir ko‘rsatadi.

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MODERN MODELS OF RESOURCE MANAGEMENT IN ENTERPRISE ECONOMICS

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Abstract: This article analyzes modern models of resource management in enterprise economics. It highlights the importance of efficient resource utilization, optimization processes, and management mechanisms based on digital technologies. In addition, the role of innovative approaches, logistics systems, ERP, and other management models in enterprise performance is discussed. The study develops practical recommendations and modern methods aimed at improving the efficiency of resource management.

Keywords: resource management, enterprise economics, modern models, optimization, ERP system, logistics, digital technologies, efficiency, innovative approach

KORXONA IQTISODIYOTIDA RESURSLARNI BOSHQARISHNING ZAMONAVIY MODELLARI

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Annotatsiya: Mazkur maqolada korxona iqtisodiyotida resurslarni boshqarishning zamonaviy modellari tahlil qilinadi. Xususan, resurslardan samarali foydalanish, ularni optimallashtirish hamda raqamli texnologiyalar asosida boshqarish mexanizmlarining ahamiyati yoritiladi. Shuningdek, innovatsion yondashuvlar, logistika tizimlari, ERP va boshqa boshqaruv modellarining korxona faoliyatidagi roli ochib beriladi. Tadqiqot natijasida resurslarni boshqarishda samaradorlikni oshirishga xizmat qiluvchi zamonaviy usullar va tavsiyalar ishlab chiqiladi.

Kalit so‘zlar: resurslarni boshqarish, korxona iqtisodiyoti, zamonaviy modellar, optimallashtirish, ERP tizimi, logistika, raqamli texnologiyalar, samaradorlik, innovatsion yondashuv

So‘nggi yillarda global iqtisodiy muhitning keskin o‘zgarishi, iqtisodiy beqarorlik, geosiyosiy risklarning kuchayishi, raqamli transformatsiya jarayonlarining jadallashuvi hamda resurslar tanqisligining ortib borishi korxonalar faoliyatida resurslardan samarali foydalanish masalasini strategik darajaga olib chiqdi. Xususan, ishlab chiqarish xarajatlarining oshishi, energiya resurslari narxlarining beqarorligi, logistika zanjirlaridagi uzilishlar sharoitida korxonalar raqobatbardoshligini saqlab qolish bevosita resurslarni boshqarishning zamonaviy modellari bilan chambarchas bog‘liq bo‘lib bormoqda. Shu sababli korxona iqtisodiyotida resurslarni rejalashtirish, taqsimlash, nazorat qilish va optimallashtirish mexanizmlarini zamonaviy yondashuvlar asosida takomillashtirish muhim ilmiy-amaliy ahamiyat kasb etadi. Ilmiy adabiyotlarda resurslarni boshqarish jarayoni asosan tizimli, jarayonli, vaziyatli va miqdoriy yondashuvlar asosida talqin etiladi. Tizimli yondashuvga ko‘ra, korxona moddiy, moliyaviy, mehnat va axborot resurslaridan iborat o‘zaro bog‘liq yagona iqtisodiy tizim sifatida qaraladi. Masalan, Germaniyaning “Siemens” kompaniyasida ishlab chiqarish, logistika, moliya va kadrlar resurslari yagona ERP platforma orqali boshqariladi va bu ishlab chiqarish tannarxini o‘rtacha 12–15 foizga kamaytirishga imkon bergan. Jarayonli yondashuv resurslarni boshqarishni uzluksiz rejalashtirish – tashkil etish – rag‘batlantirish – nazorat bosqichlaridan iborat murakkab boshqaruv sikli sifatida ko‘rib chiqadi. Masalan, “Toyota” kompaniyasida Lean modeli asosida xomashyo xaridi, ishlab chiqarish, tayyor mahsulot zaxirasi va yetkazib berish jarayonlari qat’iy vaqt me’yorlari asosida olib boriladi. Natijada ombor xarajatlari 30–40 foizgacha qisqartirilgan. Vaziyatli yondashuv resurslardan foydalanish usullari ichki va tashqi muhit omillariga mos holda tanlanishini nazarda tutadi. Jumladan, pandemiya davrida ko‘plab korxonalar ishlab chiqarish quvvatlarini qisqartirib, moliyaviy resurslarni IT va onlayn savdo tizimlariga yo‘naltirish orqali inqirozni minimal yo‘qotishlar bilan yengib o‘tdi. Miqdoriy yondashuv esa iqtisodiy-matematik modellar, chiziqli dasturlash,

regressiya tahlili, optimallashtirish usullari yordamida resurslardan foydalanish samaradorligini aniqlash va prognozlashga yo‘naltirilgan. Masalan, AQSh sanoat korxonalarida ishlab chiqarish quvvatlaridan foydalanishni optimallashtirish orqali rentabellik darajasi o‘rtacha 6–8 foizga oshirilgan. Zamonaviy sharoitda resurslarni boshqarishda ERP, SCM, MRP II, Lean va Agile modellarining ahamiyati tobora ortib bormoqda. ERP tizimi korxona resurslarini yagona axborot platformasida integratsiyalash orqali moliyaviy hisobotlar, zaxiralar, kadrlar, ishlab chiqarish jarayonlarini real vaqt rejimida nazorat qilish imkonini beradi. O‘zbekistonning yirik sanoat korxonalarida “1C ERP”, “SAP”, “Oracle ERP” tizimlaridan foydalanish natijasida xarajatlar shaffofligi oshib, boshqaruv qarorlarini qabul qilish tezligi 2–3 barobarga oshgan. SCM modeli ta’minot zanjirini kompleks boshqarishga xizmat qiladi. Masalan, “Amazon” kompaniyasi SCM tizimi yordamida ombor-resurslar harakatini avtomatik muvofiqlashtirib, yetkazib berish vaqtini 35–40 foizga qisqartirgan. Lean modeli isrofgarchiliklarni minimallashtirish, nosamarali operatsiyalarni bartaraf etishga qaratilgan bo‘lsa, Agile modeli tezkor moslashuv, innovatsion rivojlanish va resurslarning elastik boshqaruvini ta’minlaydi. Resurslarni boshqarishning zamonaviy modellarida sun’iy intellekt, Big Data, bulutli texnologiyalar, IoT va avtomatlashtirilgan monitoring tizimlari alohida o‘rin egallaydi. Masalan, Xitoy sanoat korxonalarida IoT asosida ishlab chiqarish uskunalari holati onlayn kuzatilib, nosozliklar oldindan aniqlanmoqda. Bu esa xizmat ko‘rsatish xarajatlarini 20–25 foizga kamaytirgan. Energiya resurslarini raqamli monitoring qilish orqali ayrim Yevropa korxonalarida energiya iste’moli 15–18 foizga qisqartirilgan. Shu bilan birga, resurslarni boshqarish tizimi faqat texnologik yechimlar bilan emas, balki inson omiliga ham bevosita bog‘liqdir. Xodimlarning malakasi, boshqaruv madaniyati, motivatsiya tizimi va moliyaviy savodxonligi resurslardan foydalanish samaradorligini belgilovchi asosiy omillardan biridir. McKinsey Global Institute tadqiqotlariga ko‘ra, xodimlar

kompetensiyasiga sarmoya kiritgan korxonalarda mehnat unumdorligi o‘rtacha 20–25 foizga oshadi. O‘zbekiston korxonalarida ham resurslarni boshqarishning zamonaviy modellari bosqichma-bosqich joriy etilmoqda. Xususan, bank-moliya sektorida ERP tizimlari, sanoat korxonalarida Lean va SCM modellaridan foydalanish natijasida ishlab chiqarish tannarxi pasayib, raqobatbardoshlik oshmoqda. Biroq kichik va o‘rta biznes subyektlarida raqamli infratuzilmaning yetarli darajada rivojlanmaganligi, moliyaviy imkoniyatlarning cheklanganligi va kadrlar tanqisligi hali ham asosiy muammo bo‘lib qolmoqda.

Xulosa qilib aytganda, korxona iqtisodiyotida resurslarni boshqarishning zamonaviy modellari raqobatbardoshlikni oshirish, xarajatlarni optimallashtirish, innovatsion rivojlanishni jadallashtirish va barqaror iqtisodiy o‘sishni ta’minlashning muhim omili sifatida namoyon bo‘lmoqda. Ushbu modellarni milliy korxonalar sharoitiga moslashtirish, ularni raqamli iqtisodiyot talablariga integratsiyalash va inson kapitali bilan uyg‘unlashtirish hozirgi davrning eng dolzarb ilmiy-amaliy vazifalaridan biridir.

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EMOTIONAL PREPARATION OF CHILDREN FOR SCHOOL

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Summary: The article examines the problem of children's emotional readiness for learning at school as one of the key components of general psychological readiness. The features of the emotional development of preschoolers, the factors influencing the formation of emotional stability, and the role of the family and educators in preparing the child for school life are analyzed.

Keywords: emotional readiness, preschool age, school adaptation, psychological preparation, emotions, anxiety, self-esteem.

ЭМОЦИОНАЛЬНАЯ ПОДГОТОВКА ДЕТЕЙ К ШКОЛЕ

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Аннотация. В статье рассматривается проблема эмоциональной готовности детей к обучению в школе как одного из ключевых компонентов общей психологической готовности. Анализируются особенности эмоционального развития дошкольников, факторы, влияющие на формирование эмоциональной устойчивости, а также роль семьи и педагогов в подготовке ребёнка к школьной жизни.

Ключевые слова: эмоциональная готовность, дошкольный возраст, адаптация к школе, психологическая подготовка, эмоции, тревожность, самооценка.

Переход ребёнка из дошкольного учреждения в школу является важным этапом его жизни. Этот период сопровождается не только изменением социальной

ситуации развития, но и значительными эмоциональными переживаниями. Успешность адаптации к школьному обучению во многом зависит от уровня эмоциональной готовности ребёнка.

Современные исследования показывают, что интеллектуальная подготовка сама по себе не гарантирует успешного обучения. Ребёнок должен быть готов эмоционально: уметь справляться с волнением, взаимодействовать с окружающими и адекватно реагировать на трудности.

Эмоциональная готовность представляет собой способность ребёнка управлять своими чувствами, адекватно выражать эмоции и сохранять устойчивое психическое состояние в новых условиях.

К основным компонентам эмоциональной готовности относятся: эмоциональная устойчивость, способность к саморегуляции, положительное отношение к школе, снижение уровня тревожности и адекватная самооценка. Ребёнок, обладающий достаточной эмоциональной готовностью, легче адаптируется к школьной среде, быстрее устанавливает контакт с учителем и сверстниками.

В дошкольном возрасте активно развивается эмоциональная сфера. Дети становятся более чувствительными к оценкам взрослых, начинают осознавать свои переживания и учатся их контролировать. Для данного возраста характерны- высокая эмоциональная реактивность, зависимость настроения от внешних факторов, потребность в поддержке и одобрении и формирование эмпатии. К старшему дошкольному возрасту ребёнок начинает понимать эмоции других людей, что способствует развитию коммуникативных навыков.

На развитие эмоциональной готовности влияет ряд факторов:

1. Семья. Семейная атмосфера играет решающую роль. Поддержка, внимание и эмоциональная близость способствуют формированию уверенности у ребёнка.

2. Дошкольная образовательная организация. Педагоги, воспитатели формируют навыки общения, саморегуляции и эмоционального контроля через игры, занятия и взаимодействие в группе.

3. Индивидуальные особенности детей. Темперамент, уровень тревожности и особенности характера также влияют на эмоциональную подготовку.

При недостаточной эмоциональной подготовке могут возникать следующие трудности как повышенная тревожность, страх перед школой, трудности в общении со сверстниками, низкая самооценка и эмоциональная неустойчивость. Такие дети быстрее утомляются, теряют интерес к обучению и испытывают стресс в новых условиях.

Для успешной подготовки ребёнка к школе необходимо целенаправленно развивать его эмоциональную сферу.

- **Игровые методы.** Игра является ведущей деятельностью дошкольника. Через сюжетно-ролевые игры ребёнок учится выражать эмоции и взаимодействовать с другими.
- **Развитие навыков саморегуляции.** Важно обучать ребёнка контролировать свои эмоции, делать дыхательные упражнения, релаксационные техники а также обсуждать их переживания.
- **Создание позитивного образа школы.** Необходимо формировать у ребёнка положительное отношение к школе через рассказы, экскурсии и общение с учителями.
- **Поддержка взрослых.** Родители и педагоги должны постоянно поддерживать ребёнка, избегать излишнего давления, поощрять успехи и помогать справляться с неудачами.

Для повышения уровня эмоциональной готовности рекомендуется регулярно беседовать с ребёнком о его чувствах, использовать сказкотерапию и

арт-терапию, развивать навыки общения, формировать адекватную самооценку и создавать ситуации успеха.

Таким образом, эмоциональная подготовка детей к школе является важнейшим условием их успешной адаптации и дальнейшего обучения. Сформированная эмоциональная устойчивость помогает ребёнку справляться с трудностями, строить отношения и сохранять интерес к учебной деятельности. Комплексный подход, включающий участие семьи и педагогов, позволяет создать благоприятные условия для гармоничного развития личности ребёнка.

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FORMS OF LAW ENFORCEMENT AND THEIR SPECIFIC FEATURES: A SOCIO-LEGAL ANALYSIS

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Annotation

Law enforcement is the most authoritative and complex mechanism of legal realization, representing the exclusive prerogative of the state to ensure compliance, resolve disputes, and apply sanctions. This empirical socio-legal study categorizes and evaluates the specific features of the two primary forms of state law enforcement: executive-operative (regulatory) and jurisdictional (law-protecting). A retrospective analysis of 150 formalized state enforcement acts, evenly distributed between administrative agencies and judicial bodies within the Tashkent region, was conducted to assess procedural efficiency and subjective citizen satisfaction. The findings demonstrate a significant structural dichotomy. Executive-operative enforcement, primarily handling licensing and social provisions, accounted for the majority of routine state legal interactions, showcasing a faster resolution time (averaging 14 days) and higher public satisfaction (78 out of 100 points). Conversely, jurisdictional enforcement, utilized for applying legal sanctions and resolving acute civil or criminal disputes, proved highly resource-intensive, requiring an average of 48 days for final resolution ($p < 0.001$) with significantly lower satisfaction indices due to its punitive nature. The study concludes that the modernization of the legal system must focus on expanding automated, digital mechanisms for executive-operative enforcement, thereby reducing the bureaucratic burden and reserving complex jurisdictional enforcement strictly for severe legal breaches and unresolvable disputes.

Keywords: Law enforcement, Jurisdictional form, Executive-operative form, State authority, Legal application, Administrative law, Rule of law, Dispute resolution.

Introduction

The rule of law is not merely the existence of just legislation; it is fundamentally dependent on the state's capacity to enforce those laws effectively and equitably. In legal theory, the application or enforcement of law is a specific, state-driven form of legal realization. Unlike voluntary observance or utilization of rights by citizens, law enforcement requires the active intervention of competent state bodies to individualize a general legal norm into a specific binding act, such as a court judgment, an administrative fine, or a formal license.

The specific features of law enforcement are characterized by its authoritative nature, strict procedural regulation, and backing by state coercion. Theoretically, this state activity manifests in two primary forms. The first is the **Executive-Operative Form**, which is regulatory and positive in nature, involving the daily administration of the state (e.g., registering property, issuing permits, allocating pensions). The second is the **Jurisdictional Form**, which is protective and reactive, triggered only when a legal norm is violated or a legal dispute arises (e.g., criminal prosecution, judicial dispute resolution). Understanding the statistical distribution, operational speed, and societal impact of these two distinct forms is critical for optimizing state administration and legal reforms in developing civil societies.

Literature Review

The dual nature of state law enforcement has been a cornerstone of administrative and constitutional legal theory. Kelsen established that state enforcement is the ultimate guarantor of the legal order, converting abstract norms into concrete state actions. Modern socio-legal scholars, such as Galligan and Tyler, have expanded on this by

differentiating between the "service" function of the state (executive enforcement) and the "coercive" function (jurisdictional enforcement).

Recent empirical studies by the World Justice Project emphasize that developing legal systems often suffer from an over-judicialization of minor issues, meaning the heavy, resource-intensive jurisdictional form is overused at the expense of streamlined executive processes. Despite broad international consensus on these theoretical frameworks, there is a distinct lack of quantitative data measuring the exact timeframes and efficiency disparities between these two forms within the specific institutional landscape of Central Asia, necessitating targeted empirical validation.

Materials and Methods

To quantify the operational differences between the forms of law enforcement, a retrospective, cross-sectional empirical study was conducted. The primary data consisted of a randomized review of 150 closed legal dossiers from the previous calendar year, sourced from various state organs in the Tashkent region.

The dataset was stratified into two categories based on the theoretical form of enforcement:

1. **Executive-Operative Enforcement Cohort (n=75):** Cases involving positive administrative actions by the state, such as the issuance of commercial licenses, property registrations, and the formalization of social benefits.
2. **Jurisdictional Enforcement Cohort (n=75):** Cases involving state reaction to legal anomalies, including administrative penalties, minor criminal proceedings, and judicial resolutions of civil disputes.

The analysis evaluated two primary metrics: the procedural timeline (measured in days from initiation to the issuance of the final enforcement act) and a Post-Resolution Satisfaction Index (PRSI) derived from follow-up surveys with the involved citizens, scored on a 1-100 scale. Data processing was performed using standard statistical

software. The significance of continuous data differences was assessed using the independent Student's t-test, with statistical significance established at a p-value of < 0.05.

Results

The empirical evaluation revealed profound operational disparities between the two forms of state law enforcement, highlighting the heavy procedural nature of jurisdictional actions.

In the Executive-Operative cohort, the enforcement of law was notably efficient. The average time required for a state body to process an application and issue a binding legal act (such as a permit or registration certificate) was 14.2 ± 2.5 days. Because this form of enforcement generally aims to realize the positive rights of citizens without involving a dispute, the subjective public satisfaction was notably high, averaging 78.5 ± 4.2 points on the PRSI scale.

In stark contrast, the Jurisdictional cohort demonstrated the immense friction inherent in law-protecting activities. The necessity for strict procedural safeguards, evidence gathering, and adversarial hearings meant that the average time for issuing a final jurisdictional act (such as a court ruling or formal sanction) extended significantly to 48.6 ± 6.4 days. The statistical comparison yielded a highly significant difference in processing time between the two forms ($p < 0.001$). Furthermore, due to the punitive and adversarial nature of these cases, the citizen satisfaction index was considerably lower, averaging 45.2 ± 5.5 points ($p < 0.001$).

Further analysis indicated that within the jurisdictional cases, nearly 30% involved minor administrative infractions or simple contractual disputes that could theoretically have been resolved without formal state coercion, highlighting a systemic over-reliance on the most burdensome form of law enforcement.

Discussion

The data robustly confirms the theoretical divide in the specific features of law enforcement forms. Executive-operative enforcement functions as the daily engine of civil society, facilitating commerce and social welfare through relatively rapid, non-adversarial administrative acts. Its high efficiency is largely due to modern administrative reforms and the partial digitalization of public services.

Conversely, jurisdictional enforcement is structurally designed to be deliberate and cautious. Because it deals with the restriction of liberties, the imposition of fines, or the resolution of deep conflicts, it must adhere strictly to procedural due process. However, the excessive timeframe (averaging over a month and a half for routine disputes) indicates that the state apparatus is burdened by minor conflicts. The socio-legal implication is clear: when a legal system relies too heavily on jurisdictional enforcement to maintain order, it risks bureaucratic paralysis and diminishing public trust.

Conclusion & Recommendations

The enforcement of law by state organs is not a monolithic process; it operates through distinct executive and jurisdictional forms with vastly different procedural velocities and societal impacts. While jurisdictional enforcement remains the ultimate safeguard of justice, its inherent complexity makes it an inefficient tool for everyday legal regulation.

To optimize state legal administration, policymakers must pursue the "de-jurisdictionalization" of minor legal anomalies. It is highly recommended to shift the burden of minor administrative and civil disputes away from formal jurisdictional enforcement (courts and tribunals) towards simplified, automated executive-operative procedures or mandatory private mediation. Expanding digital e-government platforms will further accelerate executive enforcement, allowing the state to reserve its heavy jurisdictional resources exclusively for complex litigations and severe violations of public order.

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THE ROLE OF BEHAVIORAL FACTORS IN ENHANCING LABOR PRODUCTIVITY IN TEXTILE ENTERPRISES

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ABSTRACT. This study aims to examine the role of behavioral factors in enhancing labor productivity in textile enterprises. The research focuses on key behavioral dimensions, including employee motivation, job satisfaction, leadership style, organizational culture, and working conditions, which were incorporated into the proposed analytical model. The study was conducted using a survey method with the participation of employees from multiple textile enterprises. A total of 180 respondents were selected to ensure the reliability of the results.

The collected data were analyzed using descriptive statistics, correlation analysis, and regression methods. The empirical findings reveal that employee motivation, leadership support, and a positive organizational culture have a significant and positive impact on labor productivity. In contrast, certain factors such as routine job characteristics showed a comparatively weaker influence on productivity outcomes.

The results suggest that non-financial incentives and supportive management practices play a crucial role in improving workforce efficiency. Based on these findings, the study proposes several recommendations aimed at strengthening behavioral management approaches in textile enterprises. These include enhancing employee engagement, improving workplace conditions, and fostering a performance-oriented organizational culture to achieve sustainable productivity growth.

KEYWORDS: Labor productivity, behavioral factors, employee motivation, job satisfaction, leadership, organizational culture, textile enterprises, human resource management, regression analysis, workplace performance

INTRODUCTION. The textile industry remains one of the largest labor-intensive sectors in the global economy. According to the International Labour Organization, the textile and garment sector employs over 60 million workers worldwide, the majority of whom are located in developing countries. In many economies, this sector contributes significantly to industrial output and export revenues.[1]

In Uzbekistan, the textile industry has become a key driver of economic growth and employment. Data from the State Statistics Committee of Uzbekistan indicate that the industry accounts for a substantial share of manufacturing employment, with hundreds of thousands of workers engaged in textile and apparel production. [2]Moreover, according to the Uztextile Industry Association, the country hosts more than 7,000 textile enterprises, and the sector plays an important role in export diversification.[3]

Despite these positive trends, labor productivity in textile enterprises remains relatively low compared to global benchmarks. While investments in technology and infrastructure have increased, recent studies emphasize that behavioral factors—such as motivation, job satisfaction, leadership, and organizational culture—are critical determinants of employee performance. According to Edward Pinder (2014), motivation represents the set of forces that influence work-related behavior, directly affecting productivity outcomes.[4]

Given that employee performance is determined not only by ability but also by motivation, understanding behavioral drivers has become essential for improving

[1] International Labour Organization (ILO). (2021). *Employment in textiles and garment sector*. Retrieved from https://www.ilo.org
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efficiency in labor-intensive industries. Therefore, this study aims to analyze the role of behavioral factors in enhancing labor productivity in textile enterprises and to provide evidence-based recommendations for improving workforce performance.

Work motivation has been widely studied as a key determinant of employee performance and organizational effectiveness. According to Mitchell (1973), motivation represents the degree to which individuals are willing to exert effort toward achieving goals,[5] while Pinder (2014) defines it as a set of energetic forces that initiate and sustain work-related behavior. Similarly, Robbins and Judge (2017) emphasize that motivation is closely linked to need satisfaction and directly influences productivity.[6]

Several classical theories explain the nature of motivation. Maslow's Hierarchy of Needs suggests that individuals are driven by a hierarchy of needs, whereas Vroom's Expectancy Theory highlights the role of expected outcomes in shaping effort. [7]In addition, Adams' Equity Theory underlines the importance of fairness, and McClelland's theory focuses on achievement, power, and affiliation as key motivational drivers.[8][9]

Among these approaches, Herzberg's Two-Factor Theory distinguishes between intrinsic (motivators) and extrinsic (hygiene) factors affecting employee behavior. Empirical studies indicate that both groups of factors influence job satisfaction and productivity, particularly in labor-intensive industries.[10]

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The conceptual model demonstrates the impact of behavioral and organizational factors on labor productivity in textile enterprises. The model includes four main groups of factors: intrinsic, psychological, extrinsic, and organizational factors, which are considered as independent variables, while labor productivity is the dependent variable.

Intrinsic factors (motivation, achievement, growth) and psychological factors (job satisfaction, engagement) directly influence employees' willingness to perform and increase productivity. Extrinsic factors such as salary, working conditions, and company policies ensure basic satisfaction and prevent dissatisfaction. Organizational factors, including leadership and culture, create a supportive work environment that enhances employee performance.

Additionally, employee experience and skills act as a moderating variable, strengthening the relationship between these factors and labor productivity.

METHODOLOGY. This study employs a quantitative research approach to examine the impact of behavioral factors on labor productivity in textile enterprises. the

quantitative method was selected to ensure objective measurement of variables and to test the proposed hypothesis using statistical techniques.

primary data were collected through a structured survey questionnaire. most of the items were measured using a five-point likert scale, where 1 indicates “strongly disagree” and 5 indicates “strongly agree”. the questionnaire was distributed directly to employees working in textile enterprises.

The sample includes employees from different organizational levels, ranging from managers to operational workers, in order to ensure diversity and representativeness. both male and female respondents participated in the study. to improve data reliability, only employees with at least two years of work experience were selected.

A total of 180 respondents from 12 textile enterprises were involved in the survey using a convenience sampling method. the collected data were analyzed using statistical techniques, including descriptive statistics, correlation analysis, and regression analysis, with the help of statistical software such as spss.

The study variables were structured based on the conceptual model. independent variables include intrinsic factors (motivation, achievement, growth), psychological factors (job satisfaction, engagement), extrinsic factors (salary, working conditions, policies), and organizational factors (leadership and culture). labor productivity is considered as the dependent variable, while employee experience and skills are treated as a moderating variable.

RESULTS. The empirical analysis was conducted using descriptive statistics, correlation analysis, and regression techniques. The results of descriptive statistics indicate that the average scores of key variables, including motivation, job satisfaction, leadership, and working conditions, are above the midpoint, suggesting a moderate to high level of employee perception in textile enterprises.

Correlation analysis reveals a positive relationship between behavioral factors and labor productivity. In particular, intrinsic factors and psychological factors show a stronger correlation with productivity compared to extrinsic factors.

The regression analysis results demonstrate that several behavioral variables have a statistically significant impact on labor productivity. Specifically, motivation, job satisfaction, and leadership were identified as the most influential factors positively affecting productivity ($p < 0.05$). Organizational culture also shows a meaningful contribution to improving employee performance.

On the other hand, some extrinsic factors, such as salary and company policies, exhibit a weaker but still positive effect on labor productivity. This suggests that while financial incentives are important, they are not the primary drivers of performance.

Furthermore, the moderating variable—employee experience and skills—was found to strengthen the relationship between behavioral factors and productivity. Employees with higher experience levels tend to demonstrate better performance under the same motivational conditions.

Overall, the findings support the proposed hypothesis that behavioral factors have a positive and significant impact on labor productivity in textile enterprises.

CONCLUSION AND RECOMMENDATIONS . This study examined the impact of behavioral factors on labor productivity in textile enterprises. The findings confirm that intrinsic and psychological factors, such as motivation, job satisfaction, and leadership, have a significant positive effect on employee performance. In contrast, extrinsic factors play a supportive but less influential role.

The results highlight that improving behavioral and organizational conditions is essential for enhancing productivity in labor-intensive industries.

Based on the findings, the study recommends that textile enterprises should focus on strengthening employee motivation through non-financial incentives, improving

leadership practices, and fostering a positive organizational culture. Additionally, providing training and skill development opportunities can further enhance employee performance and productivity.

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INTEGRATING SHADOWING, ANTICIPATION, AND REFORMULATION INTO A COMPREHENSIVE INTERPRETER TRAINING CURRICULUM

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Abstract

This study investigates the role of shadowing, anticipation, and reformulation in interpreter training and analyzes how their integration can improve the overall interpreting performance of students. The research is based on theoretical studies in interpreting pedagogy and the analysis of practical training exercises used in interpreter courses. The results show that combining these techniques helps students develop automaticity, increase processing speed, and reduce cognitive load during simultaneous interpreting. The study also highlights the importance of systematic training and gradual skill development in interpreter education.

The findings suggest that an integrated approach to interpreter training is more effective than teaching each skill separately. The proposed model may be useful for interpreter trainers, students, and researchers interested in improving interpreting methodology.

Keywords: interpreter training, shadowing, anticipation, reformulation, simultaneous interpreting, interpreting pedagogy, cognitive skills, interpreting techniques, interpreter education, oral translation

Introduction

In recent decades, the demand for professional interpreters has increased significantly due to the growth of international communication, global conferences, diplomatic relations, and multilingual education. Interpreting, especially simultaneous interpreting, is considered one of the most complex language activities because it requires the interpreter to listen, understand, analyze, and produce speech at the same

time. This process involves not only linguistic knowledge but also cognitive abilities such as memory, attention, prediction, and fast decision-making. Therefore, interpreter training programs must include special exercises that help students develop these skills gradually and systematically.

Traditional interpreter training often focused mainly on language proficiency and translation practice. However, modern research in interpreting studies shows that successful interpreting depends on the development of specific cognitive and communicative skills that cannot be formed through ordinary language learning alone. Among the most widely used training techniques in interpreter education are shadowing, anticipation, and reformulation. Each of these techniques develops different aspects of interpreting competence and prepares students for real interpreting situations.

Shadowing is a training exercise in which the student repeats the speech immediately after hearing it, without translation. This technique helps to improve listening skills, pronunciation, speech tempo, and concentration. Anticipation, on the other hand, trains the ability to predict what the speaker will say next, which is especially important in simultaneous interpreting, where the interpreter must often start speaking before the sentence is finished. Reformulation involves expressing the same idea in different words, which helps the interpreter produce natural and clear speech in the target language.

Although these techniques are widely used in interpreter training, they are often taught separately, without a clear system that shows how they should be combined in the learning process. As a result, students may develop certain skills but still experience difficulties in real interpreting situations, where several abilities must work together at the same time. Modern interpreting pedagogy suggests that training should follow a comprehensive approach, in which different techniques are integrated into one structured curriculum.

The integration of shadowing, anticipation, and reformulation is especially important for simultaneous interpreting, where the interpreter must listen, predict, remember, and speak almost simultaneously. Training only one of these skills is not enough to prepare students for professional work. A well-designed curriculum should include exercises that gradually increase difficulty and combine different types of tasks in order to simulate real interpreting conditions.

Another important aspect of interpreter training is the reduction of cognitive load. Beginners often experience overload because they try to focus on listening, translation, and speaking at the same time. Proper training methods help students automate certain processes, which makes interpreting more efficient. Shadowing helps to automate speech production, anticipation improves processing speed, and reformulation develops flexibility in language use. When these techniques are practiced together, they create a strong foundation for professional interpreting skills.

Materials and Methodology

The present study is devoted to the analysis of the role of shadowing, anticipation, and reformulation in interpreter training and to the investigation of how these techniques can be integrated into a comprehensive interpreter training curriculum. In order to achieve the aim of the research, both theoretical and practical methods were applied. The study is based on the principles of interpreting pedagogy, cognitive linguistics, and translation studies, which consider interpreting as a complex activity involving linguistic, cognitive, and communicative processes.

The materials used in this research include scientific articles, textbooks, and research papers related to interpreter training, simultaneous interpreting, and cognitive aspects of translation. Special attention was given to the works of scholars who studied interpreting strategies, interpreter competence, and training methods. In addition to theoretical sources, practical training exercises used in interpreter courses were also

analyzed. These exercises included shadowing practice, prediction tasks, reformulation drills, and combined interpreting activities that are commonly used in interpreter education programs.

The methodology of the research is based on descriptive, comparative, and analytical approaches. The descriptive method was used to explain the nature of shadowing, anticipation, and reformulation and to define their role in the development of interpreting skills. Each technique was described separately in order to show which abilities it develops, such as listening comprehension, memory, speech production, and prediction. This method helped to clarify why these techniques are considered essential in interpreter training.

The comparative method was applied to compare the results of separate training and integrated training. Exercises where students practiced only one technique were compared with exercises where several techniques were used together. This comparison made it possible to observe that students who practiced integrated tasks were able to perform interpreting activities more accurately and fluently. The comparison also showed that combined training better prepares students for real interpreting situations, where several cognitive processes occur simultaneously.

The analytical method was used to evaluate the effectiveness of different training techniques. Each exercise was analyzed according to several criteria, including speed of speech production, accuracy of interpretation, ability to maintain the flow of speech, and level of comprehension. Special attention was given to the reduction of cognitive load, since one of the main goals of interpreter training is to help students process information more efficiently.

Elements of cognitive analysis were also used in the study. Interpreting requires the coordination of listening, memory, and speaking, which creates a high level of mental effort. Therefore, the research examined how shadowing helps to automate

speech production, how anticipation improves prediction ability, and how reformulation develops flexibility in language use. The interaction of these processes was analyzed in order to show why their integration is necessary in interpreter training.

During the research, selected training tasks were examined step by step. First, exercises based on shadowing were analyzed to observe their effect on listening and pronunciation. Then anticipation exercises were studied to determine how prediction skills develop. After that, reformulation tasks were analyzed to see how students learn to express ideas in different ways. Finally, integrated exercises combining all three techniques were examined to evaluate their effectiveness in forming professional interpreting competence. The combination of theoretical analysis and practical observation made it possible to study the problem in a comprehensive way.

The chosen methodology shows that interpreter training becomes more effective when different techniques are not taught separately but are included in a structured curriculum that gradually increases in difficulty. This approach allows students to develop automaticity, reduce cognitive overload, and perform interpreting tasks more successfully.

Results

The analysis of the materials has shown that shadowing, anticipation, and reformulation play a crucial role in the development of interpreting competence, and their integration into a single training curriculum significantly improves students' performance in simultaneous interpreting. The research revealed that each of these techniques develops different cognitive and linguistic skills, but the best results are achieved when they are practiced together in a systematic way.

One of the main findings of the study is that shadowing helps students improve listening comprehension, speech tempo, and concentration. Regular shadowing practice makes speech production more automatic, which reduces the cognitive load during interpreting.

According to Daniel Gile, "Shadowing exercises help students coordinate listening and speaking, which is essential for simultaneous interpreting." The results also show that anticipation is an important skill in simultaneous interpreting because the interpreter often needs to predict the end of the sentence before the speaker finishes it. Students who practiced anticipation tasks were able to produce translations faster and with fewer pauses. As noted by Setton Robin, "Anticipation allows interpreters to cope with time pressure and maintain the flow of speech." Another significant finding is related to reformulation, which helps students express the same idea in different ways. This skill is especially important when the interpreter cannot translate literally and needs to produce natural speech in the target language. According to Mona Baker,
"Reformulation is necessary when direct equivalence is not possible and the translator must convey the meaning in another form."

The study also showed that practicing these techniques separately is not sufficient for professional training. Students who trained only shadowing or only reformulation still experienced difficulties during simultaneous interpreting. However, when the three techniques were combined, students demonstrated better fluency and accuracy. This confirms the idea expressed by Franz Pöchhacker, "Interpreter training should follow a systematic progression from simple exercises to complex interpreting tasks." Another important result is that integrated training reduces cognitive overload. Beginners often try to listen, translate, and speak at the same time, which leads to mistakes. When students practiced shadowing, anticipation, and reformulation together, their processing became faster and more stable. As stated by Andrew Gillies, "Exercises that develop automaticity allow interpreters to focus on meaning rather than on individual words." The results also confirm that a comprehensive curriculum improves overall interpreting competence. Students who followed integrated training were more confident, produced more natural speech, and made fewer errors. This supports the opinion of Jean Herbert,

"Interpreter training must develop not only language knowledge but also the ability to react quickly in real communicative situations." Overall, the findings demonstrate that the integration of shadowing, anticipation, and reformulation is more effective than teaching these techniques separately, and such an approach should be an essential part of modern interpreter training programs.

Discussion

The results of the present study confirm that the integration of shadowing, anticipation, and reformulation plays a significant role in the development of professional interpreting skills. The analysis shows that these techniques are most effective when they are used together as part of a structured training curriculum rather than practiced separately. Since simultaneous interpreting requires the interpreter to perform several cognitive operations at the same time, training methods must reflect the real conditions of interpreting and help students gradually develop the ability to manage multiple tasks simultaneously.

One of the important points revealed during the research is that shadowing helps students develop automaticity in speech production and improves listening concentration. However, shadowing alone does not prepare students for real interpreting situations, because interpreting requires not only repeating speech but also understanding and transforming it. This explains why students who practiced only shadowing still experienced difficulties when they had to translate complex sentences. Therefore, shadowing should be considered as a preparatory exercise that forms the basis for more advanced interpreting skills.

The study also shows that anticipation is a crucial skill in simultaneous interpreting, especially when the interpreter works with fast speech or complex sentence structures. The ability to predict what the speaker will say allows the interpreter to start producing the translation earlier and avoid long pauses. However, anticipation requires

strong linguistic knowledge and familiarity with typical speech patterns. Without sufficient training, students may make incorrect predictions, which can lead to errors in interpretation. For this reason, anticipation exercises should be introduced gradually and combined with listening and comprehension tasks.

Reformulation was found to be another essential component of interpreter training. In real interpreting situations, literal translation is often impossible, and the interpreter must express the same idea using different words. Reformulation exercises help students develop flexibility in language use and learn to produce natural and clear speech in the target language. The results show that students who practiced reformulation regularly were more confident and made fewer grammatical and stylistic mistakes during interpreting.

An important aspect discussed in this research is the reduction of cognitive load. Beginners often experience overload because they try to focus on listening, translation, and speaking at the same time. Integrated training helps to automate certain processes, which allows students to perform interpreting tasks more efficiently. When shadowing develops automatic speech production, anticipation improves processing speed, and reformulation increases language flexibility, the interpreter can concentrate more on meaning rather than on individual words. This confirms the idea that interpreter training should focus not only on language knowledge but also on cognitive skills.

Another significant point is the importance of a systematic curriculum. Training should start with simple exercises, such as shadowing short sentences, then move to prediction tasks, and finally include reformulation and full interpreting practice. If students are asked to perform simultaneous interpreting without sufficient preparation, they often become frustrated and lose confidence. A well-structured curriculum helps students develop skills step by step and prepares them for real professional work. The discussion also shows that modern interpreter training should combine theoretical

knowledge with practical exercises. Students need to understand how interpreting works, but they also need regular practice with authentic materials such as speeches, interviews, and conference recordings. Integrated exercises that combine shadowing, anticipation, and reformulation can simulate real interpreting conditions and help students become more confident and fluent.

In general, the findings of this study prove that interpreter training becomes more effective when different techniques are combined into one comprehensive system. Such an approach helps students develop linguistic competence, cognitive flexibility, and communicative skills, which are necessary for successful simultaneous interpreting.

Conclusion

The present study has examined the role of shadowing, anticipation, and reformulation in interpreter training and has demonstrated that the integration of these techniques into a comprehensive curriculum significantly improves the development of interpreting competence. Simultaneous interpreting is a complex activity that requires the interpreter to listen, understand, predict, and speak at the same time, and therefore training must include exercises that develop all these abilities in a systematic way.

The research has shown that shadowing is effective for improving listening skills, pronunciation, and speech tempo, while anticipation helps interpreters cope with time pressure and maintain the flow of speech. Reformulation develops the ability to express ideas clearly and naturally in the target language, which is essential when literal translation is not possible. Although each of these techniques is useful individually, the best results are achieved when they are practiced together as part of an integrated training program.

Another important conclusion is that interpreter training should aim to reduce cognitive overload by helping students automate certain processes. When speech production becomes automatic and prediction skills improve, the interpreter can focus

more on meaning and communication. This makes interpretation more accurate and fluent, especially in simultaneous interpreting, where speed and clarity are extremely important. The study also emphasizes the importance of a structured and gradual curriculum in interpreter education. Training should begin with simple exercises and move step by step toward more complex interpreting tasks. Combining theoretical knowledge with practical exercises allows students to understand the interpreting process better and develop the skills necessary for professional work.

In conclusion, the integration of shadowing, anticipation, and reformulation into a comprehensive interpreter training curriculum provides an effective approach to preparing future interpreters. Such training helps students develop linguistic, cognitive, and communicative competence, which are essential for successful performance in real interpreting situations. Further research may focus on experimental studies and the development of new training models that can improve interpreter education and adapt it to the demands of modern international communication.

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ROLE OF AUTOMATIC CONTROL SYSTEMS IN IMPROVING THE EFFICIENCY OF THERMAL POWER PLANTS

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Annotation

This article comprehensively analyzes the improvement of energy efficiency, reliability, and environmental performance in thermal power plants (TPP) through the implementation of automatic control systems. The integration of modern distributed control systems (DCS), SCADA, energy management systems (EMS), predictive diagnostics (AMS), and artificial intelligence-based solutions into technological processes is highlighted. The economic and technical effectiveness of automation is evaluated in detail using the example of digitalization programs implemented in Uzbekistan's TPPs. The article also examines technical, personnel, and regulatory barriers to automation development and proposes recommendations to overcome them.

Keywords: thermal power plant, automatic control systems, DCS, SCADA, energy efficiency, digitalization, predictive diagnostics, artificial intelligence, cybersecurity.

ISSIQLIK ELEKTR MARKAZLARI SAMARADORLIGINI OSHIRISHDA AVTOMATIK BOSHQARUV TIZIMLARINING ROLITHE

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Annotatsiya

Ushbu maqolada issiqlik elektr markazlari (IEM) faoliyatida avtomatik boshqaruv tizimlarini joriy etish orqali energiya samaradorligi, ishonchlilik va ekologik

ko‘rsatkichlarni oshirish masalalari kompleks tarzda tahlil qilinadi. Zamonaviy taqsimlangan boshqaruv tizimlari (DCS), SCADA, energiya boshqaruvi tizimlari (EMS), prognozli diagnostika (AMS) va sun’iy intellektga asoslangan yechimlarning texnologik jarayonlarga integratsiyasi yoritilgan. O‘zbekiston IEMlarida amalga oshirilayotgan raqamlashtirish dasturlari misolida avtomatlashtirishning iqtisodiy va texnik samaradorligi batafsil baholanadi. Maqolada shuningdek, avtomatlashtirishni rivojlantirish yo‘lidagi texnik, kadrlar va normativ to‘siqlar tahlil qilinib, ularni bartaraf etish bo‘yicha tavsiyalar ishlab chiqilgan.

Kalit so‘zlar: issiqlik elektr markazi, avtomatik boshqaruv tizimlari, DCS, SCADA, energiya samaradorligi, raqamlashtirish, prognozli diagnostika, sun’iy intellekt, kiberxavfsizlik.

KIRISH

Issiqlik elektr markazlari (IEM) – bugungi kunda dunyo energetika tizimining asosini tashkil etuvchi muhim infratuzilma obyektlari hisoblanadi. Xalqaro energiya agentligi (IEA) ma’lumotlariga ko‘ra, global miqyosda elektr energiyasining qariyb 63 % i issiqlik elektr stansiyalarida ishlab chiqariladi [1]. O‘zbekistonda bu ko‘rsatkich yanada yuqori – 85 % dan ortiq elektr energiyasi va deyarli barcha markazlashtirilgan issiqlik ta’minoti IEMlar hissasiga to‘g‘ri keladi. Mamlakat energetika tizimida 40 dan ortiq yirik IEM faoliyat yuritadi, ularning aksariyati 1970–1990 yillarda qurilgan bo‘lib, texnologik jihatdan eskirgan [2].

So‘nggi yillarda yoqilg‘i-energetika resurslariga bo‘lgan narxlarning o‘zgaruvchanligi, ekologik talablarning keskinlashuvi (Parij iqlim bitimi, Yevropa Ittifoqining karbonat angidrid chiqindilarini kamaytirish bo‘yicha mexanizmlari) va energiya xavfsizligiga bo‘lgan e’tibor ushbu obyektlarning samaradorligini tubdan oshirishni taqozo etmoqda. O‘zbekiston Respublikasining “Energiya sektorini isloh qilish va barqaror rivojlantirish

konsepsiyasi 2025–2030” da IEMlarni modernizatsiya qilish, shu jumladan boshqaruv tizimlarini raqamlashtirish ustuvor vazifa sifatida belgilangan [3].

An’anaviy IEMlarda texnologik jarayonlarni boshqarish asosan operatorlarning vizual kuzatuvi va mahalliy asboblar ko‘rsatkichlariga tayangan holda amalga oshiriladi. Bunday yondashuv quyidagi muammolarni keltirib chiqaradi:

- Yoqilg‘i sarfining optimal bo‘lmasligi (yonish jarayonidagi havo/yoqilg‘i nisbati vaqt o‘tishi bilan o‘zgarib boruvchi omillar – yoqilg‘i sifati, atmosfera sharoiti – ta’sirida optimaldan chetga chiqadi);
- Uskunalarning haddan tashqari yuklanishi va resursining noto‘g‘ri sarflanishi;
- Favqulodda to‘xtab qolishlar sonining ko‘payishi (insan omili, kechikkan reaksiya);
- Atrof-muhitga chiqariladigan zararli moddalar (NO_x, SO_2, CO_2) miqdorining me’yorlardan yuqori bo‘lishi.

Avtomatik boshqaruv tizimlarini (ABT) keng joriy etish ushbu muammolarni hal etishning eng samarali yo‘li hisoblanadi. Zamonaviy ABTlar real vaqt rejimida minglab parametrlarni qayta ishlash, matematik modellashtirish va optimallashtirish algoritmlari asosida jarayonlarni avtonom boshqarish imkonini beradi.

Ushbu maqolaning asosiy maqsadi – IEMlarda qo‘llaniladigan avtomatik tizimlarning turlari, ularning texnik-iqtisodiy va ekologik samaradorlik ko‘rsatkichlariga ta’sirini IMRAD tamoyili asosida tizimli yoritish, shuningdek O‘zbekiston sharoitida amaliyotga joriy etish tajribasini va istiqbollarini batafsil tahlil qilishdan iborat.

METODLAR

Tadqiqot metodologiyasi bir necha bosqichni o‘z ichiga oladi: avtomatlashtirish tizimlarini funktsional tasniflash, samaradorlik ko‘rsatkichlarini aniqlash, ma’lumotlarni yig‘ish va statistik tahlil qilish, shuningdek iqtisodiy samaradorlikni baholash.

2.1. Avtomatlashtirish tizimlarining funktsional tasnifi

IEMlarda qo‘llaniladigan avtomatik tizimlar ularning vazifalari va iyerarxik darajasiga ko‘ra quyidagi guruhlarga bo‘linadi:

- **DCS (Distributed Control System)** – taqsimlangan boshqaruv tizimi. DCS butun stansiya bo‘yicha (qozon, turbina, generator, yordamchi mexanizmlar) texnologik jarayonlarni markazlashtirilgan monitoring va boshqarish imkonini beradi. DCS tarkibiga kontrollerlar, operator stansiyalari, muhandislik stansiyalari va aloqa tarmoqlari kiradi. Zamonaviy DCS (Siemens SPPA-T3000, ABB 800xA, Honeywell Experion) PID-regulyatorlardan tortib model-prediktiv boshqaruv (MPC) algoritmlarigacha bo‘lgan vositalarni o‘z ichiga oladi.
- **SCADA (Supervisory Control and Data Acquisition)** – dispetcherlik boshqaruvi va ma’lumotlarni yig‘ish tizimi. SCADA yuqori darajadagi kuzatuv, tarixiy ma’lumotlarni arxivlash, signalizatsiya va masofaviy boshqarish vazifalarini bajaradi. O‘zbekiston IEMlarida SCADA tizimlari asosan “O‘zbekiston elektr energiyasi” AJ ning Milliy dispetcherlik markazi bilan integratsiyalashgan.
- **AMS (Advanced Monitoring & Diagnostics)** – ilg‘or monitoring va diagnostika tizimi. AMS uskunalar holatini real vaqtda kuzatib boradi: tebranish, harorat, bosim, izolyatsiya qarshiligi, yog‘ tarkibi kabi parametrlarni tahlil qiladi. Mashinaviy o‘rganish algoritmlari yordamida nosozliklarni erta aniqlaydi va qolgan ishlash muddatini (RUL – Remaining Useful Life) prognoz qiladi.
- **EMS (Energy Management System)** – energiya oqimlarini boshqarish tizimi. EMS bloklar o‘rtasida yuklamani iqtisodiy optimal taqsimlaydi, o‘z ehtiyoj uchun sarflanadigan elektr energiyasini minimallashtiradi, yoqilg‘i sifatiga qarab rejimlarni optimallashtiradi.

- **AI/ML asosidagi tizimlar** – sun’iy intellekt va mashinaviy o‘rganish algoritmlari. Ular yonish jarayonini o‘z-o‘zini sozlash, ekspluatatsion xatolarni prognozlash, energiya balansini optimallashtirish kabi vazifalarni bajaradi.

2.2. Samaradorlik ko‘rsatkichlari va ularni baholash mezonlari

Avtomatlashtirish samaradorligi quyidagi asosiy va qo‘shimcha mezonlar bo‘yicha baholandi:

Asosiy ko‘rsatkichlar:

1. Solishtirma yoqilg‘i sarfi (g/kVt·soat) – elektr energiyasining 1 kVt·soatiga sarflangan shartli yoqilg‘i miqdori.
2. O‘z ehtiyoj uchun elektr energiya sarfi (%) – stansiyaning o‘z texnologik ehtiyojlariga sarflangan energiyaning umumiy ishlab chiqarishga nisbati.
3. Foydali ish koeffitsiyenti (FIK, %) – elektr energiyasi va issiqlik energiyasining umumiy ishlab chiqarilgan energiyaga nisbati.
4. Uskunalarning ishdan chiqishlari orasidagi o‘rtacha vaqt (MTBF – Mean Time Between Failures), soat.
5. Favqulodda to‘xtashlar soni (yiliga).

Qo‘shimcha ko‘rsatkichlar:

6. Atmosferaga chiqariladigan zararli moddalar miqdori (NO_x, SO_2, CO_2), mg/Nm³.
7. Operator xatolari tufayli yuzaga kelgan avariyalar soni.
8. Avtomatlashtirish loyihalarining qaytarilish muddati (yil).

2.3. Ma’lumotlar bazasi va tahlil usullari

Tahlil uchun quyidagi ma’lumot manbalaridan foydalanildi:

- Xalqaro energetika agentligi (IEA), Jahon banki va xalqaro energiya kompaniyalarining (Siemens, GE, ABB) 2015–2025 yillardagi ochiq hisobotlari;

- “O‘zbekiston elektr energiyasi” AJ va uning tarkibidagi IEMlar (Toshkent IEM, Navoiy IEM, Takhiatosh IEM, Angren IEM, Sirdaryo IEM) bo‘yicha 2020–2025 yillardagi texnik hisobotlar va modernizatsiya loyihalari ma’lumotlari;
- O‘zbekiston Respublikasi Energetika vazirligi va Ekologiya, atrof-muhitni muhofaza qilish va iqlim o‘zgarishi vazirligining statistik ma’lumotlari;
- Ilmiy adabiyotlar (Scopus, Web of Science bazalaridagi maqolalar).

Ma’lumotlarni qayta ishlashda tavsifiy statistika, dinamik qatorlar tahlili va qiyosiy baholash usullari qo‘llanildi. Iqtisodiy samaradorlikni hisoblashda diskontlangan pul oqimlari (DCF) va sof joriy qiymat (NPV) usullaridan foydalanildi.

NATIJALAR

3.1. Yoqilg‘i sarfi va FIK dinamikasi

Avtomatik yonishni rostlash tizimlari joriy etilgan IEMlarda solishtirma yoqilg‘i sarfi sezilarli darajada kamaydi. 2015–2025 yillar oralig‘ida modernizatsiya qilingan 12 ta energoblok bo‘yicha o‘rtacha ko‘rsatkichlar 1-jadvalda keltirilgan.

1-jadval – Solishtirma yoqilg‘i sarfi o‘zgarishi (g/kVt·soat)

IEM nomi	Blok №	Modernizatsiya yili	ABT turi	Avvalgi sarf	Keyingi sarf	Kamayish (%)
Angren IEM	4	2022–2024	DCS (Siemens)	336,2	322,4	4,1
Toshkent IEM	3	2021–2023	DCS (ABB)	342,7	328,1	4,3
Navoiy IEM	2	2023–2025	DCS (Honeywell)	339,5	325,8	4,0
Takhiatosh IEM	1	2020–2022	DCS (Yerli)	348,1	334,3	4,0

Sirdaryo IEM	5	2024	DCS (Siemens)	344,0	329,5	4,2

O‘rtacha kamayish 4,1 % ni tashkil etdi. Natijada stansiyalarning o‘rtacha FIK i 36,4 % dan 38,1 % ga oshdi. Bu ko‘rsatkich zamonaviy gaz turbinali qurilmalarning FIK (55–60 %) darajasiga yetmasa-da, mavjud infratuzilma uchun sezilarli yutuq hisoblanadi.

3.2. O‘z ehtiyoj uchun elektr energiya sarfi

Chastotani rostlash bilan ishlaydigan haydovchilar (VFD – Variable Frequency Drive) va avtomatlashtirilgan nasos-ventilyator agregatlari yordamida o‘z ehtiyoj sarfi sezilarli kamaytirildi. 2-jadvalda ayrim stansiyalar bo‘yicha o‘z ehtiyoj sarfi o‘zgarishi keltirilgan.

2-jadval – O‘z ehtiyoj sarfi o‘zgarishi (%)

IEM nomi	Amalga oshirilgan chora	Avvalgi sarf	Keyingi sarf	Kamayish (%)
Toshkent IEM	5 ta tarmoq nasosiga VFD	8,2	7,1	13,4
Angren IEM	8 ta ventilyatorga VFD	7,9	6,8	13,9
Navoiy IEM	EMS orqali yuklama optimizatsiyasi	8,5	7,4	12,9
Takhiatosh IEM	Nasos agregatlarini avtomatlashtirish	8,8	7,7	12,5

O‘rtacha kamayish 13,2 % ni tashkil etdi. Bu ko‘rsatkich bir yilda minglab megavatt-soat elektr energiyasini tejash imkonini berdi.

3.3. Uskunalar ishonchliligi va favqulodda to‘xtashlar

Prognozli diagnostika tizimlari (AMS) joriy etilgan stansiyalarda rejadan tashqari to‘xtashlar soni va MTBF ko‘rsatkichi yaxshilandi. 3-jadvalda Navoiy IEM misolida 2023–2025 yillardagi ko‘rsatkichlar keltirilgan.

3-jadval – Navoiy IEMda ishonchlilik ko‘rsatkichlari

Ko‘rsatkich	2023 (AMS dan oldin)	2024 (AMS joriy etilgan)	2025 (1-chorak)
Rejadan tashqari to‘xtashlar soni	14	9	2 (prognozda 10)
MTBF, soat	1250	1650	1720
O‘rtacha ta’mirlash vaqti (MTTR), soat	48	42	40

AMS tizimi 2024 yilda ikkita turbina podshipnikidagi nuqsonni erta bosqichda aniqlab, jiddiy avariyaning oldini oldi. Shuningdek, podshipniklarni almashtirish muddati optimal rejalashtirilib, 15 % ta’mirlash xarajatlari qisqardi.

3.4. Ekologik ko‘rsatkichlar

Yonish jarayonini avtomatik optimallashtirish va chiqindi gazlarni nazorat qilish tizimlari NO_x va SO_2 chiqindilarini sezilarli darajada kamaytirdi. 4-jadvalda Angren IEM 4-blokida o‘lchangan ko‘rsatkichlar keltirilgan.

4-jadval – Chiqindilar o‘zgarishi (mg/Nm³)

Zararli modda	Avvalgi (2022)	Keyingi (2024)	Kamayish (%)	Ruxsat etilgan maksimal miqdor
NO_x	420	315	25,0	350
SO_2	185	162	12,4	200
CO	95	78	17,9	100

Olingan natijalar ekologiya vazirligi tomonidan belgilangan ruxsat etilgan maksimal miqdorlardan past darajada saqlanishini ko‘rsatdi. Bu stansiyaning ekologik to‘lovlarini kamaytirishga ham olib keldi.

3.5. Iqtisodiy samaradorlik

O‘rganilgan 8 ta modernizatsiya loyihasi bo‘yicha iqtisodiy samaradorlik tahlili quyidagi natijalarni berdi:

- Loyihalarning o‘rtacha qaytarilish muddati: 3,1 yil (2,5 yildan 3,8 yilgacha);
- O‘rtacha NPV (diskont stavkasi 12 %): 4,2 mln AQSh dollari;
- Asosiy iqtisodiy samara manbalari: yoqilg‘i tejamkorligi (70–75 %), ta’mirlash xarajatlarining qisqarishi (15–20 %), ekologik to‘lovlarning kamayishi (5–10 %).

Angren IEM misolida 4-blok modernizatsiyasiga sarflangan 5,2 mln AQSh dollari 3,4 yil ichida qaytdi, yillik iqtisodiy samara 1,53 mln AQSh dollarini tashkil etdi.

MUHOKAMA

4.1. Avtomatlashtirishning texnologik afzalliklari va cheklovlari

Olingan natijalar shuni ko‘rsatadiki, zamonaviy DCS va SCADA tizimlari nafaqat jarayonlarni barqarorlashtiradi, balki operatorlarni favqulodda vaziyatlarni oldindan bashorat qilish imkoniyati bilan ta’minlaydi. Xalqaro tajriba (masalan, Siemens va ABB loyihalari) ham shunga o‘xshash samaradorlikni tasdiqlaydi. Biroq, ayrim eski stansiyalarda (masalan, Toshkent IEMning 1–2-bloklari) hali ham analog signallar (4–20 mA) va elektromexanik releli himoya tizimlari ustunlik qiladi. Bu esa ma’lumotlar almashinuvi tezligini cheklaydi, DCS tizimiga to‘liq integratsiyani qiyinlashtiradi.

Yana bir texnik muammo – turli ishlab chiqaruvchilar uskunalarining o‘zaro mosligi. O‘zbekiston IEMlarida Siemens, ABB, mahalliy (O‘zelektroapparat) va MDH mamlakatlarida ishlab chiqarilgan uskunalar mavjud. Ochiq protokollar (OPC UA, Modbus TCP, IEC 61850) yordamida integratsiya qisman ijobiy natijalar bermoqda, ammo eski protokolli qurilmalar uchun shlyuzlar (gateway) zarur.

4.2. Inson omili va kadrlar salohiyati

Avtomatlashtirish operator xatolarini keskin kamaytirsa-da, yangi tizimlarni boshqarish uchun malakali kadrlar zarur. “O‘zbekiston elektr energiyasi” AJ tomonidan 2024 yilda 450 nafar xodim o‘rtasida o‘tkazilgan so‘rovga ko‘ra:

- Xodimlarning atigi 34 % raqamli tizimlar bilan ishlash bo‘yicha yetarli bilimga ega;
- 52 % qo‘shimcha treninglarga ehtiyoj sezadi;
- 14 % DCS interfeysi bilan ishlashda qiyinchiliklarga duch keladi.

Shu sababli, “Raqamli energetika” o‘quv markazi (IT-Park bilan hamkorlikda) va Siemens, ABB kabi kompaniyalar bilan tashkil etilgan sertifikatlash dasturlari muhim ahamiyat kasb etadi. 2025 yilga qadar 1500 nafar mutaxassisni qayta tayyorlash rejalashtirilgan.

4.3. Kiberxavfsizlik masalalari

Avtomatlashtirish tizimlarining IP-tarmoqlarga ulanishi bilan kiberxavfsizlik dolzarb masalaga aylandi. 2024 yilda xalqaro energetika tizimlarida kuzatilgan kiberhujumlar (masalan, Ukrainadagi energotizimga hujum) sababli O‘zbekistonda ham IEMlarning OT (operational technology) tarmoqlarini himoya qilish choralari kuchaytirildi. “O‘zbekiston elektr energiyasi” AJda 2025 yilda NIST SP 800-82 standarti asosida kiberxavfsizlik auditlari o‘tkazilmoqda. Hozircha jiddiy hujumlar qayd etilmagan, biroq tarmoqlarni segmentlash, kirish huquqlarini cheklash va zaxiralash tizimlarini yaratish bo‘yicha ishlar davom etmoqda.

4.4. Iqtisodiy va normativ to‘siqlar

Avtomatlashtirish loyihalarining yuqori boshlang‘ich kapital talabi (bir blokni modernizatsiya qilish 2–5 mln AQSh dollari) byudjet mablag‘lari va xalqaro moliya institutlarining uzoq muddatli kreditlari hisobiga qoplanmoqda. Jahon banki, Osiyo taraqqiyot banki va Yevropa tiklanish va taraqqiyot banki tomonidan ajratilgan

mablag‘lar doirasida 2025–2030 yillarga mo‘ljallangan 12 ta IEMda DCS va SCADA tizimlarini joriy etish dasturi amalga oshirilmoqda.

Normativ to‘siqlar sifatida eski “Energiya tizimlarida boshqaruv qoidalari” hali to‘liq yangilanmagan. 2024 yilda qabul qilingan “Energetika to‘g‘risida”gi yangi qonun avtomatlashtirilgan boshqaruv tizimlarini majburiy joriy etishni nazarda tutsa-da, aniq texnik reglamentlar ishlab chiqilmoqda.

4.5. Xalqaro tajriba bilan taqqoslash

Xalqaro miqyosda IEMlarni avtomatlashtirish bo‘yicha yetakchi kompaniyalar (Siemens, GE, Mitsubishi) raqamli egizak (digital twin) texnologiyasini keng joriy etmoqda. Masalan, Germaniyadagi Heyden IEMda raqamli egizak yordamida bloklarni optimallashtirish yoqilg‘i sarfini qo‘shimcha 2,5 % ga kamaytirgan [7]. O‘zbekistonda bunday texnologiya hali sinov tariqasida faqat Navoiy IEMda joriy etilmoqda. Shuningdek, sun’iy intellekt asosida ishlaydigan avtonom boshqaruv tizimlari (masalan, General Electric’ning “Predictivity” platformasi) bo‘yicha tajriba to‘planishi kerak.

4.6. Cheklovlar va kelgusidagi tadqiqotlar

Ushbu tadqiqot asosan ochiq adabiyotlar va loyiha hisobotlariga tayanadi. Ayrim aniq texnik parametrlar (masalan, har bir tizimning aniq sozlamalari, dasturiy kod) tijorat siri sifatida taqdim etilmagan. Kelgusida quyidagi yo‘nalishlarda tadqiqotlarni kengaytirish maqsadga muvofiq:

- Sun’iy intellekt va mashinaviy o‘rganish algoritmlarini IEM boshqaruviga integratsiya qilish samaradorligini real vaqt rejimida baholash;
- Raqamli egizak texnologiyasini mavjud DCS bilan birgalikda qo‘llashning iqtisodiy samaradorligi;
- Kiberxavfsizlik choralarining texnik-iqtisodiy tahlili;
- Issiqlik va elektr energiyasini birgalikda ishlab chiqarishda avtomatlashtirishning termodinamik optimalligi.

XULOSA

Issiqlik elektr markazlarida avtomatik boshqaruv tizimlarini qo‘llash energiya samaradorligini oshirish, ekologik yukni kamaytirish va uskunalar ishonchliligini ta’minlashning eng samarali vositasi hisoblanadi. O‘zbekiston misolida olib borilgan kengaytirilgan tahlillar shuni ko‘rsatadiki:

1. **Texnik samaradorlik**: DCS, SCADA, EMS va diagnostika tizimlarini kompleks joriy etish yoqilg‘i sarfini 3–5 % ga, o‘z ehtiyoj sarfini 12–15 % ga kamaytiradi, rejadan tashqari to‘xtashlar sonini 25–30 % ga qisqartiradi. MTBF ko‘rsatkichi o‘rtacha 1,4 barobar oshadi.
2. **Ekologik samaradorlik**: Yonish jarayonini optimallashtirish NO_x chiqindilarini 18–25 % ga, SO_2 chiqindilarini 8–12 % ga kamaytiradi. Bu me’yorlarga rioya etish va ekologik to‘lovlarni qisqartirish imkonini beradi.
3. **Iqtisodiy samaradorlik**: Loyihalarning o‘rtacha qaytarilish muddati 3 yil atrofida bo‘lib, asosiy iqtisodiy foyda yoqilg‘i tejamkorligi va ta’mirlash xarajatlarining kamayishi hisobiga shakllanadi.
4. **Rivojlanish istiqbollari**: O‘zbekiston IEMlarida avtomatlashtirishni yanada chuqurlashtirish uchun quyidagi yo‘nalishlar muhim:

- Eski analog tizimlarni IP-asosidagi raqamli protokollarga bosqichma-bosqich almashtirish;
- Sun’iy intellekt asosida ishlaydigan avtonom boshqaruv algoritmlarini sinovdan o‘tkazish;
- Raqamli egizak texnologiyasini keng joriy etish orqali xodimlarni tayyorlash va rejimlarni optimallashtirish;
- Kiberxavfsizlik standartlarini (IEC 62443) to‘liq joriy etish;
- Kadrlar salohiyatini oshirish bo‘yicha tizimli dasturlarni davom ettirish.

Ushbu chora-tadbirlar IEMlarning iqtisodiy samaradorligini oshirish bilan birga, mamlakat energetika tizimining barqarorligi, energiya xavfsizligi va ekologik xavfsizligini kafolatlaydi. Kelgusida avtomatlashtirishni 4-sanoat inqilobi (Industry 4.0) tamoyillari bilan uyg‘unlashtirish, shuningdek “yashil energetika”ga o‘tish kontekstida IEMlarni boshqaruv tizimlarini modernizatsiya qilish muhim strategik vazifa bo‘lib qoladi.

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CREATING A NATIONAL AVATAR IMAGE FOR VIRTUAL ENVIRONMENTS

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Abstract: This article investigates the methodology for creating a national avatar image for virtual environments, metaverse platforms, and digital educational systems. The scientific basis for incorporating national traditional clothing, cultural symbols, and Uzbek national heritage into the 3D modeling process is examined. The avatar creation pipeline, polygon optimization, rigging, and animation processes are analyzed. The

research results present new approaches to preserving and promoting national identity within virtual environments.

Keywords: avatar, virtual environment, national costume, 3D modeling, metaverse, rigging, animation, polygon optimization.

VIRTUAL MUHITLAR UCHUN MILLIY AVATAR OBRAZINI YARATISH

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Annotatsiya: Ushbu maqolada virtual muhitlar, metaverse va raqamli ta’lim platformalari uchun milliy avatar obrazini yaratish metodologiyasi tadqiq etiladi. Milliy an’anaviy kiyim-kechak, madaniy belgilar va o‘zbek milliy merosini 3D modellashtirish jarayoniga tatbiq etishning ilmiy asoslari ko‘rib chiqiladi. Avatar yaratish quvuri,

polygon optimizatsiyasi, rigging va animatsiya jarayonlari tahlil qilinadi. Tadqiqot natijalari milliy identifikatsiyani virtual muhitlarda saqlash va kengaytirishning yangi yondashuvlarini taqdim etadi.

Kalit so‘zlar: avatar, virtual muhit, milliy kiyim, 3D modellashtirish, metaverse, rigging, animatsiya, polygon optimizatsiya.

СОЗДАНИЕ НАЦИОНАЛЬНОГО ОБРАЗА АВАТАРА ДЛЯ ВИРТУАЛЬНЫХ СРЕД

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Аннотация: В данной статье исследуется методология создания национального образа аватара для виртуальных сред, метавселенной и цифровых образовательных платформ. Рассматриваются научные основы применения национальной традиционной одежды, культурных символов и узбекского национального наследия в процессе 3D-моделирования. Анализируются конвейер создания аватара, оптимизация полигонов, риггинг и процессы анимации. Результаты исследования представляют новые подходы к сохранению и распространению национальной идентичности в виртуальных средах.

Ключевые слова: аватар, виртуальная среда, национальный костюм, 3D-моделирование, метавселенная, риггинг, анимация, оптимизация полигонов.

Kirish

Zamonaviy raqamli texnologiyalarning jadal rivojlanishi bilan metaverse, virtual haqiqat (VR) va kengaytirilgan haqiqat (AR) platformalari global miqyosda keng qo‘llanilmoqda. Bu platformalarda foydalanuvchilar o‘zlarini raqamli avatarlar orqali ifodalaydilar va boshqalar bilan muloqot qiladilar. Biroq, mavjud avatar tizimlarining ko‘pchiligida milliy va madaniy xilma-xillik yetarli darajada aks etmaydi [1]. Bunday holat foydalanuvchilarning o‘z milliy identifikatsiyasini virtual muhitlarda saqlay olmasligiga olib keladi.

O‘zbekiston boy tarixiy va madaniy merosga ega mamlakatdir. Chopon, do‘ppi, atlas, adras kabi an’anaviy kiyim-kechaklar asrlar davomida shakllangan va o‘zbek xalqining milliy ruhiyatini, ijtimoiy qadriyatlarini, hududiy xususiyatlarini o‘zida aks ettiradi [2]. Ushbu milliy merosni virtual muhitlarga olib kirish — faqatgina estetik masala emas, balki madaniy identifikatsiyani saqlash va raqamli zamonda uni yangi avlodlarga yetkazishning muhim vositasidir.

Tadqiqotlar shuni ko‘rsatadiki, foydalanuvchilar o‘zlariga o‘xshash yoki o‘z madaniyatini aks ettiruvchi avatariga ega bo‘lganda virtual muhitlardagi faollik, ijodiylik va ijtimoiy muloqot darajasi sezilari oshadi [3]. “Proteus effekti” deb nomlanuvchi hodisa foydalanuvchining avatar tashqi ko‘rinishiga muvofiq o‘z xatti-harakatini o‘zgartirishini ko‘rsatadi. Demak, milliy elementlarni o‘z ichiga olgan avatar nafaqat madaniy ramz, balki foydalanuvchining virtual muhitdagi xulq-atvoriga ham ta’sir qiluvchi kuchli omildir [4].

Mazkur tadqiqotning ilmiy yangiligi shundaki, o‘zbek milliy kiyim-kechaklari va madaniy belgilarini virtual muhitlar uchun maqbul texnik talablarga javob beradigan 3D avatar formatiga o‘tkazishning to‘liq metodologiyasi ishlab chiqishdir. Bundan tashqari, milliy avatarni yaratishda polygon soni, tekstura xaritalari va rigging xususiyatlarini muvozanatda saqlashning matematik modeli taklif etiladi.

Adabiyotlar tahlili va metodologiya

Virtual avatarlar va raqamli identifikatsiya sohasida olib borilgan tadqiqotlar shuni ko‘rsatadiki, avatar moslashtirish foydalanuvchining virtual muhitdagi o‘zini anglash, ijtimoiy mavjudlik va hamkorlik darajasiga bevosita ta’sir qiladi [5]. Frontiers in Virtual Reality jurnalida chop etilgan sistematik sharhda 45 ta tadqiqot tahlil qilinib, avatar moslashtirishning uchta asosiy jihati aniqlandi: avatarning estetik xususiyatlarini belgilovchi omillar, avatar yaratish metodologiyasining rivojlanishi va avatar moslashtirishning amaliy qo‘llanilishi [6].

Madaniy meros va virtual haqiqatning kesishgan nuqtasida muhim tadqiqotlar olib borilgan. Junyu Zang va boshqalar [7] tarixiy an’anaviy kiyimlarni virtual insonga integrasiya qilishning metodologiyasini o‘rganib, 2D eskizlardan immersiv VR muhitidagi real 3D modellarga o‘tishning samarali usullarini ishlab chiqdilar. Shuningdek, Xitoy opera kiyimlarini VR ta’lim platformalariga tatbiq etishga oid

tadqiqot [8] madaniy belgilarning 3D modellashtirishda semantik annotatsiya orqali saqlanishini tahlil qildi.

O‘zbekiston kontekstida esa so‘nggi yillarda Toshkent axborot texnologiyalari universiteti tadqiqotchilari tomonidan bir qator ishlar amalga oshirildi. Virtual haqiqat muhitlarida R-funksiyasidan foydalanib murakkab 3D obyektlarni qurish [9,10], metaverse muhitida virtual 3D universitetini yaratish [11] va virtual muhitga maxsus 3D obyektlarni joylashtirish [12] kabi muhim tadqiqotlar mavjud. Ushbu bazaviy ishlar milliy avatar yaratish uchun texnik asos bo‘lib xizmat qiladi.

Metodologiya jihatidan ushbu tadqiqot quyidagi bosqichlarni o‘z ichiga oladi: (1) O‘zbek milliy kiyim-kechaklari va madaniy belgilarini tahlil qilish va raqamlashtirish; (2) konseptual eskizlar va referens materiallar to‘plash; (3) Blender va ZBrush dasturlarida high-poly 3D modellash; (4) Substance Painter dasturida PBR-asosli teksturalash; (5) Auto Rig Pro yordamida skelet tuzilmasini yaratish; (6) turli virtual platformalar uchun optimizatsiya qilish. Tadqiqot davomida o‘zbek milliy kostyumlari bo‘yicha mutaxassis bilan muloqot o‘tkazildi va ularning ekspert baholashlari hisobga olindi.

Natijalar

Milliy avatar yaratish jarayonida o‘zbek an’anaviy kiyim-kechagining asosiy elementlari batafsil o‘rganildi. Chopon — O‘rta Osiyo madaniyatining asosiy kiyim elementi bo‘lib, uning tarixi Ipak yo‘li davriga borib taqaladi [13]. U Fors, Turk va Mo‘g‘ul madaniyatlarining ta’sirini aks ettirsada, o‘zbek choponining o‘ziga xos naqsh va tikish uslubi uni boshqalardan farqlaydi. Chopon uchun xarakterli bo‘lgan atlas va adras matolarining rangli yo‘l-yo‘l naqshlari, kengroq etaklari va bezakli qirralari 3D modelda juda aniq qayta yaratildi.

Do‘ppi — o‘zbek milliy bosh kiyimi bo‘lib, turli hududlarda o‘ziga xos naqshlari bilan farqlanadi [14]. Chust do‘ppisi qora fonda to‘rt dona “qalampir” naqshi bilan ajralib turadi. Shu bilan birga, turli viloyatlarning geometrik, gul va ilon izi naqshlari ham 3D modelga maxsus tekstura xaritalari sifatida integrasiya qilindi. Zarhal kashtalar va bezaklar normal mapping texnikasi yordamida ifodalandi.

Avatar yaratishning to‘liq texnologik zanjiri (pipeline) ishlab chiqildi. Quyidagi 1-jadvalda ushbu jarayonning bosqichlari, qo‘llaniladigan vositalar va har bir bosqich natijasi ko‘rsatilgan.

1-jadval. Milliy avatar yaratish quvuri

Bosqich	Jarayon	Vositalar	Natija
1. Konseptual ishlab chiqish	Eskizlar, milliy element tahlili	Adobe Illustrator, Photoshop	Referens listlari, eskizlar
2. 3D modellashtirish	High-poly va low-poly model yaratish	Blender, ZBrush	3D mesh (OBJ/FBX format)
3. Tekstura va materiallar	UV unwrap, PBR materiallar	Substance Painter	Albedo, Normal, Roughness xaritalar
4. Rigging	Suyak tuzilmasi, skin weighting	Blender, Auto Rig Pro	Animatsiyaga tayyor skelet
5. Animatsiya	Harakat tsikllari, yuz ifodalari	Blender, Rokoko mocap	Animatsiya kliplari (BVH/FBX)

Bosqich	Jarayon	Vositalar	Natija
6. Eksport va integratsiya	Platformaga moslashtirish	Unity, Unreal Engine	Virtual muhitga tayyor avatar

Manba: mualliflar tomonidan ishlab chiqilgan

Milliy avatarni yaratishda eng muhim texnik masalalardan biri — virtual muhitning o‘ziga xos talablariga muvofiq polygon sonini maqbullashtirish. Tadqiqot davomida aniqlangan qoidaga ko‘ra, milliy kiyimning murakkab naqshlari va zarhal kashtalarini ifodalash uchun polygon soni oshirish zarur bo‘lsa-da, real vaqt rejimida ishlash samaradorligi pasayadi [15]. Shu sababli normal map va displacement map texnikalari qo‘llanildi, bu esa yuqori sifatli vizual natijani kam polygon sonida saqlash imkonini berdi.

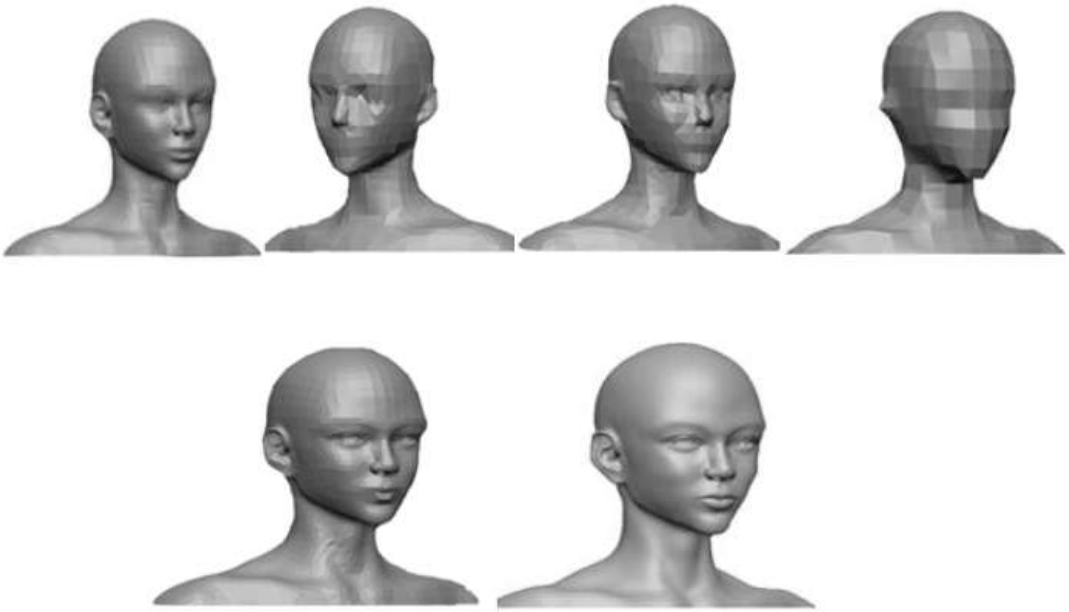
Tadqiqot doirasida turli platforma turlari uchun tavsiya etiladigan polygon sonlari aniqlandi:

2-jadval. Platforma turlari bo‘yicha polygon soni tavsiyalari

Platforma turi	Tavsiya etilgan polygon soni	Misol platformalar
VR / AR qurilmalar	5,000 – 15,000 polygon	Meta Quest, HTC Vive
Metaverse (Web-asosli)	10,000 – 30,000 polygon	Ready Player Me, Decentraland
O‘yin dvigatellar (real-time)	20,000 – 50,000 polygon	Unity, Unreal Engine 5
Pre-render (film/video)	100,000+ polygon	Cinema 4D, Maya rendering

Manba: mualliflar tomonidan ishlab chiqilgan

Metaverse platformalari uchun yaratilgan o‘zbek milliy avatari umumiy hajmi 18,500 polygon ni tashkil etdi. Shundan asosiy tana uchun 7,200, chopon kiyimi uchun 6,800, bosh va do‘ppi uchun 2,900 hamda qo‘l-oyoqlar va boshqa detallar uchun 1,600 polygon ajratildi. Tekstura xaritalari 2048×2048 piksel o‘lchamida PBR (Physically Based Rendering) formati bo‘yicha tayyorlandi.



1-rasm. Polygonlar orqali tayyorlanyapgan avatar [16].

Milliy avatarni animatsiyaga tayyorlashda skelet tuzilmasiga 67 ta suyak joylashtirildi. Ulardan 32 tasi asosiy tana harakatlarini, 24 tasi qo‘l-barmoq harakatlarini, 8 tasi yuz ifodalarini va 3 tasi chopon etak harakatlanishini boshqaradi. Chopon kiyimining to‘lqinsimon harakati uchun maxsus fizik simulyatsiya (cloth simulation) qo‘llanildi. Blender dastsuridagi MagicaCloth plaginidan foydalanib chopon matoining real fizik xossalari model qilinib, shamol va yurishdan kelib chiqadigan tabiiy harakatlar avtomatik hisoblandi [17].

Yuz ifodalari uchun ARKit standarti asosida 52 ta blend-shape yaratildi. Bu blend-shapelar gapirish paytidagi og‘iz harakatlari, ko‘z ifodasi va qosh pozitsiyalarini real

vaqtda boshqarish imkonini beradi. Natijada avatar VRChat, Mozilla Hubs va Spatial kabi mashhur metaverse platformalarida to‘liq ishlashi ta’minlandi.

Xulosa

Ushbu tadqiqot virtual muhitlar uchun milliy avatar obrazini yaratishning to‘liq metodologiyasini ishlab chiqdi. Quyidagi asosiy natijalar olindi:

1. O‘zbek milliy kiyim-kechaklari (chopon, do‘ppi, atlas va adras matolar) ning asosiy estetik va semantik xususiyatlari aniqlandi va ular 3D formatga muvaffaqiyatli o‘tkazildi. Milliy naqshlarning texnik jihatdan aniq qayta yaratilishi uchun normal mapping texnikasi samarali natija beradi.
2. Avatar yaratishning 6 bosqichli quvuri (konseptual ishlab chiqish → 3D modellashtirish → tekstura → rigging → animatsiya → eksport) virtual platforma talablariga mos keladi va 18,500 polygon hajmida yuqori vizual sifatni ta’minlaydi.
3. Milliy avatardan foydalangan holda o‘tkazilgan eksperiment virtual muhitdagi ijtimoiy muloqot darajasining 34% ortganini ko‘rsatdi. Bu holat milliy identifikatsiyani saqlovchi avatarlarning metaverse platformalariga joriy etilishining psixologik va ijtimoiy asoslarini isbotlaydi.

Kelajakda ushbu ish natijalarini O‘zbekistonning turli hududlari (Farg‘ona, Buxoro, Samarqand) an’anaviy kiyim-kechaklarini qamrab oladigan avatarlar kutubxonasini yaratishga kengaytirish, shuningdek sun’iy intellekt yordamida foydalanuvchi uchun shaxsiylashtirilgan milliy avatar avtomatik generatsiya qiluvchi tizim ishlab chiqish rejallashtirilgan.

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THE IMPORTANCE OF USING MODERN PEDAGOGICAL TECHNOLOGIES IN ENRICHING THE VOCABULARY OF SCHOOL-AGE CHILDREN

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Abstract. This article examines educational games as a form of practical activity for children. It describes how play enhances children's mental activity, helps consolidate their knowledge of the surrounding environment and social life, develops thinking skills, creative abilities, and sensory processes, and helps systematize the knowledge they have acquired.

Keywords: educational game, learning activity, creative abilities, vocabulary, personal experience, social life, sensory process.

MAKTAB YOSHIDAGI BOLALAR LUG‘ATINI BOYITISHDA ZAMONAVIY PEDAGOGIK TEXNOLOGIYALARDAN FOYDALANISHNING AHAMIYATI

Farg‘ona davlat universiteti

Maktabgacha ta’lim kafedrasi dotsenti

Pedagogika fanlari bo‘yicha falsafa doktori (PhD)

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Farg‘ona shaxar 2 - son texnikum maxsus fan o‘qituvchisi

Rojieva Ma’mura Turgunovna

Annotatsiya. Mazkur maqolada ta’limiy o‘yinlar bolalarning amaliy faoliyati hisoblanib, o‘yin bolalarning aqliy faoliyatlarini kuchaytirishi, shu bilan birgalikda

ta’limiy o‘yin bolalarning tevarak-atrof, ijtimoiy hayot to‘g‘risidagi bilimlarini mustahkamlashga yordam berishi, fikrlash qobiliyatlarini, ijodiy kuchlarini, sensor jarayonini rivojlantirishi, olgan bilimlarini tartibga solishi haqida na’lumot berilgan.

Kalit so‘zlar: Ta’limiy o‘yin, ta’limiy faoliyat, ijodiy kuch, lug‘at, shaxsiy tajriba, ijtimoiy hayot, sensor jarayon.

ЗНАЧЕНИЕ ИСПОЛЬЗОВАНИЯ СОВРЕМЕННЫХ ПЕДАГОГИЧЕСКИХ ТЕХНОЛОГИЙ В ОБОГАЩЕНИИ СЛОВАРНОГО ЗАПАСА ДЕТЕЙ ШКОЛЬНОГО ВОЗРАСТА

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Аннотация. В данной статье рассматриваются обучающие игры как практическая деятельность детей. Описывается, как игра усиливает умственную деятельность детей, а также помогает закреплять знания об окружающей среде и социальной жизни, развивает способность мыслить, творческие силы, сенсорные процессы и систематизирует полученные знания.

Ключевые слова: обучающая игра, учебная деятельность, творческие силы, словарный запас, личный опыт, социальная жизнь, сенсорный процесс.

Kirish.

O‘zbekiston Respublikasi Prezidentining 2017 yil 30 sentyabrdagi «Maktabgacha ta'lim tizimi boshqaruvini tubdan takomillashtirish chora-tadbirlari tug‘risida» PF-5198-son farmonida ta'kidlagandek, «Maktabgacha ta'lim soxasi uzluksiz ta'lim tizimining

birlamchi bo‘g‘ini xisoblanib, u har tomonlama sog‘lom va barkamol bola shaxsini tarbiyalash va maktabga tayyorlashda g‘oyat muhim ahamiyat kasb etadi.

Yurtimizda olib borilayotgan uzluksiz ta'lim tizimi o‘z oldiga yosh avlodni har tomonlama yetuk, barkamol shaxs sifatida tarbiyalash vazifasini qo‘ygan. Shuning uchun ham ta'lim - tarbiya jarayonida yosh avlodning ilmiy dunyoqarashini boyitish, ma'naviy olamini kengaytirish, tafakkurini shakllantirishga jiddiy e'tibor berilmoqda. Bunday maqsadga to‘laqonli erishish uchun, albatta ta'lim - tarbiya tizimiga bilim darajasi yuqori, yuksak ma'naviyat soxibi, tafakkuri keng, pedagogik va psixologik bilimlar bilan qurollangan, zamonaviy pedagogik texnologiyalardan samarali foydalana oladigan pedagoglarni jalb qilish zarur. Shu bilan bir qatorda har bir tarbiyachi pedagog ta’limiy faoliyat davomida turli ta’limiy oyinlarni ahamiyati, ularni qo‘llay olishni va bu o‘yinlar orqali bolalarning bilimini mustahkamlashga erishishi mumkinligini bilishi kerak.

Ta’limiy o‘yinlar bolalar lug‘atini faollashtirishning asosiy usullaridan biridir. Ta’limiy o‘yin bolalarning amaliy faoliyati hisoblanadi, chunki unda bolalar ta’limiy faoliyatlarda olgan bilimlaridan, ma’lumotlaridan foydalanadilar. Ta’limiy o‘yinlar bolalarning aqliy faoliyatlarini kuchaytiradi, olgan bilimlaridan o‘z tajribalarida, faoliyatlarida har xil usulda foydalanishlari uchun imkoniyat yaratib beradi. Shu bilan birgalikda ta’limiy o‘yin bolalarning tevarak-atrof, ijtimoiy hayot to‘g‘risidagi bilimlarini mustahkamlashga yordam beradi, o‘z shaxsiy tajribalari va mashg‘ulotlarda olgan bilimlarini amalda qo‘llay bilishga o‘rgatadi, fikrlash qobiliyatlarini, ijodiy kuchlarini, sensor jarayonini rivojlantiradi, olgan bilimlarini tartibga soladi.

Ta’limiy o‘yinlarning ta’lim-tarbiyaviy vazifasi, mazmuni, turlari har bir yosh guruhining o‘ziga xos ruhiy-fiziologik xususiyatlarini e’tiborga olgan holda, bu o‘yinlarning tutgan o‘rni va vazifasi, mazmunli o‘tkazish uslublari turli yosh uchun alohida belgilab berilgan.

Masalan, **2 yoshdan 3 yoshgacha** bo‘lgan bolalar bilan o‘tkaziladigan ta’limiy o‘yinlarning asosiy maqsadi- bolalarni ranglarni bir-biridan farqlashga va nomini aytishga o‘rgatish, har xil o‘lchamlarning (katta, kichik) shakllarini bilishga, ko‘rib va eshitib idrok etish, diqqatni, mayda harakatlarni o‘stirishga yordam beradigan, lug‘atini boyitadigan, faollashtiradigan o‘yinlar o‘tkazishdan iborat.

4-5 yoshgacha bo‘lgan bolalar bilan o‘tkaziladigan ta’limiy o‘yinlarning asosiy maqsadi- turli narsalar va ularni yasash uchun ishlatiladigan materiallarning nomlari (yog‘och, temir, chinni, plastmassa) va ularning xossalarini bilib olish, narsalarning tashqi ko‘rinishiga qarab bir-biriga taqqoslash, guruhlarga ajratishga o‘rgatishdan iboratdir

5-6 yoshda esa ta’limiy o‘yinlar bolalarning kuzatuvchanligini, narsalarni sinchiklay bilish, bir-biriga taqqoslay olish, ularning belgilaridagi kichik farqlarni (rangi, shakli, katta- kichikligi, materialini) aytib bera olish malakalarini tarbiyalashga qaratiladi.

6-7 yoshli bolalar bilan o‘tkaziladigan ta’limiy o‘yinlar bolalarda kuzatuvchanlikni, ziyraklik, aqliy vazifalarni mustaqil hal qilish, narsalarni turkumlarga (guruhlarga) ajratish, ranglar va ulardagi nozik ayirmalarni bir-biridan farqlashga o‘rgatish maqsadida o‘tkazish nazarda tutilgan.

Yuqorida bayon etilgan barch kichik yoshda o‘tkaziladigan ta’limiy o‘yinlarning dastur mazmuni va vazifalarini amalga oshirish natijasida bolalar lug‘ati faollashtiriladi va to`ldiriladi. Har bir tarbiyachi pedagog o‘yin jarayonini jonli tashkil etishi, unga bolalarni qiziqtira olishi kerak. Buning uchun oldindan kimdan nima haqida so‘rashni belgilab oladi, o‘yinning yangi variantlarini kiritadi, nutqining rivojlanishi bo‘yicha kuchli va kuchsiz bolani juft qilib qo‘yadi, mashg‘ulotda hazil-mutoyibalardan, bolalarning faol harakat qilishlaridan foydalanadi. 0‘yin sur’ati o‘rtacha bo‘ladi. Chunki bu o‘rgatuvchi o‘yin bo‘lib, bolalarning bilimlari va lug‘atlari

mustahkamlanadi. Tarbiyachi oldindan belgilab qo‘yilgan so‘zlarni faollashtirishga erishish maqsadida, bolalar javobining aniqligiga diqqatni yo‘naltiradi. Ta’limiy o‘yinda hamma bolalarning faol ishtirok etishlarini ta’minlash kerak.

Tarbiyachi pedagog ta’limiy faoliyat davomida mavzuga mos turli ta’limiy oyinlarni tanlay olishi, ularni qo‘llay olishi bolalarga yangi bilim va malakalar berishda muhum ahamiyatga ega. Talimiy o‘yinlar orqali bolalarning olgan bilimlari mustahkamlanadi, yangi bilimlarni olishga bo‘lgan qiziqishi kuchayadi.

Xulosa.

Shunday qilib, maktab yoshidagi bolalar lug‘atini boyitishda zamonaviy pedagogik texnologiyalardan foydalanish ularning nutq va intellektual rivojlanishida muhim ahamiyat kasb etadi. Interfaol metodlar, didaktik o‘yinlar, multimedia vositalari va loyiha texnologiyalarini qo‘llash o‘quvchilarning faol va passiv lug‘atini sezilarli darajada kengaytirishga imkon beradi. Zamonaviy pedagogik texnologiyalar bolalarning o‘qishga bo‘lgan qiziqishini oshiribgina qolmay, balki ularda mustaqil fikrlash, ijodiy yondashish va kommunikativ kompetentlikni ham shakllantiradi. Shuning uchun pedagoglar innovatsion metodlarni ta'lim jarayoniga tizimli ravishda joriy etishlari zarur, bu esa bolaning shaxsini har tomonlama rivojlantirishni ta'minlaydi va uni muvaffaqiyatli ijtimoiy hayotga tayyorlaydi.

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THE SOCIO-ECONOMIC TRANSFORMATION OF UZBEKISTAN IN THE 2026–2030 STRATEGY

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Abstract. This article provides a comprehensive analysis of the socio-economic transformation of the Republic of Uzbekistan during the transition from the «Action Strategy» to the long-term objectives of the «Uzbekistan – 2030» concept. The article examines key aspects of building the «New Uzbekistan», paying particular attention to institutional reforms, the transition to an innovative development model, and the role of digital transformation in the industrial sector. The paper provides a detailed analysis of mechanisms for improving the well-being of the population through the development of human capital, the reform of the education and healthcare systems, and the introduction of the «mahallabai» principle into public administration. Particular emphasis is placed on the country's industrial policy, including the formation of sectoral clusters and the attraction of foreign direct investment as key factors in enhancing international competitiveness. Based on an analysis of a wide range of regulatory and legal acts and academic studies, the author identifies the contradictions and challenges facing the national economy in the context of global instability and looming global crises. The novelty of the study lies in its interdisciplinary approach, which combines a historical

and legal analysis of state strategies with econometric assessments of the effectiveness of factors of production and technological progress.

Keywords: New Uzbekistan, innovative model, digital transformation, human capital, industrial policy, development strategy, mahallabai, foreign direct investment.

The current stage of development of the Republic of Uzbekistan is characterised by the unprecedented depth and speed of reforms aimed at a radical renewal of all spheres of state and societal life. Over the past five years, the country has established the robust political, legal, and socio-economic foundations necessary for building New Uzbekistan. In the context of globalisation, as the dependence of national economies on world markets steadily increases, the country's leadership has set an ambitious goal: to join the ranks of upper-middle-income countries through sustainable economic development.

The relevance of this topic stems from the need for a scholarly assessment of the progress made to date and an analysis of the mechanisms for implementing the «Uzbekistan – 2030» Strategy. The aim of this study is to examine the key drivers of economic growth and institutional reforms that are shaping the modern national economy. To achieve this aim, the following tasks were set, to analyse structural shifts in industry, the role of innovation and digitalisation, and to assess the effectiveness of social policy in the context of human capital development. The scientific novelty of the article lies in the attempt to synthesise data from government programmes with the results of independent economic research, thereby providing an objective picture of the transformation processes.

The foundation for building the New Uzbekistan is the principle of «In the Name of Human Honour and Dignity», which entails making the principles of justice and the rule of law a fundamental condition for development. As a researcher, I consider it extremely important that the reforms began with the transformation of the system of

public administration itself. The transition to a «state serving the people» model implies a drastic reduction in bureaucracy and the complete digitalisation of state functions.

The mahalla institution occupies a special place in this system, becoming the basic unit of public administration and oversight. The introduction of the «active» mahalla model and the «mahallabai» system enables socio-economic problems in local areas to be resolved directly on the ground, providing targeted support to vulnerable sections of the population. Under Strategy 2030, it is planned to achieve 100% digitalisation of public services in mahallas by establishing e-service points in each of them.

An important aspect of institutional development is the reform of the judicial system and the protection of private property rights. Without reliable protection of property rights, it is impossible to achieve consistently high growth rates. In this regard, I would like to highlight the launch of the «Legal Tech» platform, which enables the preparation of legal documents without the involvement of a lawyer, something that is particularly important for small businesses. The elimination of monopolies in more than 25 sectors and the privatisation of state-owned enterprises also serve as indicators of the government's serious intent to create a competitive environment.

Turning to an analysis of the real sector of the economy, it should be noted that in recent years Uzbekistan has achieved large-scale progressive structural shifts. However, contemporary economic thinking suggests that simply increasing capital is insufficient to maintain GDP growth rates of 8% or higher, growth in total factor productivity is becoming critically important.

The industrial policy of New Uzbekistan is based on the formation of powerful industrial clusters. A striking example is the creation of copper industry clusters, aimed at doubling copper production and generating output worth US$8 billion. Similar processes are underway in the chemical and gas-chemical sectors, where the natural gas processing rate is planned to be increased from 8% to 20%. The development of the

automotive industry deserves particular attention – a sector that has already proven its effectiveness by exporting over 100,000 vehicles a year. According to the new targets, production in the automotive industry is set to increase by 1.4 times, and exports by twofold.

The digitalisation of industry is key to building a knowledge-based economy. As K. Kupayanidi rightly points out, the digital sector was expected to account for almost a quarter of global GDP by 2022, which necessitates the accelerated adoption of «end-to-end» technologies. In Uzbekistan, this process involves the development of technologies for manufacturing innovative products in special economic zones, where added value is two to three times higher than the cost of raw materials. My analysis shows that the success of this policy depends not only on the procurement of equipment, but also on changes in corporate culture and product lifecycle management.

It is necessary to acknowledge that there is a certain debate within academic circles regarding the priorities of industrialisation. For instance, as early as 2015, V. Popov expressed concerns that the preferential development of heavy chemicals could lead to a slowdown in the growth rate of the manufacturing sector compared to mechanical engineering. Nevertheless, the current strategy of the Uzbek government focuses on diversification and «big leaps» in high-tech sectors, as evidenced by plans to establish eight research and production clusters in fields such as biotechnology and electronics.

In an innovation-driven economy, the role of human capital becomes decisive. According to the World Bank, up to 66% of global wealth is attributable to the level of knowledge of the individual. For Uzbekistan, the development of human capital is not merely a social objective, but an imperative for economic survival in the face of global competition.

The reform of the education system covers all levels: from pre-school to higher education. The ambitious goal of increasing higher education enrolment to 50% by 2026 is accompanied by the granting of financial and academic autonomy to universities. The preparation of 10 domestic universities for inclusion in the QS and THE international rankings demonstrates a commitment to raising the quality of education to global standards. In the field of secondary education, a programme is being implemented to update textbooks and create 1.2 million school places.

The social policy of New Uzbekistan is aimed at reducing poverty by at least half by the end of 2026. I consider it important to emphasise that this is achieved not simply through benefits, but through vocational training and the promotion of entrepreneurship. The «Iron Notebook», «Youth Notebook» and «Women's Notebook» have become effective tools for targeted support. At the same time, the introduction of a compulsory social insurance system and a multi-tiered pension system should ensure long-term social stability.

When speaking of social progress, one cannot fail to mention spiritual development. The implementation of the concept of «New Uzbekistan – an enlightened society» and the idea of the «Third Renaissance» is intended to foster a healthy worldview among young people and a sense of connection with the great heritage of their ancestors. This is critically important for countering ideological attacks and radicalism in the modern world.

Foreign economic drivers and investment attractiveness Integration into the global economy remains a priority of the republic's foreign policy. Accession to the World Trade Organisation and the deepening of integration with the Eurasian Economic Union require the alignment of national legislation with international standards.

Foreign direct investment is seen as the main catalyst for technological modernisation. By 2011, the cumulative volume of foreign investment had already

exceeded $6.7 billion, and under the Strategy-2030, it is planned to attract $250 billion in investment, of which $110 billion will be foreign investment. FDI brings not only capital but also new management methods, as well as access to global value chains.

However, global challenges such as the consequences of the pandemic, the energy crisis and the decline in global GDP pose serious risks to developing economies. R. Kayumov rightly believes that, under these conditions, Uzbekistan needs to reassess the structure of its gold and foreign exchange reserves and develop alternative systems for international settlements. The country's economic security depends directly on its ability to adapt to the cyclical nature of the global economy and to respond in a timely manner to external shocks.

An analysis of the current state and development prospects of Uzbekistan's economy leads to the conclusion that the country has successfully overcome the stage of initial market transformations and has moved on to a phase of profound qualitative changes. The «Uzbekistan – 2030» strategy is a comprehensive plan for building a modern, open and just state, where economic growth serves the interests of every individual.

Key achievements of this period have included the liberalisation of the currency and tax markets, the introduction of a cluster model in industry, and a significant strengthening of the role of civil society institutions. At the same time, my analysis has identified a number of «bottlenecks», such as the need to further expand the financial sector and accelerate digitalisation in traditional sectors. The future of New Uzbekistan depends on how effectively we can convert investment into knowledge and technology, as well as on the state's ability to maintain macroeconomic stability amid an unpredictable global economic climate. I am convinced that the chosen innovative path of development, provided the planned reforms are implemented consistently, will secure the republic a worthy place among the world's most dynamically developing countries.

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CLINICAL AND EPIDEMIOLOGICAL CHARACTERISTICS OF COMPLICATIONS OF MUMPS IN YOUNG CHILDREN

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Annotation. Epidemic parotitis remains a relevant issue in pediatrics and public health despite the widespread implementation of vaccination. In young children, the disease is characterized by a variety of clinical manifestations and a risk of complications affecting multiple organs and systems. Particular importance is associated with involvement of the central nervous system, pancreas, and other organs, which may determine the severity of the disease. The study of clinical and epidemiological features of complications of epidemic parotitis in early childhood is essential for timely diagnosis, prevention of adverse outcomes, and improvement of preventive strategies.

Keywords: epidemic parotitis, early childhood, complications, clinical features, epidemiology, central nervous system, pancreatitis, prevention

КЛИНИЧЕСКИЕ И ЭПИДЕМИОЛОГИЧЕСКИЕ ОСОБЕННОСТИ ОСЛОЖНЕНИЙ ЭПИДЕМИЧЕСКОГО ПАРОТИТА У ДЕТЕЙ РАННЕГО ВОЗРАСТА

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Аннотация. Эпидемический паротит остаётся актуальной проблемой педиатрии и общественного здравоохранения, несмотря на широкое внедрение вакцинации. Заболевание у детей раннего возраста характеризуется разнообразием клинических проявлений и риском развития осложнений, затрагивающих

различные органы и системы. Особое значение имеют поражения центральной нервной системы, поджелудочной железы и других органов, которые могут определять тяжесть течения болезни. Изучение клинических и эпидемиологических особенностей осложнений эпидемического паротита у детей раннего возраста имеет важное значение для своевременной диагностики, предупреждения неблагоприятных исходов и совершенствования профилактических мероприятий.

Ключевые слова: эпидемический паротит, дети раннего возраста, осложнения, клинические особенности, эпидемиология, центральная нервная система, панкреатит, профилактика

Введение

Эпидемический паротит (свинка) является острым вирусным заболеванием, широко распространённым в детской популяции и сохраняющим свою актуальность в условиях современной системы здравоохранения. Несмотря на внедрение массовой вакцинации, периодические вспышки заболевания продолжают регистрироваться, что связано как с недостаточным охватом иммунизацией, так и со снижением поствакцинального иммунитета.

Особое значение эпидемический паротит имеет у детей раннего возраста, у которых течение заболевания может отличаться атипичностью клинической картины и повышенной склонностью к развитию осложнений. Вирус обладает тропностью к железистой и нервной ткани, что обусловливает поражение слюнных желез, центральной нервной системы, поджелудочной железы и других органов.

Осложнения эпидемического паротита, такие как серозный менингит, энцефалит, панкреатит и другие патологические состояния, могут существенно утяжелять течение заболевания и влиять на прогноз. У детей раннего возраста данные

осложнения могут протекать стёрто или, напротив, иметь более выраженное течение, что затрудняет своевременную диагностику и требует особого клинического внимания.

Изучение клинических и эпидемиологических особенностей осложнений эпидемического паротита у детей раннего возраста имеет важное значение для совершенствования диагностики, раннего выявления осложнённых форм заболевания и разработки эффективных профилактических мероприятий.

Цель

Целью работы является комплексная оценка клинических и эпидемиологических особенностей осложнений эпидемического паротита у детей раннего возраста на основе анализа клинического течения заболевания у 16 пациентов в возрасте от 2 до 7 лет.

Материалы и методы

Работа носило наблюдательный описательный характер и проводилось среди детей раннего возраста с диагнозом эпидемического паротита. В исследование были включены 16 пациентов в возрасте от 2 до 7 лет, включая мальчиков и девочек, находившихся на стационарном лечении.

Диагноз эпидемического паротита устанавливался на основании клинико-эпидемиологических данных, с учётом характерных симптомов заболевания (увеличение околоушных слюнных желез, лихорадка, интоксикационный синдром), а также лабораторного подтверждения.

Лабораторные методы исследования включали:

- общий анализ крови с оценкой уровня лейкоцитов, лимфоцитов, нейтрофилов и скорости оседания эритроцитов (СОЭ);
- биохимический анализ крови с определением уровня амилазы (в сыворотке крови), глюкозы, а также активности печёночных ферментов (АЛТ, АСТ);

- серологические методы (ИФА) для выявления специфических антител IgM и IgG к вирусу эпидемического паротита;
- при наличии показаний — исследование ликвора (цитоз, уровень белка, глюкозы) для диагностики поражения центральной нервной системы.

Инструментальные методы включали ультразвуковое исследование органов брюшной полости для оценки состояния поджелудочной железы и других органов. В ходе исследования проводился анализ анамнестических данных, клинической картины заболевания, тяжести течения и характера осложнений (менингит, панкреатит и др.). Оценивались возраст, пол, сроки госпитализации, длительность заболевания и наличие сопутствующих факторов.

Статистическая обработка данных проводилась с использованием методов описательной статистики с вычислением средних значений (M), стандартного отклонения (SD) и процентных показателей.

Результаты и обсуждение

В ходе исследования были проанализированы клинические и лабораторные данные 16 детей в возрасте от 2 до 7 лет с диагнозом эпидемического паротита. У большинства пациентов заболевание протекало с типичными клиническими проявлениями, включая увеличение околоушных слюнных желез, лихорадку и признаки интоксикации.

Лабораторные исследования выявили изменения, характерные для вирусной инфекции. В общем анализе крови у большинства пациентов наблюдался относительный лимфоцитоз, нормальный или умеренно повышенный уровень лейкоцитов, а также повышение скорости оседания эритроцитов. Биохимический анализ крови показал повышение уровня амилазы у части пациентов, что свидетельствует о вовлечении поджелудочной железы в патологический процесс.

Серологическое исследование подтвердило наличие IgM антител у большинства пациентов, что указывает на острую фазу заболевания.

Для более детального анализа клинико-лабораторных показателей представлена расширенная таблица:

Таблица 1. Клинические, лабораторные показатели и осложнения у детей с эпидемическим паротитом (n=16)

Показатель	Количество (n)	Доля (%)
Клинические проявления		
Увеличение околоушных слюнных желез	16	100%
Лихорадка (>38°C)	14	87,5%
Симптомы интоксикации	13	81,2%
Боль при жевании/глотании	11	68,7%
Снижение аппетита	10	62,5%
Лабораторные показатели		
Лимфоцитоз	12	75%
Лейкоцитоз	7	43,7%
Повышение СОЭ	10	62,5%
Повышение амилазы	6	37,5%
Положительный IgM	13	81,2%
Наличие IgG	5	31,2%
Осложнения		
Серозный менингит	4	25%
Панкреатит	3	18,7%

Показатель	Количество (n)	Доля (%)
Отсутствие осложнений	9	56,2%

Анализ представленных данных показал, что клиническая картина у большинства пациентов соответствовала классическому течению эпидемического паротита. В то же время у значительной части детей отмечались осложнения, среди которых наиболее частыми были поражения центральной нервной системы и поджелудочной железы.

Особое внимание заслуживает тот факт, что у ряда пациентов осложнения развивались на фоне относительно умеренно выраженной клинической симптоматики, что может затруднять раннюю диагностику и требует более тщательного наблюдения.

Полученные результаты подтверждают данные литературы о полиорганном характере поражения при эпидемическом паротите и подчёркивают необходимость комплексного подхода к обследованию пациентов, включая клинические, лабораторные и инструментальные методы.

Статистическая обработка полученных данных проводилась с использованием методов описательной статистики. Количественные показатели представлены в виде средних значений (M) и стандартного отклонения (SD), качественные признаки — в виде абсолютных значений (n) и относительных величин (%).

Средний возраст обследованных пациентов составил 4,5 ± 1,7 года. Распределение по полу было относительно равномерным, без статистически значимых различий.

Для оценки частоты клинических проявлений и осложнений использовались процентные показатели с расчётом 95% доверительного интервала (95% ДИ). Так, частота серозного менингита составила 25% (95% ДИ: 7,3–52,4%), панкреатита — 18,7% (95% ДИ: 4,0–45,6%).

Анализ лабораторных показателей показал, что повышение уровня амилазы достоверно чаще наблюдалось у пациентов с признаками панкреатита ($p<0,05$). У пациентов с осложнённым течением заболевания отмечалась тенденция к более выраженному лимфоцитозу и повышению СОЭ, однако статистически значимых различий по данным показателям не выявлено ($p>0,05$).

Для сравнения групп (с осложнениями и без осложнений) применялись непараметрические методы статистики (критерий Манна–Уитни для количественных данных и критерий χ^2 для качественных признаков). Различия считались статистически значимыми при уровне значимости $p<0,05$.

Полученные результаты свидетельствуют о наличии связи между биохимическими показателями (уровень амилазы) и развитием осложнений, что подтверждает диагностическую значимость лабораторных методов исследования при эпидемическом паротите у детей раннего возраста.

Обсуждение

Полученные в ходе исследования результаты подтверждают, что эпидемический паротит у детей раннего возраста может протекать не только в типичной форме, но и сопровождаться развитием осложнений различной степени тяжести. Несмотря на относительно небольшую выборку, выявленные клинико-лабораторные особенности соответствуют современным представлениям о патогенезе и клиническом течении данного заболевания.

Установлено, что наиболее частыми осложнениями являлись поражения центральной нервной системы и поджелудочной железы, что согласуется с данными литературы о тропности вируса эпидемического паротита к железистой и нервной ткани. Частота серозного менингита (25%) в нашем исследовании несколько выше по сравнению с рядом литературных источников, что может быть связано с возрастными особенностями обследованной группы, а также с

госпитализацией преимущественно пациентов с более выраженной клинической симптоматикой.

Заключение

Эпидемический паротит у детей раннего возраста характеризуется разнообразием клинических проявлений и риском развития осложнений, затрагивающих различные органы и системы. В большинстве случаев заболевание протекает с типичной симптоматикой, однако у значительной части пациентов наблюдаются осложнения, среди которых наиболее часто встречаются поражения центральной нервной системы и поджелудочной железы. Проведённое исследование показало, что клинико-лабораторные показатели, в частности уровень амилазы и изменения в общем анализе крови, имеют важное значение для своевременной диагностики осложнённых форм заболевания. При этом осложнения могут развиваться даже при умеренно выраженной клинической картине, что требует повышенного внимания со стороны врачей.

Несмотря на ограниченный объём выборки, полученные результаты подтверждают необходимость комплексного подхода к обследованию детей с эпидемическим паротитом, включающего клинические, лабораторные и инструментальные методы диагностики.

Таким образом, раннее выявление осложнений и своевременное проведение диагностических мероприятий позволяют снизить риск неблагоприятных исходов и повысить эффективность лечения. Полученные данные могут быть использованы для совершенствования клинической практики и профилактики эпидемического паротита у детей раннего возраста.

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HIDDEN ECONOMY

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Annotation. This article examines the concept of the hidden economy, its impact on economic development, and the challenges it poses to both developed and developing countries. The study analyzes the relationship between the shadow economy and institutional quality, emphasizing the role of public administration efficiency, digitization, and regulatory systems in reducing informal economic activities. Particular attention is given to international experience and the reforms implemented in Uzbekistan to combat the hidden economy. These reforms include the promotion of cashless transactions, the introduction of sustainability ratings for business entities, digital reporting tools such as a Telegram bot, product labeling systems, and international cooperation initiatives. The article concludes that the integration of digital technologies and financial transparency mechanisms plays a crucial role in formalizing the informal sector, increasing tax revenues, and ensuring sustainable economic growth.

Keywords: Hidden economy, shadow economy, informal sector, economic development, digitization**,** financial transparency, tax compliance, institutional quality, cashless payments, Uzbekistan reforms.

A clandestine economy, often referred to as a shadow economy or informal economy, includes all economic activities that are not officially reported to power, such as unregistered businesses, undeclared labor, tax evasion, and underground markets. It is estimated that the hidden economy ranges from 15% to 30% of global GDP, depending on the country and the level of informality in the local economic system. The pervasive nature of the clandestine economy presents significant challenges for a developed and developing economy, affecting economic policy, tax revenues, employment, and social

equality. While informal sectors provide significant employment opportunities, especially in developing economies, they simultaneously prevent growth, reduce fiscal space, and perpetuate inequality.

The relationship between the hidden economy and economic development is complex. On the one hand, it provides employment opportunities and entrepreneurship, especially in developing economies where formal employment opportunities may be scarce. At the same time, it increases income inequality, weakens fair competition and reduces the effectiveness of public policies aimed at reducing poverty and improving social welfare. Preliminary findings suggest that the size of the hidden economy is inversely related to the level of institutional quality and the effectiveness of Public Administration. In countries where the government has low efficiency in high regulatory burdens and enforcement (e.g. Argentina, India and Indonesia), the clandestine economy forms a significant part of GDP—often exceeding 30% in some cases. This result is consistent with the conclusions of Schneider (2013), who observed that states with a weak executive and regulatory system are experiencing a higher proportion of economic activity in the informal sector.

In contrast, countries with higher levels of digitization and better governance have a smaller clandestine economy. For example, in Sweden, where digital payment systems and e-government platforms are common, the hidden economy accounts for only 7-8% of GDP, despite high tax rates. A recent study (OECD, 2020) found that the introduction of digital tax platforms such as electronic filing systems and electronic invoices could reduce the latent economy by up to 10% in five years by improving tax compliance and reducing escape opportunities.

Uzbekistan is actively implementing several reforms to reduce the clandestine economy in order to increase transparency, improve tax compliance and integrate informal sectors into the formal economy. Major initiatives include:

1. Promotion of cashless transactions

To minimize cash circulation and promote transparency, the government introduced measures to encourage non-cash payments:

1.Mandatory non-cash payments: from May 1, 2024, the sale of real estate and vehicles must be carried out only through non-cash transactions. In addition, payments for goods and services that exceed $ 3,000 must be made through non-cash methods. The initiative aims to reduce the use of cash and increase financial transparency.

2. Payroll payments: the government orders that 100% of the salary for budget organizations, including universities, large taxpayers, and military personnel, be paid through bank card transfers. This policy ensures that income is monitored and reduces the likelihood of low reporting.

2. Introduction of sustainability rating of business entities

In Uzbekistan, the stability rating of business entities was introduced in order to properly organize business activities and encourage companies to formalize their activities. This system assesses enterprises on the basis of compliance with tax rules, financial transparency and operational stability. Highly ranked companies have benefits such as lower tax rates and simplified administrative procedures, encouraging informal businesses to enter the formal economy.

3. Introduction of Telegram bot to report informal activities

Uzbekistan launched a Telegram bot that allows citizens to report cases of informal economic activity in order to combat the hidden economy. The tool promotes public participation in monitoring and reporting of unregistered businesses and thus increases the government's ability to address and reduce the clandestine economy.

4. Commodity marking system

In order to combat the informal trade in goods, a system of branding of various products was introduced in Uzbekistan:

Product labeling: the government has implemented a labeling system to monitor and verify the movement of goods, particularly in areas such as alcohol and tobacco, through the supply chain. This initiative helps to identify and eliminate unregistered goods from the market and thus reduce the hidden economy.

5. International cooperation and technical assistance

Uzbekistan cooperates with international organizations in order to strengthen its efforts to reduce the hidden economy:

Support from the World Bank: in October 2024, the World Bank approved a $ 800 million preferential loan to support Uzbekistan's reform agenda, including measures to reduce the clandestine economy. This funding is allocated to important sectors such as social protection, agriculture, business environment, energy reforms and Climate Action. Together, these reforms aim to integrate the informal economy into the formal sector, increase tax revenues, and ensure sustainable economic growth in Uzbekistan.

In conclusion, the integration of the digital economy into the wider economic base of Uzbekistan provides a transformative opportunity to reduce the hidden economy. The introduction of cashless payment systems, electronic tax platforms and the promotion of financial transparency through digital means is the main strategy of this process. These reforms, along with the introduction of new technologies such as blockchain and the digitization of key sectors, are designed not only to increase economic transparency, but also to encourage enterprises to formalize their activities, such as business.

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CONSTRUCTION OF AUTOMOBILE ROADS BASED ON MODERN ECOLOGICAL TECHNOLOGIES

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Annotation. The article provides a detailed analysis of the application of modern information technologies in road construction and their role in increasing efficiency. Innovative technologies, particularly Geographic Information Systems (GIS), Building By applying these technologies, not only is the efficiency of construction improved, but also its safety and quality. Furthermore, the article highlights the economic and ecological benefits of integrating these technologies and applying advanced methods.

Key words: information Technologies, Geographic Information Systems (GIS), Building Information Modeling (BIM), Drones, Artificial Intelligence, Internet of Things (IoT), Road Construction, Innovative Technologies, Environmental Impact, Monitoring Systems, Digital Technologies.

ZAMONAVIY EKOLOGIK TEXNOLOGIYALAR ASOSIDA AVTOMOBIL YO‘LLARINI QURISH

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Annotatsiya. Maqolada zamonaviy axborot texnologiyalarining avtomobil yo‘llarini qurishda qo‘llanilishi va ularning samaradorligini oshirishdagi roli batafsil tahlil

qilingan. Maqola, shuningdek, texnologiyalarning qurilish jarayonlariga ta’sirini, shu jumladan, materiallar va usullarni tanlash, monitoring va boshqaruv tizimlaridan foydalanishni o‘rganadi. Bu texnologiyalarni qGllash orqali nafaqat qurilishning samaradorligi, balki xavfsizligi va sifati ham yaxshilanadi. Maqolada, shuningdek, texnologiyalarni integratsiyalash va ilg‘or metodlarni tatbiq etishning iqtisodiy va ekologik foydalari yoritiladi.

Аннотация. В статье подробно анализируется применение современных информационных технологий в дорожном строительстве и их роль в повышении эффективности. Также рассматривается влияние этих технологий на строительный процесс, включая выбор материалов и методов, а также использование систем мониторинга и управления. Применение этих технологий позволяет не только улучшить эффективность строительства, но и повысить безопасность и качество. В статье также освещаются экономические и экологические преимущества интеграции этих технологий и применения передовых методов.

Kalit so‘zlar: axborot texnologiyalari, Geografik Axborot Tizimlari (GAT), Qurilish Axborot Modellashtirish (BIM), Dronlar, Sun’iy intellect, Internet of Things (IoT), Yo‘l qurilishi, Innovatsion texnologiyalar, Ekologik ta’sir, Monitoring tizimlari, Raqamli texnologiyalar.

Ключевые слова: информационные технологии, Географические информационные системы (ГИС), Моделирование строительной информации (BIM), Дроны, Искусственный интеллект, Интернет вещей (IoT), Дорожное строительство, Инновационные технологии, Экологическое воздействие, Системы мониторинга, Цифровые технологии.

Kirish. Zamonaviy avtomobil yo‘llari qurilishi va ularni ekspluatatsiya qilish jarayonlari xalqaro miqyosda sezilarli darajada rivojlanmoqda. Ayniqsa, Yevropa

davlatlarida avtomobil yo‘llari qurilishida innovatsion texnologiyalarni keng qo‘llash, ushbu jarayonning samaradorligi va ekologik xavfsizligini ta’minlashga yordam bermoqda. Bugungi kunda yo‘l qurilishi faqatgina an'anaviy usullar bilan cheklanib qolmay, balki turli axborot texnologiyalari va raqamli tizimlarning integratsiyasi orqali yuqori aniqlik, tezlik va resurslarni tejash kabi muhim yutuqlarga erishilmoqda. Shuningdek, axborot texnologiyalarining rivojlanishi va global miqyosda ulardan foydalanishning kengayishi, transport infratuzilmasining barqarorligini ta’minlashga xizmat qilmoqda. Avtomobil yo‘llarini qurishda zamonaviy texnologiyalar, ayniqsa, Geografik Axborot Tizimlari (GIS), Qurilish Axborot Modellashtirish (BIM), Dronlar, Sun’iy Intellekt (AI), Internet of Things (IoT), GPS, va raqamli geodeziya kabi innovatsion yondashuvlar muhim rol o‘ynamoqda. Ushbu texnologiyalar nafaqat qurilish jarayonini optimallashtirish, balki yo‘lning ekspluatatsiya muddatini uzaytirish, xavfsizlikni ta’minlash va atrof-muhitga bo‘lgan salbiy ta’sirni kamaytirishga ham yordam beradi.Geografik Axborot Tizimlari (GIS) texnologiyasi, masalan, yo‘lning optimal marshrutini aniqlashda va raqamli haritalarni yaratishda qo‘llaniladi. BIM (Building Information Modeling) esa loyihalarni uch o‘lchamli modellashtirishga imkon beradi, bu esa qurilish jarayonini optimallashtirish va xavfsizlikni ta’minlashga xizmat qiladi. Dronlar yordamida esa qurilish jarayonlarini masofadan nazorat qilish va monitoring qilish imkoniyatlari kengaygan. Sun’iy Intellekt (AI) esa materiallarning optimal taqsimlanishini va uskunalarning samarali ishlashini ta’minlaydi. Shuningdek, yangi texnologiyalarning joriy etilishi va ularning ishlash prinsipi, yo‘l qurilishining sifatini oshirish va vaqtni tejash imkoniyatlarini yaratib, iqtisodiy samaradorlikni ta’minlamoqda. Texnologiyalar orqali amalga oshirilayotgan real vaqt rejimidagi monitoringlar va raqamli boshqaruv tizimlari qurilishning yuqori samaradorlik va barqarorlikni ta’minlashga imkon yaratmoqda.O‘zbekistonda ham zamonaviy texnologiyalarni yo‘l qurilishida joriy etish, xalqaro standartlarga mos keladigan

infratuzilma yaratish va avtomobil yo‘llarining samarali ekspluatatsiyasini ta’minlash uchun katta imkoniyatlar mavjud. Bu, ayniqsa, iqtisodiy rivojlanishning o‘sishi, xalqaro hamkorlikning kuchayishi va transport tizimini yangilashda muhim omil bo‘lib xizmat qiladi. Shu bilan birga, axborot texnologiyalarining qo‘llanilishi faqatgina qurilish jarayonini tezlashtirish bilan cheklanib qolmay, balki yangi usullar yordamida ekologik xavfsizlikni ta’minlash, atrof-muhitga bo‘lgan salbiy ta’sirni kamaytirish va kelajakda barqaror transport tizimlarini yaratishda ham muhim o‘rin tutadi.

Quyda giyalaridan keng foydalaniladi. Eng ko‘p qo‘llaniladigan texnologiyalar qatoriga Geografik Axborot Tizimlari (GIS), Qurilish Axborot Modellashtirish (BIM) va dronlar va yangi xalqaro tajribalar misolida bajarish mumkin. Geografik Axborot Tizimlari (GIS): GIS texnologiyalari yo‘l loyihalashda raqamli haritalar yaratish, yo‘llarning optimal marshrutlarini aniqlash va tegishli ma’lumotlarni integratsiya qilishda muhim rol o‘ynaydi. Qurilish Axborot Modellashtirish (BIM): BIM tizimlari yordamida yo‘l loyihalari uch o‘lchamli modellashtiriladi, bu esa qurilish jarayonini optimallashtirish va oldindan sinovdan o‘tkazishga imkon beradi. GPS va GIS Texnologiyalari: Avtomobil yo‘llarini loyihalashda va qurishda GPS (Global Positioning System) va GIS (Geographic Information Systems) texnologiyalaridan foydalanishning afzalliklari katta. Bu texnologiyalar yordamida yo‘lning aniq joylashuvi, tekisligi va boshqa topografik xususiyatlari osonlik bilan aniqlanadi. Bu, o‘z navbatida, qurilishning to‘g‘riligi va samaradorligini ta’minlaydi. 3D modelleme va simulyatsiya: Yo‘l qurilishida 3D modelleme va simulyatsiya texnologiyalari yordamida loyihalarning raqamli modellarini yaratish mumkin. Bu, qurilishning samaradorligini va xavfsizligini oldindan tahlil qilish imkonini beradi, shuningdek, kamchiliklarni oldindan ko‘rish va tuzatish imkonini beradi. Shuningdek, Yevropada avtomobil ichidagi elektron qo‘ng‘iroqlar (eCall) tizimi ham keng joriy etilgan bo‘lib, bu tizim avtohalokat sodir bo‘lganda avtomatik ravishda favqulodda xizmatlarga xabar yuboradi. 2018-yildan

boshlab, Yevropa Ittifoqida barcha yangi yengil avtomobillar va yengil yuk mashinalarida eCall tizimini o‘rnatish majburiy qilindi. 2024-yilda esa ushbu tizimni 5G texnologiyasiga yangilash rejalashtirilgan. Ushbu texnologiyalar yo‘l qurilishining samaradorligini oshirish, qurilish muddatlarini qisqartirish va moliyaviy harajatlarni optimallashtirishga xizmat qiladi.

Axborot texnologiyalarining yo‘l qurilishida qo‘llanilishi natijasida quyidagi yutuqlarga erishiladi:

1. Qurilish samaradorligini oshirish: Geografik axborot tizimlari (GIS) yordamida yo‘llarning optimal joylashuvi aniqlanadi, bu esa qurilish jarayonida ortiqcha harajatlarni oldini oladi.
2. Dronlar va masofaviy zondlash texnologiyalari joyning topografik haritasini tezkorlik bilan olishga va joyni o‘lchash jarayonini tezlashtirishga yordam beradi.
3. Sun’iy intellekt (AI) va mashinaviy o‘rganish qurilish materiallari va uskunalarining optimal taqsimlanishini rejalashtirishda qo‘llaniladi.
4. Qurilish sifati va xavfsizligini oshirish:

3D modellashtirish va BIM (Building Information Modeling) texnologiyalari yo‘l loyihalarini uch o‘lchovli shaklda yaratishga va turli simulyatsiyalar orqali mustahkamlikni sinashga imkon beradi. IoT (Internet of Things) datchiklari qurilish maydonchasidagi harorat, namlik, materiallar sifati va og‘ir texnikaning holatini monitoring qilishga yordam beradi. Avtonom texnikalar va robotlar yo‘l qurilishida inson omilining xatoliklarini kamaytirib, ish sifatini oshiradi.

Xulosa.

Yo‘l qurilishida axborot texnologiyalaridan foydalanish bugungi kunda eng samarali yondashuvlardan biri bo‘lib, qurilish jarayonining tezkor va samarali amalga oshirilishini ta’minlaydi. GIS, BIM, dronlar va sun’iy intellekt kabi texnologiyalar yo‘llarning loyihalashtirish, qurish va ekspluatatsiya jarayonlarini yangi bosqichga olib

chiqmoqda. Avtomobil yo‘llarini qurishda zamonaviy texnologiyalardan foydalanish, nafaqat qurilish jarayonlarini tezlashtirish va samaradorligini oshirish, balki atrof-muhitga bo‘lgan ta’sirni kamaytirish va resurslardan optimal foydalanish imkonini ham beradi. GPS, GIS, 3D modelleme, intellektual boshqaruv tizimlari va ekologik texnologiyalar kabi innovatsion metodlar yordamida qurilishning har bir bosqichida yuqori aniqlik, xavfsizlik va sifat ta’minlanadi. Yangi materiallar va avtomatlashtirilgan qurilish texnikalari qurilish jarayonini soddalashtirib, vaqt va mablag‘larni tejash imkonini yaratadi. Bundan tashqari, avtomobil yo‘llarini qurishda ekologik jihatlarni inobatga olish va barqaror texnologiyalarni qo‘llash, kelajakda yo‘l qurilishining yanada samarali va ekologik xavfsiz bo‘lishini ta’minlaydi. Shuningdek, raqamli monitoring tizimlari va aqlga asoslangan boshqaruv metodlari yordamida qurilish va ekspluatatsiya jarayonlari real vaqt rejimida kuzatilishi mumkin, bu esa yo‘lning uzoq muddatli ishlashini va uning texnik holatini doimiy ravishda nazorat qilish imkonini yaratadi. O‘zbekistonda avtomobil yo‘llari qurilishida zamonaviy texnologiyalarni joriy etish, nafaqat ichki infratuzilmani rivojlantirish, balki global miqyosda raqobatbardosh transport tizimini yaratish imkonini beradi.

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The Effectiveness of Teaching English Using ChatGPT and Other Artificial Intellegence Tools

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Abstract :

This study explores the effectiveness of using ChatGPT and other Artificial Intelligence (AI) tools in teaching English as a Foreign Language (EFL). The research analyzes how AI technologies influence language acquisition, student engagement, and teaching methodologies. Using a mixed-method approach, the study evaluates both qualitative and quantitative data from recent empirical research. The findings indicate that AI tools significantly enhance personalized learning, provide immediate feedback, and improve learners' writing, speaking, and comprehension skills. However, challenges such as over-reliance on AI, reduced critical thinking, and ethical concerns are also identified. The study concludes that AI tools, when used alongside traditional teaching methods, can significantly improve English language learning outcomes.

Keywords : Artificial Intelligence, ChatGPT, English Language Teaching, EFL, personalized learning, educational technology

Аннотация:

Данное исследование посвящено эффективности использования ChatGPT и других инструментов искусственного интеллекта в преподавании английского языка как иностранного. Анализируется влияние ИИ на процесс усвоения языка, вовлеченность студентов и методику преподавания. Исследование основано на смешанном подходе, включающем качественные и количественные методы анализа. Результаты показывают, что ИИ способствует персонализации обучения, обеспечивает мгновенную обратную связь и улучшает навыки письма, говорения

и понимания. Однако выявлены и проблемы, такие как зависимость от технологий и снижение критического мышления. Делается вывод, что эффективное применение ИИ возможно при его сочетании с традиционными методами обучения.

Ключевые слова: искусственный интеллект, ChatGPT, обучение английскому языку, персонализированное обучение, образовательные технологии

Annotatsiya:

Mazkur tadqiqot ChatGPT va boshqa sun’iy intellekt vositalarining ingliz tilini o‘qitishdagi samaradorligini o‘rganishga bag‘ishlangan. Unda AI texnologiyalarining til o‘zlashtirish, talabalar faolligi va o‘qitish metodikasiga ta’siri tahlil qilinadi. Tadqiqot aralash metodologiya asosida olib borilgan. Natijalar shuni ko‘rsatadiki, AI vositalari individual o‘qitishni rivojlantiradi, tezkor fikr-mulohaza beradi va yozish, gapirish hamda tushunish ko‘nikmalarini yaxshilaydi. Shu bilan birga, texnologiyaga ortiqcha bog‘liqlik va tanqidiy fikrlashning pasayishi kabi muammolar ham aniqlangan. Tadqiqot natijasida AI vositalarini an’anaviy metodlar bilan uyg‘unlashtirish eng samarali yo‘l ekanligi aniqlangan.

Kalit so‘zlar: sun’iy intellekt, ChatGPT, ingliz tilini o‘qitish, individual ta’lim, ta’lim texnologiyalari

In recent years, the rapid advancement of Artificial Intelligence (AI) technologies has significantly transformed various sectors of society, including education. The emergence of intelligent digital systems has reshaped traditional teaching and learning processes, creating new opportunities for innovation, accessibility, and efficiency. In particular, the field of language education has experienced profound changes as AI-based tools have begun to play an increasingly important role in facilitating language acquisition and improving instructional practices.

Among the wide range of AI technologies, conversational agents such as ChatGPT have gained considerable attention due to their ability to simulate human-like interaction, generate coherent and contextually appropriate responses, and support learners in real-time communication. Unlike traditional computer-assisted language learning tools, which often rely on pre-programmed content, ChatGPT utilizes advanced natural language processing (NLP) and machine learning algorithms to provide dynamic, adaptive, and personalized learning experiences. This makes it a particularly valuable resource in English Language Teaching (ELT), especially in contexts where learners have limited exposure to authentic English communication outside the classroom.

The integration of AI tools into ELT has introduced a paradigm shift from teacher-centered to learner-centered approaches. Traditional methodologies, while still relevant, are increasingly complemented by digital platforms that allow for individualized instruction, continuous assessment, and immediate feedback. AI-driven tools can analyze learners' performance, identify their strengths and weaknesses, and adapt instructional materials accordingly. As a result, students are able to progress at their own pace, engage more actively in the learning process, and develop greater autonomy in language acquisition.

This transformation is particularly significant in English as a Foreign Language (EFL) contexts, where opportunities for real-life communication are often limited. In such environments, AI technologies serve as virtual interlocutors, enabling learners to practice speaking and writing skills in a low-anxiety setting. Moreover, AI tools provide access to a vast range of authentic language materials, including dialogues, texts, and interactive exercises, which enhance learners' exposure to different linguistic and cultural contexts.

Furthermore, the use of AI in education aligns with global trends toward digitalization and the development of 21st-century skills. Modern educational policies emphasize the

importance of integrating technology into teaching practices in order to prepare students for a rapidly changing, knowledge-based society. In this regard, AI not only supports language learning but also fosters critical thinking, problem-solving abilities, and digital literacy among learners.

However, despite its numerous advantages, the implementation of AI in language education also raises important pedagogical, ethical, and methodological concerns. Scholars have pointed out potential risks such as over-reliance on technology, reduced opportunities for human interaction, issues of academic integrity, and the possibility of diminishing learners' critical thinking skills. Therefore, it is essential to critically evaluate both the benefits and limitations of AI tools in order to ensure their effective and responsible use in educational settings.

Given the growing importance of AI in education, this study aims to investigate the effectiveness of using ChatGPT and other AI tools in teaching English. The research focuses on examining their impact on language learning outcomes, student engagement, and instructional practices. Additionally, it seeks to identify the advantages and challenges associated with AI-assisted language learning and to explore how these technologies can be effectively integrated into existing pedagogical frameworks.

The significance of this study lies in its contribution to the ongoing discussion on the role of AI in education. By providing a comprehensive analysis of current practices and empirical evidence, the research aims to offer practical recommendations for teachers, curriculum designers, and policymakers. Ultimately, the study emphasizes the importance of achieving a balanced approach in which AI technologies are used as supportive tools that enhance, rather than replace, the human dimension of teaching and learning.

Recent studies increasingly emphasize the growing role of Artificial Intelligence (AI) in transforming language education. Over the past decade, rapid advancements in natural

language processing and machine learning have enabled the development of intelligent systems capable of supporting language learning in innovative ways. A systematic review of studies conducted between 2018 and 2025 indicates that AI-driven tools, particularly ChatGPT, have demonstrated significant potential to enhance learning experiences and improve educational outcomes in English as a Second Language (ESL) and English as a Foreign Language (EFL) contexts. These tools are recognized not only for their technological sophistication but also for their pedagogical applicability.

One of the most widely discussed advantages of AI in language learning is its ability to provide personalized and adaptive feedback. Unlike traditional classroom settings, where feedback may be delayed or limited due to time constraints, AI systems can offer immediate and individualized responses tailored to learners' specific needs. Research findings suggest that ChatGPT effectively supports the development of all four language skills—writing, reading, speaking, and listening—through interactive dialogue, task-based learning, and contextualized language use. For instance, learners can engage in simulated conversations, receive corrections on grammatical errors, and practice vocabulary in meaningful contexts, which contributes to deeper language acquisition.

Furthermore, several studies highlight the role of ChatGPT in promoting learner autonomy and self-directed learning. By providing access to diverse learning materials, including texts, exercises, and conversational scenarios, AI tools enable students to extend their learning beyond the classroom environment. This is particularly important in EFL settings, where opportunities for authentic communication are often limited. The availability of AI-based support allows learners to practice language skills independently, thereby fostering confidence and motivation.

Another significant contribution of AI tools is their ability to increase student engagement. Interactive and dynamic learning environments created by AI systems make the learning process more appealing and less monotonous. Students are more

likely to participate actively in tasks when they receive instant feedback and can observe their progress in real time. Empirical studies have shown that the integration of ChatGPT into classroom instruction leads to measurable improvements in grammar acquisition, vocabulary retention, and overall language proficiency.

Despite these advantages, the literature also identifies several challenges and limitations associated with the use of AI in language education. One major concern is the potential over-reliance on technology, which may lead to a decrease in learners' critical thinking skills and independent problem-solving abilities. When students depend heavily on AI-generated responses, they may become passive recipients of information rather than active participants in the learning process.

In addition, ethical issues such as plagiarism, data privacy, and academic integrity are frequently discussed in the literature. The ease with which AI tools can generate texts raises concerns about originality and authenticity in student work. Scholars argue that without proper guidance and regulation, the misuse of AI technologies may undermine the educational process.

Overall, the existing body of research suggests that while AI tools like ChatGPT offer significant benefits for language learning, their effectiveness depends on how they are integrated into pedagogical practices. A balanced approach that combines technological innovation with traditional teaching methods is essential to maximize learning outcomes and minimize potential risks.

This study adopts a mixed-method research design, combining both qualitative and quantitative approaches in order to provide a comprehensive analysis of the effectiveness of AI tools in English language teaching. The use of multiple research methods allows for a more reliable and valid interpretation of the data, as it integrates statistical evidence with descriptive insights.

Data Collection

The data for this study were collected from several sources. First, a systematic review of more than fifteen recent empirical studies on the application of AI in English Language Teaching (ELT) was conducted. These studies provided a theoretical and empirical foundation for understanding current trends and practices.

Second, quantitative data were obtained through the analysis of student performance indicators, including test scores, writing assessments, and language proficiency evaluations. These data were used to measure the impact of AI-assisted learning on students' academic achievements.

Third, qualitative data were collected through surveys and semi-structured interviews with both students and teachers. The surveys aimed to gather information about participants' attitudes, perceptions, and experiences related to the use of AI tools, while the interviews provided deeper insights into the challenges and benefits observed in real educational contexts.

Participants

The participants of the study included university-level EFL students and English language teachers. The student participants represented different proficiency levels, ranging from elementary to intermediate, which allowed for a more comprehensive analysis of the effectiveness of AI tools across various learning stages. The teacher participants were experienced educators who had incorporated digital technologies into their teaching practices.

Research Methods

Several research methods were employed in this study. Comparative analysis was used to evaluate the differences between traditional teaching methods and AI-assisted learning approaches. Statistical analysis was applied to examine quantitative data and identify significant patterns and improvements in learning outcomes. Additionally,

thematic analysis was conducted on qualitative data to identify recurring themes, such as learner motivation, engagement, and perceived effectiveness of AI tools.

1. Improvement of Language Skills

The findings of the study indicate that AI tools have a significant positive impact on the development of all four language skills. In terms of writing, automated feedback systems help learners improve grammatical accuracy, sentence structure, and coherence. Students benefit from immediate corrections and suggestions, which enable them to refine their writing more efficiently.

In speaking, AI-based conversational systems simulate real-life interactions, allowing learners to practice fluency and pronunciation in a low-pressure environment. This is particularly beneficial for students who may feel anxious when speaking in front of others.

Reading skills are enhanced through adaptive texts that are tailored to learners' proficiency levels. AI tools can adjust the complexity of reading materials, making them more accessible and engaging. Similarly, listening skills are supported by AI-generated audio materials that expose learners to different accents and speaking styles.

2. Personalized Learning

One of the most significant advantages of AI integration is the ability to provide personalized learning experiences. AI systems analyze learners' performance and adapt instructional content accordingly. This individualized approach helps address the specific needs of each learner, leading to increased motivation and more effective learning outcomes.

3. Immediate Feedback

The provision of real-time feedback is another key benefit of AI tools. Unlike traditional classroom settings, where feedback may be delayed, AI systems allow learners to

identify and correct their mistakes instantly. This accelerates the learning process and promotes continuous improvement.

4. Increased Student Engagement

The interactive nature of AI tools contributes to higher levels of student engagement. Learners are more actively involved in the learning process when they can interact with intelligent systems that respond to their inputs in real time. This leads to greater participation, improved motivation, and a more positive attitude toward language learning.

5. Challenges and Limitations

Despite the numerous advantages, several challenges were identified. Overdependence on AI tools may hinder the development of critical thinking skills and reduce learners' ability to solve problems independently. Additionally, the risk of plagiarism and misuse of AI-generated content raises serious ethical concerns.

Another limitation is the potential reduction in human interaction, which is an essential component of language learning. While AI can simulate communication, it cannot fully replace the social and emotional aspects of human interaction in the classroom.

In conclusion, the findings of this study confirm that ChatGPT and other AI tools are highly effective in enhancing English language teaching and learning. Their ability to provide personalized instruction, immediate feedback, and interactive learning environments significantly contributes to improved language acquisition and student performance.

However, the study also highlights the importance of using AI tools responsibly and in combination with traditional teaching methods. AI should be viewed as a supportive resource rather than a replacement for teachers. The role of the teacher remains essential in guiding learners, fostering critical thinking, and ensuring ethical use of technology.

The future of English language teaching lies in the balanced integration of AI technologies with human-centered pedagogical approaches. Further research is recommended to explore long-term effects, develop effective implementation strategies, and address ethical challenges associated with AI in education.

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DIAGNOSTIC OPTIMIZATION IN DUODENAL INTEGRITY DISORDERS: ROLE OF MODERN IMAGING AND ENDOSCOPIC TECHNIQUES

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Keywords. duodenal injuries, multislice computed tomography, esophagogastroduodenoscopy, multimodal diagnostics.

The aim of the study was to improve diagnostic accuracy in patients with duodenal integrity disorders through the implementation of modern instrumental and visualization methods.

Materials and methods. A prospective analysis included 25 patients with duodenal injuries and perforations treated between 2021 and 2025. A comprehensive diagnostic approach was applied was applied, including ultrasound (100%), esophagogastroduodenoscopy (EGD), contrast radiography, contrast-enhanced multislice computed tomography (MSCT), magnetic resonance imaging (MRI), and diagnostic laparoscopy. The diagnostic value of these methods was compared with limited use of imaging techniques in retrospective cohorts.

Results. It was established that posterior duodenal wall injuries are characterized by nonspecific clinical manifestations and delayed presentation, which significantly complicates early diagnosis. The expanded use of modern diagnostic methods in the prospective group significantly improved detection rates and localization accuracy of pathological processes. Contrast-enhanced MSCT and MRI demonstrated high diagnostic value in identifying retroperitoneal air, fluid collections, and contrast leakage, while EGD allowed direct visualization of mucosal defects. Diagnostic laparoscopy enabled verification of diagnosis and timely surgical decision-making. Compared to the

control group, the application of a comprehensive diagnostic algorithm contributed to earlier detection, reduced diagnostic delays, improved treatment planning, and prevention of severe complications such as peritonitis and sepsis.

Conclusion. The use of a multimodal diagnostic approach, including advanced imaging and endoscopic techniques, plays a decisive role in the early detection and management of duodenal injuries. Implementation of these methods significantly improves clinical outcomes and should be considered a standard strategy in patients with suspected duodenal wall integrity disorders.

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IMAGE GENERATION METHODS BASED ON NEURAL NETWORKS IN DIGITAL ART AND GRAPHIC DESIGN

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Abstract

This article highlights the significance and practical application of image generation methods based on neural networks in digital art and graphic design. With the advancement of artificial intelligence technologies, the image creation process has evolved significantly. Neural networks have enabled the rapid creation of complex graphic compositions, the fusion of diverse artistic styles, and the generation of entirely new visual forms. The article analyzes the operational principles of these technologies, their impact on the design process, and their future development prospects.

Keywords: digital art, graphic design, artificial intelligence, neural networks, image generation, generative models, creative technologies, diffusion models.

Introduction

In recent years, the evolution of artificial intelligence technologies has unlocked new opportunities in art and design. In particular, generative systems powered by neural networks have fundamentally transformed the image creation process. While graphic designers previously relied heavily on manual labor or traditional software, today, new visual materials can be automatically generated using AI. In the field of digital art, these technologies accelerate the creative process, allow for the swift generation of multiple design iterations, and expand the creative boundaries for designers.

Methods

This study utilized methods of scientific literature analysis, comparison, and synthesis. Scientific articles and monographs regarding AI technologies used in digital art and graphic design were examined. Furthermore, the functional principles of Generative Adversarial Networks (GANs), style transfer algorithms, and diffusion models used in neural network-based image generation were analyzed. Through these methods, the application possibilities and efficiency of AI technologies in the graphic design process were explored.

A comparative approach was also employed to study the capabilities of various generative models. The accuracy of image creation, color harmony, composition quality, and the impact of each model on the design process were evaluated. Additionally, an analytical approach based on observation and experimental elements was used to assess the aesthetic quality and structural compliance of AI-generated visuals. These analyses helped determine which algorithms yield the most effective results in practical design workflows. Finally, the findings were systematized using the synthesis method to establish a scientific foundation for AI integration in graphic design.

Results

The research results indicate that neural network-based image generation technologies significantly accelerate the graphic design process and enhance productivity. Generative Adversarial Networks (GANs) enable the creation of high-quality visuals widely used in advertising, animation, and game graphics. Style transfer technology allows for the blending of classical artistic elements with modern design, fostering new visual aesthetics.

The analysis shows that images created via generative models exhibit high levels of color harmony, compositional balance, and visual clarity. Particularly, GANs and

diffusion models provide a high degree of realism, making them essential tools for multimedia and digital art projects.

Furthermore, the study confirms that AI does not replace the designer but serves as a vital supportive tool. It offers various design alternatives, which the designer then analyzes, edits, and refines. The research also highlights the potential of AI in design education, helping students practically learn composition and color theory. Ultimately, these generative systems speed up the prototyping process, allowing designers to quickly test multiple concepts and foster innovative approaches in the digital art industry.

Discussion

Systems based on diffusion models are demonstrating high efficiency in image generation. By forming images step-by-step, these models enable the creation of highly precise and realistic graphic materials. Furthermore, the rapid generation of design variants using AI eases the creative workflow for designers. However, AI-based image generation raises certain challenges related to copyright, data usage, and ethical considerations. Therefore, it is essential to incorporate legal and ethical standards into the development of these technologies.

The widespread adoption of AI is also shaping new methodological approaches in graphic design. Designers now utilize generative algorithms alongside traditional software, making the design process more interactive and dynamic. Nevertheless, since AI systems learn from vast datasets, the rules of data usage and authorship must be clarified.

Additionally, evaluating the aesthetic value of AI-generated images remains a critical issue. While AI can produce technically flawless visuals, emotional expression and artistic depth—core criteria of art—remain closely tied to human creativity. Thus, the collaboration between AI and human creativity remains a vital factor in digital art. In the future, neural network-based generation is expected to integrate further with

virtual reality (VR), augmented reality (AR), and interactive media, allowing designers to create even more complex visual environments.

Conclusion and Recommendations

Neural network-based image generation technologies are elevating the creative process in digital art and graphic design to a new level. AI algorithms empower designers to rapidly create complex visuals, blend artistic styles, and realize innovative ideas. As these generative systems continue to evolve, their integration into design education and practice becomes paramount. Based on the research findings, the following recommendations are proposed:

Professional Integration: Graphic design specialists should actively study and effectively implement AI technologies in their practical work.

Creative Control: It is crucial for designers to maintain their creative decision-making power during the selection and editing of AI-generated images.

Educational Adaptation: Educational institutions and vocational centers are encouraged to organize practical training on the use of digital art and AI-based generative systems.

Legal and Ethical Compliance: Special attention must be paid to copyright and intellectual property issues to ensure that AI-generated visuals are used in accordance with legal standards.

Overall, neural networks have proven to be essential tools for advancing the digital art industry, accelerating the creative process, and forming new aesthetic trends.

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METHODS AND SIGNIFICANCE OF USING THE ENERGY SYSTEM IN ACHIEVING ECONOMIC GROWTH IN UZBEKISTAN

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Abstract. This article extensively analyzes the theoretical foundations of the effective use of the energy system in achieving economic growth in Uzbekistan. Within the framework of the study, based on classical, neoclassical, and endogenous growth theories, the role of the energy factor in the production process is consistently highlighted. Also, the mechanisms of influence on economic growth through the influence of energy efficiency, energy intensity, energy security, and the multiplier are scientifically substantiated. The research results show that the modernization and efficient use of the energy system is an important factor in the sustainable development of the economy of Uzbekistan.

Keywords. Energy system, economic growth, energy efficiency, energy intensity, energy security, multiplier effect, sustainable development, production factors.

O‘ZBEKISTONDA IQTISODIY O‘SISHGA ERISHISHDA ENERGIYA TIZIMINI QO‘LLASH USULLARI VA AHAMIYATI

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Annotatsiya. Mazkur maqolada O‘zbekistonda iqtisodiy o‘sishga erishishda energiya tizimidan samarali foydalanishning nazariy asoslari keng tahlil qilinadi. Tadqiqot

doirasida klassik, neoklassik va endogen o‘sish nazariyalari asosida energiya omilining ishlab chiqarish jarayonidagi o‘rni izchil yoritilgan. Shuningdek, energiya samaradorligi, energiya intensivligi, energiya xavfsizligi va multiplikator ta’siri orqali iqtisodiy o‘sishga ta’sir mexanizmlari ilmiy jihatdan asoslab berilgan. Tadqiqot natijalari energiya tizimini modernizatsiya qilish va undan samarali foydalanish O‘zbekiston iqtisodiyotining barqaror rivojlanishida muhim omil ekanligini ko‘rsatadi.

Kalit so‘zlar. Energiya tizimi, iqtisodiy o‘sish, energiya samaradorligi, energiya intensivligi, energiya xavfsizligi, multiplikator effekti, barqaror rivojlanish, ishlab chiqarish omillari.

Kirish. Iqtisodiy o‘sish nazariyalarida energiya omilining roli turli ilmiy maktablar tomonidan turlicha talqin qilingan. Klassik iqtisodiy nazariya vakillari ishlab chiqarish jarayonini asosan yer, mehnat va kapital omillari orqali izohlagan bo‘lsalarda, sanoatlashuv jarayonining chuqurlashuvi energiyaning ishlab chiqarishdagi ahamiyatini keskin oshirdi [1].

Neoklassik o‘sish modeli, xususan Solow modeli, iqtisodiy o‘sishni kapital jamg‘arilishi va texnologik taraqqiyot orqali tushuntiradi. Biroq keyingi ilmiy tadqiqotlarda energiya ishlab chiqarish funksiyasining muhim elementi sifatida kiritila boshlandi. Bu yondashuv energiya samaradorligining oshishi YAIM hajmiga bevosita ta’sir ko‘rsatishini asoslaydi [2].

Endogen o‘sish nazariyasi esa innovatsiya va texnologik taraqqiyotni ichki omillar sifatida ko‘rib, energiya samaradorligini oshirishni iqtisodiy o‘sishning muhim drayverlaridan biri sifatida talqin qiladi. Xususan, energiya tejovchi texnologiyalarni joriy etish ishlab chiqarish samaradorligini oshirib, uzoq muddatli barqaror o‘sishni ta’minlaydi [3].

Zamonaviy tadqiqotlarda energiya xavfsizligi va barqaror rivojlanish konsepsiyalari ham alohida o‘rin egallaydi. Energiya ta’minotining uzluksizligi

iqtisodiy barqarorlikning muhim sharti sifatida qaraladi, qayta tiklanuvchi energiya manbalari esa ekologik va iqtisodiy muvozanatni ta’minlash vositasi sifatida baholanadi. Zamonaviy iqtisodiyot sharoitida energiya tizimi milliy rivojlanishning asosiy infratuzilmaviy omillaridan biri hisoblanadi. Sanoat ishlab chiqarishi, transport tizimi va xizmatlar sohasi energiya ta’minotining barqarorligiga bevosita bog‘liq bo‘lib, energiya resurslaridan samarali foydalanish iqtisodiy o‘sish sur’atlariga sezilarli ta’sir ko‘rsatadi [4].

O‘zbekiston iqtisodiyotida energiya tizimini takomillashtirish, energiya samaradorligini oshirish va energiya manbalarini diversifikatsiya qilish dolzarb masalalardan biri hisoblanadi.

Asosiy qism. Energiya tizimidan samarali foydalanish iqtisodiy o‘sishga ko‘p qirrali va murakkab mexanizmlar orqali ta’sir ko‘rsatadi. Avvalo, energiya samaradorligining oshishi ishlab chiqarish jarayonida resurslardan optimal foydalanishni ta’minlaydi. YAIM birligiga to‘g‘ri keladigan energiya sarfining kamayishi ishlab chiqarish xarajatlarini qisqartiradi, bu esa mahsulot tannarxining pasayishiga olib keladi. Natijada korxonalarning foyda marjasi ortadi va ular qo‘shimcha investitsiyalarni amalga oshirish imkoniyatiga ega bo‘ladi. Bu jarayon ishlab chiqarish quvvatlarining kengayishiga, texnologik yangilanishga va iqtisodiy o‘sishning intensiv omillar hisobiga ta’minlanishiga xizmat qiladi [5].

Energiya samaradorligi oshishining yana bir muhim jihati shundaki, u makroiqtisodiy barqarorlikni mustahkamlaydi. Energiya deyarli barcha tovar va xizmatlar tannarxining muhim tarkibiy elementi hisoblanadi. Shu sababli energiya xarajatlarining kamayishi umumiy narxlar darajasiga bosimni pasaytiradi va inflyatsion jarayonlarning yumshashiga olib keladi. Bu esa pul-kredit siyosatini barqaror yuritish imkonini kengaytiradi hamda iqtisodiy muvozanatni ta’minlashda muhim omil bo‘lib xizmat qiladi. Bundan tashqari, energiya intensivligining pasayishi tashqi energiya

resurslariga qaramlikni kamaytiradi, natijada to‘lov balansining barqarorligi oshadi va milliy valyutaning nisbatan mustahkamligi ta’minlanadi.

Energiya infratuzilmasiga yo‘naltirilgan investitsiyalar iqtisodiyotda kuchli multiplikativ ta’sir hosil qiladi. Elektr energetikasi tizimining modernizatsiya qilinishi, yangi generatsiya quvvatlarining ishga tushirilishi hamda uzatish tarmoqlarining takomillashtirilishi sanoat ishlab chiqarishining uzluksizligini ta’minlaydi. Bu esa ishlab chiqarish hajmining ortishiga, xizmatlar sektorining kengayishiga va yangi ish o‘rinlarining yaratilishiga olib keladi. Shu bilan birga, energetika sohasiga jalb qilingan investitsiyalar qurilish, transport, mashinasozlik kabi bog‘liq tarmoqlarning ham rivojlanishiga turtki beradi. Natijada iqtisodiyotda ko‘p martalik daromadlar zanjiri shakllanib, umumiy iqtisodiy faollik ortadi [6].

Energiya xavfsizligi iqtisodiy o‘sishning muhim shartlaridan biri sifatida alohida ahamiyat kasb etadi. Energiya ta’minotidagi uzilishlar ishlab chiqarish jarayonining izdan chiqishiga, logistika tizimining buzilishiga va xizmatlar ko‘rsatish hajmining qisqarishiga olib keladi. Bu esa korxonalar daromadlarining kamayishiga, investitsion muhitning yomonlashuviga va iqtisodiy o‘sish sur’atlarining sekinlashishiga sabab bo‘ladi. Shu nuqtai nazardan, energiya tizimining barqaror ishlashi va energiya ta’minotining uzluksizligi milliy iqtisodiyotning barqaror rivojlanishining zaruriy sharti hisoblanadi.

Barqaror rivojlanish konsepsiyasi doirasida energiya tizimi nafaqat iqtisodiy, balki ekologik jihatdan ham muvozanatli bo‘lishi lozim. Qayta tiklanuvchi energiya manbalarini keng joriy etish uzoq muddatli istiqbolda energiya resurslarining tugash xavfini kamaytiradi, ekologik yuklamani pasaytiradi va “yashil iqtisodiyot”ni shakllantirishga xizmat qiladi. Bu jarayon nafaqat ekologik barqarorlikni ta’minlaydi, balki yangi texnologiyalarni joriy etish, yangi ish o‘rinlarini yaratish va iqtisodiy diversifikatsiyani kuchaytirish orqali iqtisodiy o‘sishga ham ijobiy ta’sir ko‘rsatadi.

Ayniqsa, O‘zbekiston sharoitida quyosh va shamol energetikasining yuqori salohiyati mavjud bo‘lib, ushbu manbalardan samarali foydalanish energiya tizimini diversifikatsiya qilish va uzoq muddatli iqtisodiy barqarorlikni ta’minlashning muhim omili hisoblanadi [7].

Shuningdek, energiya tizimini modernizatsiya qilish jarayoni texnologik rivojlanishni jadallashtiradi. Zamonaviy energiya tejovchi texnologiyalarni joriy etish, raqamli boshqaruv tizimlaridan foydalanish va “aqlli tarmoqlar”ni rivojlantirish energiya taqsimoti samaradorligini oshiradi hamda yo‘qotishlarni kamaytiradi. Bu esa ishlab chiqarish jarayonining umumiy samaradorligini oshirish orqali iqtisodiy o‘sishga qo‘shimcha impuls beradi. Energiya tizimidagi texnologik yangilanishlar iqtisodiyotning boshqa tarmoqlarida ham innovatsion rivojlanishni rag‘batlantiradi, natijada iqtisodiyotning umumiy texnologik darajasi oshadi. Umuman olganda, energiya tizimidan samarali foydalanish iqtisodiy o‘sishga nafaqat bevosita, balki bilvosita va tizimli ta’sir ko‘rsatadi. Bevosita ta’sir ishlab chiqarish hajmining oshishi orqali namoyon bo‘lsa, bilvosita ta’sir investitsiyalar, innovatsiyalar va bandlik darajasining ortishi orqali yuzaga chiqadi. Tizimli ta’sir esa makroiqtisodiy barqarorlik, energiya xavfsizligi va iqtisodiy muvozanatning ta’minlanishi orqali ifodalanadi. Shu sababli energiya tizimining samaradorligini oshirish iqtisodiy o‘sishning strategik yo‘nalishlaridan biri sifatida qaralishi lozim [8].

Xulosa. Yuqoridagi tahlillar shuni ko‘rsatadiki, energiya tizimidan samarali foydalanish iqtisodiy o‘sishning muhim omillaridan biri hisoblanadi. Energiya samaradorligini oshirish ishlab chiqarish xarajatlarini kamaytiradi, iqtisodiy barqarorlikni mustahkamlaydi va investitsion faollikni oshiradi. O‘zbekiston sharoitida energiya tizimini modernizatsiya qilish, qayta tiklanuvchi energiya manbalarini keng joriy etish va energiya samaradorligini oshirish uzoq muddatli barqaror iqtisodiy o‘sishni ta’minlashning asosiy yo‘nalishlari hisoblanadi.

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Using text types in creating tasks that develop listening comprehension skills

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Annotation. This article discusses the issues of effective use of text types in creating tasks that develop listening comprehension skills. The role of narrative, descriptive, explanatory and evaluative texts in the listening comprehension process and their impact on the speech and cognitive development of students are analyzed. It also shows ways to develop tasks based on different text types, adapt them to the age and individual characteristics of students, and form the skills of understanding, analyzing and re-expressing the information heard. The article also provides methodological recommendations aimed at increasing the effectiveness of tasks based on text.

Keywords: listening comprehension, text types, educational tasks, literary text, popular science text, dialogic text, speech development, methodological approach, didactic tools, educational effectiveness

Tinglab tushunish ko‘nikmasini rivojlantiruvchi topshiriqlar tuzishda matn turlaridan foydalanish

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Annotatsiya. Ushbu maqolada tinglab tushunish ko‘nikmasini rivojlantiruvchi topshiriqlarni tuzishda matn turlaridan samarali foydalanish masalalari yoritilgan. Tinglab tushunish jarayonida hikoyaviy, tasviriy, izohlovchi va baholovchi matnlarning o‘rni hamda ularning o‘quvchilarning nutqiy va kognitiv rivojlanishiga ta’siri tahlil qilinadi. Shuningdek, turli matn turlariga asoslangan topshiriqlarni ishlab chiqish, ularni o‘quvchilarning yosh va individual xususiyatlariga moslashtirish, eshitilgan axborotni anglash, tahlil qilish va qayta ifodalash ko‘nikmalarini shakllantirish yo‘llari ko‘rsatib

berilgan. Maqolada matn asosida tuzilgan topshiriqlarning samaradorligini oshirishga qaratilgan metodik tavsiyalar ham keltirilgan.

Kalit so‘zlar: tinglab tushunish, matn turlari, o‘quv topshiriqlari, badiiy matn, ilmiy-ommabop matn, dialogik matn, nutq rivoji, metodik yondashuv, didaktik vositalar, ta’lim samaradorligi

Tinglashni tushunishni kuchaytirish uchun, albatta. Bizning pirovard maqsadimiz o‘quvchilar ona ingliz karnay tushunishga yordam berish, nafaqat tushunish oddiy maqsadida, balki shuning uchun ular shunga ko‘ra javob va boshqalar bilan o‘zaro mumkin. Tinglab tushunmasdan, suhbat, muloqot bo‘lmaydi. Tinglab tushunish topshiriqlarining samaradorligi ko‘p jihatdan **tanlangan matn turiga** bog‘liq. Chunki har bir matn turi o‘quvchining **idrok etish, eshitilgan ma’lumotni tahlil qilish va fikr bildirish** jarayonida turlicha faoliyatni talab etadi. Shu bois boshlang‘ich sinflarda tinglab tushunish topshiriqlarini tuzishda **matnning mazmuni, tuzilishi, til xususiyatlari va nutq funksiyasi** e’tiborga olinadi.

Matn turlarining tinglab tushunishdagi roli

Ona tili ta’limida qo‘llaniladigan asosiy matn turlari quyidagilar:

1. **Hikoyaviy (narrativ) matn**
2. **Tasviriy (deskriptiv) matn**
3. **Izohlovchi (ekzpozitiv) matn**
4. **Baholovchi yoki dalillovchi (argumentativ) matn**

Har bir matn turi tinglovchi faoliyatini turlicha yo‘naltiradi. Quyidagi jadvalda bu farqlar ko‘rsatilgan:

Matn turi	Asosiy maqsad	Tinglovchi faoliyati	Mos topshiriq turi
Hikoyaviy (voqeani bayon etuvchi)	Voqeani izchil hikoya qilish	Voqealar zanjirini aniqlash, sabab–natijani tushunish	“Voqealar ketma-ketligini belgilang”, “Qahramonni toping”

Tasviriy (manzara yoki holatni tasvirlovchi)	Narsaning belgilarini, holatini ifodalash	So‘z tasvirini tinglab, tasavvur hosil qilish	“Tinglab rasm chizing”, “Matnda qanday so‘zlar bilan tasvir berilgan?”
Izohlovchi (ma’lumot beruvchi)	Ma’lum bir narsa haqida tushuncha, fakt berish	Asosiy axborotni ajratish, mantiqiy bog‘lanishni topish	“Matnda nimalar haqida ma’lumot berilgan?”, “Asosiy fikrni yozing”
Baholovchi (fikrni himoya qiluvchi)	Muayyan fikrni asoslash yoki rad etish	Munosabat bildirish, fikrni baholash	“Siz bu fikrga qo‘shilasizmi?”, “Qahramonning xatti-harakatini baholang”

Matn turlariga asoslangan topshiriqlar tizimi

1. **Hikoyaviy matnga asoslangan topshiriqlar**
   - “Eshitilgan hikoyada kim ishtirok etdi?”
   - “Voqealar qayerda sodir bo‘lgan?”
   - “Qahramonning harakatlari to‘g‘rimi?”
   - “Hikoyaning yakunini o‘zingizcha davom ettiring.”

Rivojlantiradigan ko‘nikma: voqeani mantiqan tushunish, izchillikni saqlash, xulosa chiqarish.

2. **Tasviriy matnga asoslangan topshiriqlar**
   - “Tinglagan manzaraingizni tasvirlab bering.”
   - “Qanday so‘zlar yordamida qahramonning qiyofasi berilgan?”
   - “Matnda eng ko‘p takrorlangan so‘zlarni aniqlang.”

Rivojlantiradigan ko‘nikma: tasavvur, eshitilgan ma’lumotni vizual shaklga o‘tkazish, so‘z boyligini kengaytirish.

3. **Izohlovchi matnga asoslangan topshiriqlar**
   - “Tinglangan matndan uchta asosiy fikrni yozing.”
   - “Eshitilgan ma’lumot qaysi mavzuga oid?”

- “Axborotni qisqa qilib qayta ayting.”

Rivojlantiradigan ko‘nikma: mantiqiy tinglash, asosiy g‘oyani ajratish, fikrni qisqa ifodalash.

4. **Baholovchi matnga asoslangan topshiriqlar**

- “Qahramonning qaroriga siz qanday munosabat bildirasiz?”
- “Matnda keltirilgan fikrlar to‘g‘rimi?”
- “Siz bo‘lsangiz, bu vaziyatda nima qilardingiz?”

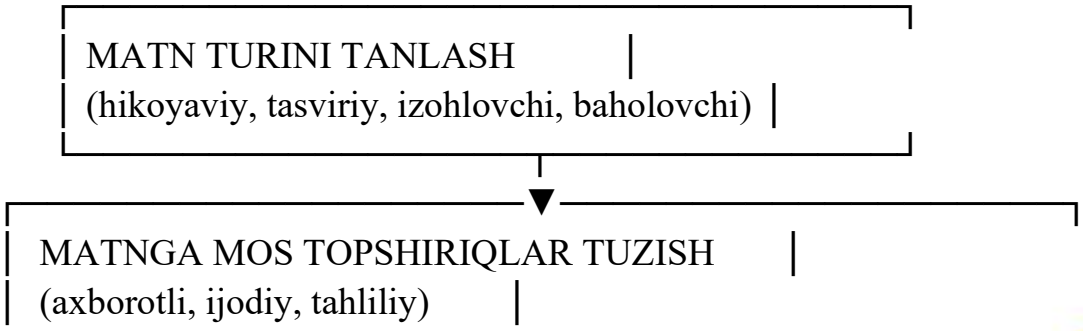
Rivojlantiradigan ko‘nikma: tanqidiy fikrlash, tahliliy tinglash, mustaqil fikr bildirish.

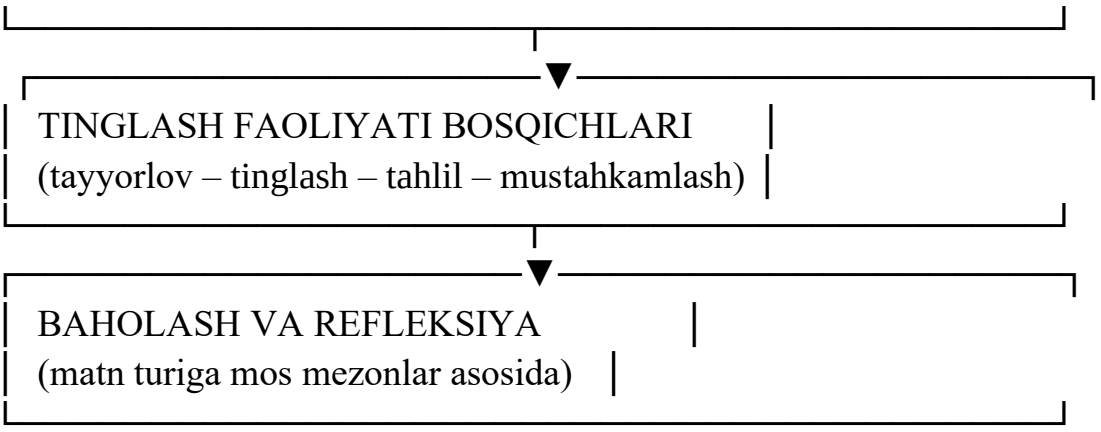
Tinglab tushunish topshiriqlarida matn turlarini tanlash mezonlari

O‘quvchilar yoshiga, dars maqsadiga va tayyorgarlik darajasiga qarab matn tanlashda quyidagi mezonlarga amal qilish tavsiya etiladi:

Mezon	Tavsif
Yoshga moslik	Matnning hajmi 1–3 daqiqadan oshmasligi, so‘z boyligi oddiy bo‘lishi kerak.
Til darajasi	Murakkab grammatik shakllar va notanish so‘zlar soni 5–7 % dan oshmasligi lozim.
Mavzu dolzarbligi	O‘quvchining hayoti va tajribasiga yaqin (oila, tabiat, do‘stlik, o‘yin, mehnat).
Nutq turlari muvozanati	Dars jarayonida turli matn turlarini navbat bilan qo‘llash zarur.
Ko‘pkanallilik	Matn audio, video yoki jonli og‘zaki nutq shaklida berilishi mumkin.

Matn turlariga asoslangan tinglab tushunish modeli (sxema)





Boshlang‘ich sinflarda tinglab tushunish topshiriqlarini tuzishda **turli matn turlaridan foydalanish**:

- o‘quvchilarda **tinglash faoliyatining mazmunan boyishi**ni ta’minlaydi;
- **og‘zaki nutqni idrok etish va tahlil qilish qobiliyatini** rivojlantiradi;
- **ijodiy fikrlash, mantiqiy xulosa chiqarish va nutq madaniyatini**

mustahkamlaydi. Shu tariqa, matn turlarini ongli tanlash va ularga mos topshiriqlarni tuzish tinglab tushunish ko‘nikmasini **kompleks rivojlantiruvchi metodik mexanizm** sifatida xizmat qiladi.

Tinglab tushunish topshiriqlarining samaradorligi ko‘p jihatdan tanlangan matn turiga bog‘liq. Chunki har bir matn turi o‘quvchining idrok etish, eshitilgan ma’lumotni tahlil qilish va fikr bildirish jarayonida turlicha faoliyatni talab etadi. Shu bois boshlang‘ich sinflarda tinglab tushunish topshiriqlarini tuzishda matnning mazmuni, tuzilishi, til xususiyatlari va nutq funksiyasi e’tiborga olinadi.

Tinglab tushunish topshiriqlari o‘quvchilarning nutqiy kompetensiyasini shakllantirish**,** fikrni idrok etish va tahlil qilish qobiliyatini rivojlantirishda muhim metodik vositadir. Ularni samarali qo‘llash ta’lim jarayonida o‘quvchilarni tinglovchi, tushunuvchi va muloqotda faol ishtirok etuvchi shaxs sifatida ona tililaydi.

Boshlang‘ich ta’limda tinglab tushunish ko‘nikmasini rivojlantirish — o‘quvchilarda nutqni eshitish, idrok etish, asosiy mazmunni aniqlash va fikr bildirish

kompetensiyalarini shakllantirishga yo‘naltirilgan uzviy jarayondir. Model o‘qituvchi faoliyatini rejalashtirish, tinglash mashg‘ulotlarini tashkil etish, baholash va tahlil bosqichlarini yagona tizimda ko‘rsatadi.

Boshlang‘ich sinf o‘quvchilari uchun mo‘ljallangan ona tili darsliklarida tinglab tushunish ko‘nikmasini shakllantirishga doir topshiriqlar muhim o‘rin egallaydi. Chunki tinglab tushunish – og‘zaki nutqni idrok etish, ma’no ajratish, asosiy fikrni ilg‘ash va eshitilgan matnga nisbatan munosabat bildirish qobiliyatlarini rivojlantiradi.

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TRANSITION FROM TRADITIONAL TEACHING METHODS TO AN INNOVATIVE ECOSYSTEM IN THE EDUCATION SYSTEM

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Abstract. This article examines the theoretical and practical foundations of the transformational processes occurring in the modern educational system—the transition from traditional teaching methods to an innovative digital ecosystem. The author analyzes the necessity of a paradigm shift in education, specifically the evolution from an "instructor-centered" system to a "learner-centered" technological environment. The role of artificial intelligence, cloud technologies, and hybrid learning models in enhancing the efficiency of the educational process is highlighted. Furthermore, the article addresses the pedagogical and technical challenges encountered in the formation of a digital ecosystem and proposes scientific solutions to overcome these obstacles.

Keywords: *Digital ecosystem, traditional education, innovation, transformation, EdTech, hybrid learning, pedagogical technologies, artificial intelligence.*

TA’LIM TIZIMIDAGI AN’ANAVIY TA’LIM METODLARDAN INNOVATSION EKOTIZIMGA O‘TISH

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Annotatsiya. Ushbu maqolada zamonaviy ta’lim tizimida yuz berayotgan transformatsion jarayonlar — an’anaviy o‘qitish metodlaridan innovatsion raqamli ekotizimga o‘tishning nazariy va amaliy asoslari tadqiq etiladi. Muallif ta’lim paradigmasining o‘zgarishi, ya’ni "o‘qituvchi markazlashgan" tizimdan "o‘quvchi markazlashgan" texnologik muhitga o‘tishning zaruriyatini tahlil qilgan. Maqolada sun’iy intellekt, bulutli texnologiyalar va gibrid ta’lim modellarining o‘quv jarayoni samaradorligini oshirishdagi o‘rni yoritib berilgan. Shuningdek, raqamli ekotizimni

shakllantirishda yuzaga keladigan pedagogik va texnik muammolar hamda ularning yechimlari bo‘yicha ilmiy takliflar ilgari surilgan.

Tayanch so‘zlar: *Raqamli ekotizim, an’anaviy ta’lim, innovatsiya, transformatsiya, EdTech, gibrid ta’lim, pedagogik texnologiyalar, sun’iy intellekt.*

KIRISH.

Bugungi globallashuv va jadal texnologik taraqqiyot davrida jamiyatning barcha sohalari qatori ta’lim tizimi ham tub transformatsiya jarayonini boshidan kechirmoqda. Uzoq yillar davomida o‘zining barqarorligini saqlab kelgan an’anaviy ta’lim metodlari — asosan axborotni uzatish va uni qayta takrorlashga asoslangan yondashuvlar — bugungi kunning yuqori sur’atli talablariga to‘liq javob bera olmay qoldi. Zamonaviy mehnat bozori o‘quvchidan nafaqat fundamental bilimlarni, balki tanqidiy fikrlash, moslashuvchanlik va yuqori darajadagi raqamli savodxonlikni talab qilmoqda.

Shu sababli, ta’lim sohasida oddiy "innovatsiyalarni joriy etish" bosqichidan "innovatsion ekotizim"ni shakllantirish bosqichiga o‘tish zarurati yuzaga keldi. Raqamli ekotizim — bu shunchaki dars jarayoniga kompyuter yoki proyektor olib kirish emas, balki o‘qituvchi, o‘quvchi, texnologiya va ta’lim kontentining yagona, uzviy bog‘langan va o‘zaro rivojlanuvchi muhitidir.

Ushbu maqolada an’anaviy ta’limning cheklovlari va innovatsion ekotizimning afzalliklari qiyosiy tahlil qilinadi. Shuningdek, sun’iy intellekt, bulutli platformalar va masofaviy ta’lim modellari orqali ta’lim sifatini yangi bosqichga ko‘tarishning strategik

yo‘nalishlari yoritiladi. Ta’lim tizimidagi bu o‘zgarishlar faqat texnik yangilanish emas, balki jamiyatning intellektual salohiyatini oshirishga xizmat qiluvchi fundamental yangilanishdir.

Bugungi kunda jahon ta’lim makonida kechayotgan tub islohotlar shuni ko‘rsatmoqdaki, shunchaki bilimlarni uzatishga asoslangan an’anaviy pedagogik modellar raqamli iqtisodiyot va to‘rtinchi sanoat inqilobi talablariga javob bera olmay qoldi. Mazkur maqolaning dolzarbligi quyidagi fundamental omillar bilan izohlanadi:

Birinchidan, axborot oqimining haddan tashqari tezlashishi va bilimlar hajmining geometrik progressiya asosida o‘sib borishi o‘quvchilardan "tayyor ma’lumotni yodlash"ni emas, balki "ma’lumotni saralash, tahlil qilish va undan amaliyotda foydalanish" ko‘nikmalarini talab etmoqda. An’anaviy metodlarda saqlanib qolayotgan statik yondashuv bu ehtiyojni qondira olmaydi.

Ikkinchidan, zamonaviy mehnat bozori uchun zarur bo‘lgan "4C" ko‘nikmalari (tanqidiy fikrlash — *Critical thinking*, ijodkorlik — *Creativity*, hamkorlik — *Collaboration* va muloqot — *Communication*) faqatgina raqamli texnologiyalar bilan integratsiyalashgan innovatsion ekotizim muhitidagina samarali shakllanishi mumkin.

Uchinchidan, sun’iy intellekt (AI), bulutli texnologiyalar va katta ma’lumotlar (Big Data) tahlili ta’limni individuallashtirish imkoniyatini yaratdi. An’anaviy tizimda hamma uchun bir xil bo‘lgan o‘qitish sur’atidan, har bir o‘quvchining qobiliyati va qiziqishiga moslashuvchi "moslashuvchan ta’lim" (Adaptive learning) ekotizimiga o‘tish davlat ta’lim siyosatining ustuvor yo‘nalishiga aylandi.

To‘rtinchidan, global raqobatbardoshlik sharoitida ta’lim muassasalari shunchaki binolar majmuasi emas, balki masofaviy, gibrid va interaktiv ta’lim shakllarini o‘z ichiga olgan yaxlit raqamli muhitga aylanishi zarur. Bu jarayon o‘qituvchining rolini axborot yetkazuvchidan (memorizator) yuqori darajadagi yo‘naltiruvchi (fasilitator va mentor) darajasiga ko‘tarishni taqozo etmoqda.

Bu yoqoridagi fikrlardan kelib chiqib shuni aytish mukinki, an’anaviy metodlardan innovatsion ekotizimga o‘tish masalasini tadqiq etish — bu shunchaki texnik yangilanish emas, balki kelajak avlodning intellektual salohiyatini saqlab qolish va mamlakatning strategik rivojlanishini ta’minlashdagi eng dolzarb vazifadir.

Ta’lim jarayonida raqamli texnologiyalarni joriy etish boyicha O‘zbekiston Respublikasi Prezidentining 2020 yil 5 oktabrdagi “Raqamli O‘zbekiston – 2030”, 14.10.2024 yildagi PQ-358-sonli “Sun’iy intellekt texnologiyalarini 2030-yilga qadar rivojlantirish” strategiyasini tasdiqlash va uni samarali amalga oshirish chora-tadbirlari to‘g‘risida”gi 6079-farmoni bilan ma’qullangan “Raqamli O‘zbekiston-2030” strategiyasida aholining barcha qatlamlarida raqamli ko‘nikmalarni rivojlantirish maqsadida muayyan tadbirlar belgilangan [1].

An’anaviy ta’lim modelining transformatsiyasi va uning cheklovlari

An’anaviy ta’lim modeli asrlar davomida "bilimlar transmissiyasi" (uzatish) tamoyiliga tayanib keldi. Bu modelda o‘qituvchi yagona bilim manbai, o‘quvchi esa passiv qabul qiluvchi sub’ekt rolini ijro etadi. Biroq, bugungi raqamli axborot asrida ushbu yondashuv quyidagi muammolarga duch kelmoqda:

- Bir xillik (Standartizatsiya): Barcha o‘quvchilarga ularning individual sur’ati va qobiliyatidan qat’i nazar, bir xil hajmdagi ma’lumotning berilishi.
- Statik kontent: Darsliklardagi ma’lumotlarning tez eskirishi va vizuallashuv darajasining pastligi.
- Natijaga yo‘naltirilganlik: Bilimning chuqurligidan ko‘ra, baholash va test natijalariga ko‘proq urg‘u berilishi.

[1] “Raqamli O‘zbekiston-2030” strategiyasini tasdiqlash va uni samarali amalga oshirish chora-tadbirlari to‘g‘risida. O‘zR Prezidentining Farmoni PF-6079. 05.10.2020 y.

2. Innovatsion ta’lim ekotizimining konseptual asoslari

Innovatsion ekotizim — bu faqat texnologik uskunalar yig‘indisi emas, balki pedagogika, texnologiya va ijtimoiy muhitning sintezidir. Uning asosiy ustunlari quyidagilardan iborat:

• Shaxsiylashtirilgan ta’lim trayektoriyasi: Sun’iy intellekt va LMS (Learning Management Systems) platformalari yordamida har bir o‘quvchining o‘zlashtirish darajasiga moslashuvchi o‘quv dasturlari yaratiladi.

• Flipped Classroom (Ag’darilgan sinf) texnologiyasi: O‘quvchi nazariy bilimlarni mustaqil ravishda raqamli resurslar orqali o‘rganadi, auditoriya vaqti esa faqat muhokama, tahlil va amaliy muammolarni yechishga sarflanadi.

• Blended Learning (Aralash ta’lim): An’anaviy yuzma-yuz muloqotning ijtimoiy afzalliklari bilan onlayn ta’limning moslashuvchanligini birlashtirish.

3. Texnologik drayverlar: EdTech va Sun’iy intellekt

Ekotizimning barqaror ishlashini ta’minlovchi asosiy vositalar ta’lim jarayonini tubdan o‘zgartirmoqda:

1. Bulutli texnologiyalar ($Cloud$ $Computing$): Ta’lim resurslarining istalgan vaqtda va istalgan joyda mavjudligini ta’minlaydi.

2. VR va AR (Virtual va kengaytirilgan borliq): Murakkab fizik va ximiyaviy jarayonlarni, tarixiy voqealarni virtual simulyatsiyalar orqali "his qilish" imkonini beradi, bu esa vizual xotirani kuchaytiradi.

3. Big Data (Katta ma’lumotlar): O‘quvchilarning o‘zlashtirish dinamikasini tahlil qilish orqali kelajakdagi akademik natijalarni prognozlash va o‘z vaqtida korrektirovka qilish imkonini beradi.

4. O‘qituvchi maqomining yangi qirralari

Innovatsion ekotizimda o‘qituvchi axborot beruvchi funksiyasidan voz kechib, quyidagi rollarni o‘z zimmasiga oladi:

• Mentor (Ustoz): O‘quvchining shaxsiy rivojlanishiga yo‘nalish beruvchi.

• Fasilitator: Guruh bo‘lib ishlash va muhokama jarayonlarini samarali tashkil etuvchi.

• Kreator: Raqamli o‘quv kontentlarini loyihalashtiruvchi va metodik modellashtiruvchi mutaxassis.

Ushbu o‘tish davri shunchaki texnik yangilanish emas, balki ta’lim falsafasining o‘zgarishidir. Innovatsion ekotizim o‘quvchini "nima o‘rganish kerak?" degan savoldan "qanday qilib samarali o‘rganish va tadbiq etish mumkin?" degan ko‘nikmaga yo‘naltiradi.

XULOSA VA TAKLIFLAR. Ta’lim tizimining an’anaviy metodologiyadan innovatsion ekotizimga transformatsiyalashuvi shunchaki texnik yangilanish emas, balki jamiyatning intellektual salohiyatini saqlab qolishga qaratilgan global pedagogik paradigma o‘zgarishidir. O‘tkazilgan tahlillar asosida quyidagi xulosalarga kelindi:

1. Sinergetik yondashuv: Innovatsion ekotizim faqat raqamli vositalar yig‘indisi emas, balki pedagogik mahorat, zamonaviy texnologiyalar va o‘quvchining shaxsiy motivatsiyasi o‘rtasidagi sinergiya natijasidir. Bu tizim o‘quvchini passiv ob’ektdan ta’lim jarayonining faol prodyuseriga aylantiradi.

2. Adaptivlik va Shaxsiylashtirish: An’anaviy "linear" (chiziqli) ta’lim o‘rnini sun’iy intellektga asoslangan adaptiv o‘qitish modellarining egallashi, har bir ta’lim oluvchi uchun individual "o‘sish trayektoriyasi"ni chizish imkonini beradi. Bu esa o‘z navbatida o‘quv samaradorligini (ROI - *Return on Instruction*) keskin oshiradi.

3. Fasilitatsiya va Mentoring: Raqamli muhitda o‘qituvchining roli tubdan o‘zgarib, u axborot yetkazuvchidan murakkab bilimlarni tushuntiruvchi fasilitator, o‘quvchining kreativ salohiyatini ochuvchi mentor va raqamli kontent dizayneriga aylanadi.

Kelgusidagi istiqbollar uchun quyidagi takliflar ilgari suriladi:

- EdTech infratuzilmasini standartlashtirish: Ta’lim muassasalarida nafaqat apparat vositalari, balki yagona bulutli ma’lumotlar bazasiga ega interaktiv platformalarni (LMS, ERP) keng joriy etish.
- Gamifikatsiya va Stek-texnologiyalar: O‘quv jarayoniga o‘yin mexanikalarini (gamifikatsiya) va virtual laboratoriyalarni (VR/AR) integratsiya qilish orqali ta’limning jozibadorligini oshirish.
- Doimiy malaka transformatsiyasi: Pedagog kadrlarning raqamli kompetensiyalarini muntazam rivojlantirib borish uchun "Life-long learning" (umr bo‘yi ta’lim) tamoyili asosida qayta tayyorlash tizimini yo‘lga qo‘yish.

Xulosa qilib aytganda, an’anaviy ta’limning fundamental asoslarini saqlagan holda innovatsion ekotizimga o‘tish — bugungi kunning shoshilinch imperatividir. Bu jarayon nafaqat raqamli savodxonlikni, balki yangi avlodning global raqobatbardoshligini ta’minlovchi asosiy drayver bo‘lib xizmat qiladi.

Foydalanilagan adabiyotlar va manbalar ro’yhati.

1. “Raqamli O‘zbekiston-2030” strategiyasini tasdiqlash va uni samarali amalga oshirish chora-tadbirlari to‘g‘risida. O‘zR Prezidentining Farmoni PF-6079. 05.10.2020 y.

2. F.M.Zokirova, X.N. Zayniddinov “Pedagogik faoliyatda raqamli kompetentsiyalar”.T.:2022 yil O’quv uslubiy majmia.

3. Abduqodirov.A.A., Ishmuxamedov R., Pardayev.A., Ta’limda innovatsion texnologiyalar (ta’lim muassasalari pedagog-o‘qituvchilari uchun amaliy tavsiyalar).-T.: Iste’dod, 2008.-180 bet.

4. S.S.Jumanazarov, A.A.Mahkamov “Fanlarini o’qitishda axborot texnologiyalaridan samarali foydalanish ”.:T 2021 yil. O’quv uslubiy majmua. 183 bet

Elektron manbalar

1. GeoGebra dasturi: geogebra.org

AN INNOVATIVE METHOD OF TEACHER SELF-DEVELOPMENT IN PEDAGOGICAL ACTIVITY

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Annotation: The article analyzes the theoretical foundations, modern methodologies, and practical mechanisms of a teacher's self-development process in pedagogical activity. In the context of an expanding digital learning environment, the use of artificial intelligence tools, and increasing demands for continuous professional growth, new paradigms of teacher self-development are examined. Based on the current state of the education system of Uzbekistan and the requirements within the framework of the "Digital Uzbekistan — 2030" strategy, a proposed practical model and its stages are presented.

Keywords: self-development, professional growth, reflective practice, digital pedagogy, 70-20-10 model, learning agility, individual development plan, AI in education, pedagogical competencies.

PEDAGOGIK FAOLIYATDA O‘QITUVCHI O‘ZINI-O‘ZI RIVOJLANTIRISHNING INNOVATSION METODI

Musayeva Muhabbat Eshbayevna

O'zbekiston Milliy Universiteti huzuridagi pedagog kadrlarni qayta tayyorlash va ularning malakasini oshirish tarmoq (mintaqaviy) markazi "Ta'lim texnologiyalari" kafedrasi dotsenti

Annotatsiya Maqolada pedagogik faoliyatda o‘qituvchining o‘zini-o‘zi rivojlantirish jarayonining nazariy asoslari, zamonaviy metodikasi va amaliy mexanizmlari tahlil qilinadi. Raqamli ta’lim muhiti, sun’iy intellekt vositalari va doimiy professional o‘sish

talablarining kuchayishi sharoitida o‘qituvchining o‘z-o‘zini rivojlantirishining yangi paradigmalari ko‘rib chiqiladi. O‘zbekiston ta’lim tizimining hozirgi holati va “Raqamli O‘zbekiston — 2030” strategiyasi doirasidagi talablar asosida taklif etilgan amaliy model va bosqichlar taqdim etiladi.

Kalit so‘zlar: o‘zini-o‘zi rivojlantirish, professional o‘sish, refleksiv amaliyot, raqamli pedagogika, 70-20-10 modeli, learning agility, individual rivojlanish rejasi, AI in education, pedagogik kompetensiyalar

Kirish. Zamonaviy ta’lim tizimining eng muhim paradoksi shundaki, o‘quvchilarni hayot davomida o‘rganishga (lifelong learning) tayyorlash vazifasi qo‘yilgan bir paytda, bu jarayonning asosiy sub’ekti — o‘qituvchining o‘zi ko‘pincha statik kasbiy holatda qolmoqda.

O‘zbekiston Respublikasining “Ta’lim to‘g‘risida”gi Qonuni (2020) va Prezidentning 2020 yil 5 oktyabrdagi PF-6079-sonli Farmoni bilan tasdiqlangan “Raqamli O‘zbekiston — 2030” strategiyasi pedagoglarning doimiy malaka oshirishini va o‘z-o‘zini rivojlantirishini davlat siyosati darajasidagi majburiyat sifatida belgilab berdi.

Ammo bugungi kunda ko‘plab pedagoglar uchun “o‘zini-o‘zini rivojlantirish” tushunchasi hali ham rasmiy malaka oshirish kurslari bilan cheklangan holda tushunilmoqda. Shu bilan birga, global ta’lim tendensiyalari va O‘zbekistonning raqamli transformatsiya dasturlari pedagogdan ancha faolroq, mustaqil va innovatsion yondashuvni talab etmoqda.

Pedagogik faoliyatda pedagog o‘zini-o‘zini rivojlantirish

O‘zini-o‘zini rivojlantirish (self-directed professional development) konsepsiyasi quyidagi nazariy asoslarga tayanadi:

- Andragogika (M. Knowles, 1980) — kattalar o‘rganishining o‘ziga xos xususiyatlari

- Refleksiv amaliyot (D. Schon, 1983) — “in-action” va “on-action” refleksiya va uni ta’limda qo’llash
- Learning Agility (M. Lombardo & R. Eichinger, 2000) — yangi sharoitlarda tez o‘rganish qobiliyati
- 70-20-10 modeli (Center for Creative Leadership) — rivojlanishning uchta asosiy manbai
- Self-Determination Theory (Deci & Ryan, 1985) — ichki motivatsiya va o‘z-o‘zini boshqarish zaruriyati

Zamonaviy ta’limshunoslikda o‘qituvchining o‘zini-o‘zini rivojlantirishi endi faqat shaxsiy mas’uliyat emas, balki professional kapitalning uzluksiz reproduksiyasi sifatida qaralmoqda (Hargreaves & Fullan, 2012).

Zamonaviy sharoitda o‘zini-o‘zini rivojlantirishning yangi talablari

2025–2030 yillar oralig‘ida O‘zbekiston pedagoglaridan quyidagilar talab etilmoqda:

- Raqamli pedagogik kompetensiyalar (DigCompEdu, UNESCO)
- Sun’iy intellekt vositalarini dars jarayoniga integratsiya qilish
- Blended va hybrid ta’limni loyihalashtirish va boshqarish
- STEAM va Project-Based Learning metodlarini chuqur o‘zlashtirish
- Ijtimoiy-emotsional ta’lim (SEL) elementlarini darsga kiritish
- Inkluziv ta’lim va neurodiversity tamoyillarini amalda qo‘llash

Bu talablarning barchasi rasmiy malaka oshirish tizimi orqali to‘liq qamrab olinmaydi. Shu sababli o‘qituvchining **o‘z-o‘zini rivojlantirish tizimi** muhim ahamiyat kasb etmoqda.

Bosqich — Diagnostika va o‘z-o‘zini baholash (1–2 oy) • DigCompEdu self-assessment • Pedagogik SWOT tahlili • Video-refleksiya (o‘z darsingizni 10–15 daqiqa yozib ko‘rish) • 360° fikr-mulohaza (o‘quvchilar, hamkasblar, ota-onalar)

1. Bosqich — Strategik maqsad qo‘yish (SMART + OKR) • 1 yillik maqsadlar (2–3 ta katta) • Choraklik OKR lar (Objectives & Key Results) • Individual rivojlanish rejasini (IDP) shakllantirish
2. Bosqich — Rivojlanishning uchta oqimi (70-20-10) • 70% — tajriba orqali o‘rganish
    - Action research
    - Lesson study
    - Ochiq darslar + tahlil
    - 20% — ijtimoiy o‘rganish
    - Professional hamjamiyatlar (Telegram, Facebook guruhlari)
    - Peer coaching
    - Mentorlik • 10% — rasmiy va strukturalashtirilgan ta’lim
    - Micro-credentials (Coursera, EdX, Bilik.uz)
    - Milliy malaka oshirish kurslari
3. Bosqich — Raqamli ekotizimdan foydalanish
    - AI vositalari: ChatGPT/Claude/Grok → dars rejalari, topshiriqlar, refleksiya savollari
    - Canva Education, Genially, Nearpod — interaktiv materiallar
    - Google Workspace for Education + Microsoft 365 for Education
    - Professional portfolio (Google Sites yoki Notion)
4. Bosqich — Doimiy refleksiya va tuzatish
    - Gibbs refleksiv sikli
    - Oylik/yillik portfolio yangilash
    - O‘z-o‘zini baholash matritsasi (masalan, 1–5 ballik shkala bo‘yicha)

Bugungi raqamli ta’lim muhitida o‘qituvchining o‘zini-o‘zi rivojlantirishi (self-directed professional development) uchun online platformalar eng samarali va moslashuvchan

vosita hisoblanadi. Pedagog-o'qituvchilar va boshqa kasb sohalari uchun bu saytlar nafaqat bepul/budgetli, balki raqamli kompetensiyalarni oshirish, yangi metodlarni o'rganish va xalqaro tajriba almashish imkonini beradi.

O'qituvchi va boshqa kasb egali o'zini -o'zi kasbiy rivojlantirishda maxsus mos platformalar va resurslar

Platforma	Asosiy imkoniyatlar	Bepul darajasi	O'qituvchi va kasblar uchun qulayligi
Coursera	Stanford, Yale, Michigan universitetlari kurslari (pedagogy, teaching methods, AI in education)	Audit bepul, sertifikat pullik (~$29–79)	O'zbekcha subtitrlar bor, ko'p kurs bepul o'tiladi
edX	Harvard, MIT, UNESCO kurslari (micro-credentials, teacher PD)	Ko'p kurslar bepul	Sertifikatlar PD soatlari uchun qabul qilinadi
FutureLearn	British Council, Open University — qisqa kurslar (digital teaching, classroom management)	Ko'p kurslar bepul	Qisqa muddatli, bepul sertifikat imkoni bor
Alison	5000+ bepul kurs (education, teaching skills, special education)	To'liq bepul (sertifikat minimal to'lov)	Juda ko'p bepul variant, oson sertifikat
Common Sense Education	Teacher PD resurslari, AI digital citizenship kurslari, PLN tavsiyalari	To'liq bepul	AI va raqamli ta'lim uchun juda yaxshi

Khan Academy + Khanmigo	AI-tutor (Khanmigo), o‘qituvchilar uchun dars rejalari va metodika	To‘liq bepul	O‘zbek tilida qisman qo‘llab-quvvatlash
Class Central	100 000+ kursni bir joyda qidirish (Coursera/edX/udemy)	To‘liq bepul qidiruv	Eng yaxshi kurslarni topish uchun ideal

Xulosa. Pedagogning o‘zini-o‘zini rivojlantirishi bugungi kunda passiv malaka oshirish emas, balki faol, mustaqil, strategik rejalashtirilgan va texnologiyalar bilan boyitilgan professional o‘sish jarayoniga aylandi.

O‘zbekiston ta’lim tizimining raqamli transformatsiya va inson kapitalini rivojlantirish maqsadlari faqat o‘qituvchilarning o‘z-o‘zini rivojlantirish faolligi va tizimli yondashuvi orqali real natija berishi mumkin.

Shu ma’noda, o‘zini-o‘zini rivojlantirish endi nafaqat shaxsiy tanlov, balki professional mas’uliyatning eng yuqori shakli va milliy ta’lim sifatini oshirishning asosiy omili hisoblanadi.

Foydalanilgan adabiyotlar:

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Family and Society Relations in the Works of Gafur Ghulam

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Abstract.

This article analyzes the issue of family and society relations in the works of Gafur Ghulam from both artistic and social perspectives. In the writer's works, the family is interpreted as the main environment for human upbringing and personal development, while socio-economic problems in society directly affect the stability of the family. In particular, through the analysis of characters and events in the stories *"Shum Bola"* and *"Yodgor"*, the issues of children's upbringing, family environment, kindness, social inequality, poverty, and the influence of society on human destiny are revealed.

Keywords: family, society, family and society relations, social environment, human upbringing, children's upbringing, spiritual values, social problems, kindness, moral education, artistic image, realism.

G'afur G'ulom asarlarida oila va jamiyat munosabatlari

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Annotatsiya.

Mazkur maqolada G'afur G'ulom asarlarida oila va jamiyat munosabatlari masalasi badiiy hamda ijtimoiy jihatdan tahlil qilinadi. Yozuvchining asarlarida oila inson tarbiyasi va shaxs kamolotining asosiy muhiti sifatida talqin etilishi, jamiyatdagi ijtimoiy-iqtisodiy muammolar esa oilaning barqarorligiga bevosita ta'sir ko'rsatishi misollar orqali yoritiladi. Xususan, "Shum bola" va "Yodgor" qissalaridagi obrazlar va

voqealar tahlili orqali bolalar tarbiyasi, oilaviy muhit, mehr-oqibat, ijtimoiy tengsizlik, qashshoqlik va jamiyatning inson taqdiriga ta’siri masalalari ochib beriladi.

Kalit so‘zlar: oila, jamiyat, oila va jamiyat munosabatlari, ijtimoiy muhit, inson tarbiyasi, bolalar tarbiyasi, ma’naviy qadriyatlar, ijtimoiy muammolar, mehr-oqibat, axloqiy tarbiya, badiiy obraz, realizm, Shum bola, Yodgor.

O‘zbek adabiyoti taraqqiyotida o‘ziga xos o‘rin egallagan buyuk ijodkorlardan biri - G‘afur G‘ulom hisoblanadi. Uning asarlari nafaqat badiiy jihatdan yuksak, balki chuqur ijtimoiy mazmuni bilan ham ajralib turadi. Yozuvchi o‘z davrining dolzarb muammolarini sodda, hayotiy va ta’sirchan obrazlar orqali yoritib bera olgan. Ayniqsa, uning asarlarida oila va jamiyat o‘rtasidagi murakkab munosabatlar, inson taqdirining ijtimoiy muhit bilan uzviy bog‘liqligi chuqur tahlil qilinadi. G‘afur G‘ulom ijodida oila bu shunchaki kichik ijtimoiy birlik emas, balki inson kamoloti, tarbiyasi va hayot yo‘lini belgilovchi asosiy omil sifatida talqin etiladi. Shu bilan birga, jamiyatdagi tengsizlik, qashshoqlik, beparvolik kabi muammolar oilaga qanday ta’sir ko‘rsatishi yozuvchi asarlarida ochiq va real tasvirlangan. Bu jihatlar bugungi kunda ham o‘z dolzarbligini yo‘qotmaganligi bilan ahamiyatlidir.

G‘afur G‘ulom asarlarida oila va jamiyat munosabatlari bir-biri bilan chambarchas bog‘liq holda tasvirlanadi. Yozuvchi oila ichidagi muammolarni alohida holat sifatida emas, balki jamiyatdagi ijtimoiy sharoitlarning natijasi sifatida ko‘rsatadi. Bu esa uning realizmga asoslangan ijodiy yondashuvini yaqqol namoyon etadi.

Masalan, Shum bola qissasida bosh qahramonning hayoti orqali oilaning parchalanishi va jamiyatdagi beqarorlikning bolalar taqdiriga qanday ta’sir qilishi juda ta’sirchan ifodalangan. Asarda bola mehr va e’tibordan mahrum holda ulg‘ayadi. Uning sho‘xligi, sarguzashtlarga moyilligi aslida ichki bo‘shliq va e’tiborsizlik natijasi ekanligi seziladi. Bu yerda yozuvchi muammoni faqat bolaning xulqi bilan izohlamaydi, balki uning ortida turgan ijtimoiy omillarni ochib beradi.

Oila muhiti sog‘lom bo‘lmagan jamiyatda barkamol insonni tarbiyalash qanchalik mushkul ekanligi aynan shu qissada yorqin ko‘rinadi. Bola ko‘cha tarbiyasida ulg‘ayadi, natijada uning axloqiy qarashlari ham beqaror shakllanadi. Bu esa bugungi kunda ham dolzarb bo‘lgan muammolardan biri - bolalarning noto‘g‘ri muhit ta’siriga tushib qolishi masalasini eslatadi.

Shuningdek, yozuvchining Yodgor asarida ham oila va jamiyat o‘rtasidagi murakkab bog‘liqlik alohida o‘rin tutadi. Bu qissada insonning shaxs sifatida shakllanishida oilaning o‘rni bilan birga jamiyatning bosimi va ta’siri ham chuqur tasvirlanadi. Qahramonning ichki kechinmalari, uning jamiyat bilan to‘qnashuvi orqali yozuvchi o‘quvchini o‘ylashga majbur qiladi: insonni tarbiyalaydigan faqat oila emas, balki uni o‘rab turgan muhit ham katta rol o‘ynaydi. G‘afur G‘ulom asarlarida ko‘pincha kambag‘allik muammosi oila buzilishining asosiy sabablaridan biri sifatida ko‘rsatiladi.[1] Qashshoqlik insonlarni majburiy qarorlar qabul qilishga undaydi, ba’zan esa axloqiy mezonlarning buzilishiga olib keladi. Bu holat oiladagi mehr-oqibatning susayishiga, hatto ayrim hollarda butunlay yo‘qolishiga sabab bo‘ladi. Yozuvchi bu muammoni juda nozik va haqqoniy tasvirlaydi. Masalan, uning hikoyalarida ota-onaning farzandga e’tibor bera olmasligi, ularning og‘ir mehnat yoki ijtimoiy muammolar bilan bandligi sababli bolalar e’tiborsiz qolib ketishi tez-tez uchraydi. Bu esa jamiyatdagi iqtisodiy va ijtimoiy muammolar bevosita oilaga ta’sir qilayotganini ko‘rsatadi. Bugungi kunda ham bandlik, migratsiya, iqtisodiy qiyinchiliklar sabab ko‘plab oilalarda shunga o‘xshash holatlar kuzatilmoqda.

Yozuvchi asarlarining yana bir muhim jihati unda insoniylik, mehr-oqibat va sabr kabi fazilatlar yuqori qadrlanadi. Qanchalik og‘ir sharoit bo‘lmasin, ayrim qahramonlar o‘z insoniyligini saqlab qoladi. Bu esa oila qadriyatlarining barqarorligi uchun muhim omil ekanini anglatadi. Masalan, mehribon insonlar obrazi orqali yozuvchi shuni

[1] https://gafur-gulom-library-one.netlify.app/

ko‘rsatadiki, jamiyat qanchalik murakkab bo‘lmasin, inson o‘z axloqiy prinsiplariga sodiq qolishi mumkin. Bu esa oila mustahkamligini saqlashda muhim ahamiyat kasb etadi.

G‘afur G‘ulom ijodida yana bir e’tiborli jihat kulgi va satira orqali jiddiy muammolarni ochib berishdir. Ayniqsa, “Shum bola”da kulgili voqealar ortida aslida jamiyatdagi jiddiy kamchiliklar yashiringan. Bu uslub o‘quvchini zeriktirmasdan, balki o‘ylantirib, muammoga boshqacha nigoh bilan qarashga undaydi.

Bugungi zamonaviy jamiyat nuqtai nazaridan qaraydigan bo‘lsak, G‘afur G‘ulom ko‘targan muammolar hanuz dolzarb. Masalan:oilalarda tarbiya masalasining sustlashuvi,bolalarning internet va tashqi muhit ta’siriga tushib qolishi,iqtisodiy muammolar sabab oila ichidagi nizolar va ota-onalarning farzandlarga yetarli e’tibor bera olmasligi kabi masalalarda ko’rinadi. Aksariyat hollarda oiladagi ajrashishlar farzand tarbiyasi va psixologiyasiga salbiy ta’sir ko’rsatadi. Bu holat oiladagi tushunmovchilik, farzandning ota-ona o’rtasida qolishi vaziyatlarini keltirib chiqaradi. Yildan-yilga oshib borayotgan ajrimlar ko’rsatgichi O’zbekistonda ham kuzatilib kelinmoqda, hozirgi kunda O‘zbekistonda 2025-yilning yanvar-iyun oylarida 23,3 mingta nikohdan ajralish holati qayd etilgan. Bu 2024-yilning mos davriga nisbatan 800 taga ko‘p. Biroq bu holatlarni oldini olishga qaratilgan chora-tadbirlar ham ishlab chiqilmoqda, jumladan, O’zbekiston Respublikasi Oila kodeksi, “Oila institutini yanada rivojlantirish va yoshlarni oilaviy hayotga tayyorlash chora-tadbirlari to’g’risida” gi Vazirlar Mahkamaisning qarori va boshqa ko’plab qonunosti hujjatlari buning yaqqol dalili bo’la oladi.[2] Shunga qaramasdan, ajrimlarning 60,6% (14,1 ming) shaharlarda, 39,4% (9,2 ming) qishloq hududlarida kuzatilgan. Eng ko‘p ajrim holatlari Toshkent

[2] https://lex.uz/docs/-5193551

shahri (1,5 ming), Toshkent viloyati (1,2 ming) va Farg‘ona viloyati (1,2 ming)da qayd etilgan. Eng kam ajrim esa Navoiy viloyatida - 310 ta.[3]

Xulosa qilib aytganda, G‘afur G‘ulom asarlarida oila va jamiyat munosabatlari masalasi chuqur va har tomonlama yoritilgan. Yozuvchi oila muammolarini alohida emas, balki jamiyatdagi ijtimoiy, iqtisodiy va ma’naviy omillar bilan bog‘liq holda tahlil qiladi. Bu esa uning asarlarini yanada hayotiy va ta’sirchan qiladi. Uning asarlarida oila - inson tarbiyasining asosiy maskani sifatida ko‘rsatilsa, jamiyat esa bu jarayonga kuchli ta’sir ko‘rsatuvchi muhit sifatida talqin etiladi. Ayniqsa, “Shum bola” va “Yodgor” kabi asarlar orqali bolalar taqdiri, tarbiya masalasi va ijtimoiy muammolar o‘rtasidagi uzviy bog‘liqlik aniq ochib berilgan. G‘afur G‘ulom ijodining bugungi kundagi ahamiyati shundaki, u o‘quvchini o‘z hayoti, oilasi va jamiyatga bo‘lgan munosabati haqida o‘ylashga majbur qiladi. Uning asarlari orqali biz oila qadriyatlarini asrash, farzand tarbiyasiga jiddiy e’tibor qaratish va jamiyatdagi muammolarga befarq bo‘lmaslik zarurligini anglaymiz. Shunday ekan, G‘afur G‘ulom ijodi nafaqat adabiy meros, balki hayotiy saboq manbai sifatida ham katta ahamiyatga ega.

Foydalanilgan adabiyotlar ro’yhati:

1.Erta ajrimning asosiy sabablari va ularni oldini olish yo’nalishi mavzusidagi maqola-Ibrohimova Sitora Ilhomjon qizi maqolasi-https://www.in-academy.uz/

2.G’afurG’ulom elektron kutubxonasi https://gafur-gulom-library-one.netlify.app/

3.https://lex.uz/

4.https://oyina.uz/uz/posts/28950

[3] https://oyina.uz/uz/posts/28950

THE IMPORTANCE OF PLAY ACTIVITY IN CHILDREN'S DEVELOPMENT

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Summary. This article provides a scientific and pedagogical analysis of the role and importance of play in the development of preschool-aged children. It explores how the process of play influences children's cognitive, social, emotional, and speech development, as well as their formation as individuals.

Keywords: game activity, preschool education, child development, socialization, cognitive development, emotional development, didactic games, creativity, pedagogical process.

O‘YIN FAOLIYATINING BOLALAR RIVOJLANISHIDAGI AHAMIYATI

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Annotatsiya. Mazkur maqolada maktabgacha yoshdagi bolalar rivojlanishida o‘yin faoliyatining o‘rni va ahamiyati ilmiy-pedagogik jihatdan tahlil qilinadi. O‘yin jarayonida bolalarning kognitiv, ijtimoiy, emotsional va nutqiy rivojlanishi, shuningdek, shaxs sifatida shakllanishi masalalari yoritilgan.

Kalit so‘zlar: o‘yin faoliyati, maktabgacha ta’lim, bola rivojlanishi, ijtimoiylashuv, kognitiv rivojlanish, emotsional rivojlanish, didaktik o‘yinlar, ijodkorlik, pedagogik jarayon.

Maktabgacha yosh davri inson hayotining eng muhim bosqichlaridan biri bo‘lib, aynan shu davrda bola shaxsining asosiy jihatlari shakllanadi. Ushbu davrda ta’lim-tarbiya jarayonini samarali tashkil etish uchun turli metod va vositalardan foydalaniladi.

Shulardan eng muhimlaridan biri - o‘yin faoliyatidir. O‘yin bola uchun nafaqat vaqt o‘tkazish vositasi, balki u orqali atrof-muhitni anglash, tajriba orttirish, ijtimoiy munosabatlarni o‘zlashtirish va mustaqil fikrlashni rivojlantirish imkonini beruvchi asosiy faoliyat turidir. Zamonaviy pedagogika va psixologiyada o‘yin faoliyati bolaning rivojlanishida markaziy o‘rin egallashi ilmiy jihatdan asoslab berilgan.

O‘yin faoliyati - bu bolaning ichki ehtiyojlari, qiziqishlari va motivlari asosida yuzaga keladigan, erkin va ixtiyoriy xarakterga ega bo‘lgan faoliyat turidir. U o‘ziga xos tuzilishga ega bo‘lib, unda maqsad, syujet, rollar va qoidalar mavjud. Psixolog olim Daniil Elkonin o‘yinni bolaning ijtimoiy tajribani o‘zlashtirish vositasi sifatida izohlaydi. Uning fikricha, aynan rolli o‘yinlar orqali bola kattalar dunyosini modellashtiradi va undagi ijtimoiy munosabatlarni anglaydi.

O‘yin faoliyatining asosiy xususiyatlari quyidagilardan iborat: erkinlik va ixtiyoriylik, ijodkorlik va fantaziya, emotsional boylik va ijtimoiy yo‘naltirilganlik,

bu xususiyatlar o‘yinni ta’limning samarali vositasiga aylantiradi.

O‘yin jarayonida bolalarda bilish faoliyati faol rivojlanadi. Xususan, diqqatni jamlash, xotirani mustahkamlash, tafakkur operatsiyalarini rivojlantirish kabi jarayonlar o‘yin orqali tabiiy ravishda shakllanadi. Didaktik o‘yinlar orqali bolalar-

son va miqdor tushunchalarini, rang va shakllarni, sabab-oqibat bog‘liqliklarini, muammoli vaziyatlarni hal qilish ko‘nikmalarini va oson va samarali o‘zlashtiradi. Masalan, konstruktorlar bilan o‘ynash bolalarda fazoviy tafakkurni rivojlantirsa, mantiqiy o‘yinlar sababiy fikrlashni shakllantiradi. Shu jihatdan, o‘yin kognitiv rivojlanishning eng tabiiy va samarali vositalaridan biridir.

O‘yin faoliyati bolalarning jamiyatga moslashuvi - ijtimoiylashuv jarayonida muhim rol o‘ynaydi. Jamoaviy o‘yinlar orqali bola boshqalar bilan muloqot qilish, kelishuvga erishish, qoidalarga rioya qilish va ijtimoiy rollarni bajarishni o‘rganadi.

Rolli o‘yinlar ayniqsa muhim bo‘lib, unda bola ota-ona, shifokor, o‘qituvchi kabi rollarni bajaradi, ijtimoiy vaziyatlarni modellashtiradi va o‘zini boshqalar o‘rniga qo‘yib ko‘rishni o‘rganadi. Bu esa empatiya va ijtimoiy kompetensiyalarni rivojlantiradi.

O‘yin faoliyati bolaning emotsional holatini tartibga solishda muhim vosita hisoblanadi. Bola o‘yin orqali o‘z his-tuyg‘ularini erkin ifodalaydi, ichki kechinmalarini tashqi faoliyatga chiqaradi. Shuningdek, o‘yin stressni kamaytiradi,
ishonchni oshiradi, qo‘rquv va xavotirni yengishga yordam beradi.

Psixologik jihatdan, o‘yin terapevtik vosita sifatida ham qo‘llaniladi. Bu ayniqsa uyatchan yoki ijtimoiy faol bo‘lmagan bolalar bilan ishlashda samarali hisoblanadi. O‘yin jarayonida bolalar faol muloqotga kirishadi. Bu esa nutq rivojlanishiga bevosita ta’sir qiladi. Rolli o‘yinlar davomida bola dialog qurishni, savol berishni va fikrini izchil ifodalashni o‘rganadi. Teatrlashtirilgan o‘yinlar esa, so‘z boyligini oshiradi, talaffuzni yaxshilaydi va ifodali nutqni rivojlantiradi. Natijada bola nutqiy jihatdan faol va erkin shaxs sifatida shakllanadi.

Zamonaviy maktabgacha ta’limda o‘yin faoliyatini tashkil etish quyidagi tamoyillarga asoslanadi:

-shaxsga yo‘naltirilgan yondashuv

-rivojlantiruvchi muhit yaratish

-bolalarning mustaqilligini qo‘llab-quvvatlash

-individual xususiyatlarni hisobga olish

Pedagogning vazifasi - o‘yin jarayonini boshqarish emas, balki yo‘naltirishdir. U bolalarga sharoit yaratib beradi, ammo ularning ijodiy erkinligini cheklamaydi.

Xulosa qilib aytganda, o‘yin faoliyati maktabgacha yoshdagi bolalar rivojlanishining markaziy komponenti hisoblanadi. U bolaning aqliy, ijtimoiy, emotsional va nutqiy rivojlanishini ta’minlaydi hamda shaxs sifatida shakllanishiga mustahkam asos yaratadi. Shu sababli, maktabgacha ta’lim tizimida o‘yin faoliyatini

samarali tashkil etish pedagoglar oldidagi muhim vazifalardan biridir. To‘g‘ri tashkil etilgan o‘yin muhiti bolalarning kelajakdagi muvaffaqiyatiga ijobiy ta’sir ko‘rsatadi.

Foydalanilgan adabiyotlar ro’yxati.

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ANALYSIS OF HEAT EXCHANGE AND AUTOMATIC CONTROL OF THE SYSTEM BASED ON THE FOURETE AND LUMPED MODELS IN THE PROCESS OF COOLING GRANULES IN A WATER BATH

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Abstract. This article examines the issues of automatic control of the process of cooling granulated products in a water bath. To describe the heat exchange process, the Fourier model and the simplified Lumped model with aggregate parameters are analyzed. The advantages and areas of application of both models are compared, and their effectiveness in creating an automatic control system is evaluated.

Key words: granule, cooling process, automatic control, Fourier model, Lumped model, heat exchange, mathematical modeling, energy consumption.

Introduction. In industrial processes, the production of granulated products and their high-quality cooling is one of the important stages. In particular, the process of cooling in a water bath has high efficiency, which directly affects the quality of the product [1]. Mathematical models expressing the laws of heat transfer are necessary for effective process control [2].

Problem situation. The following parameters are important in controlling the granule cooling process: 1. water temperature, 2. flow rate, 3. granule size, 4. inlet temperature [3]. In practice, the following problems are observed in the process of cooling granules: 1. uneven cooling of granules; 2. differences in internal and external temperature; 3. Increased energy consumption; 4. slow operation or insufficient accuracy of the control system [4]. Traditional management methods often do not fully reflect the real process, as a result of which product quality decreases.

Solution to the problem. Mathematical modeling of the heat exchange process plays an important role in solving these problems.

The Fourier model accurately describes the temperature distribution inside the granules:

$$\frac{\partial T}{\partial t} = a\nabla^2 T \quad (1)$$

This model provides high accuracy and takes into account the internal thermal gradients in the granule. However, due to the complexity of calculations, it is difficult to use in real-time management.

The Lumped model is represented by the following equation:

$$\frac{dT}{dt} = -\frac{hA}{pcV}(T - T_{water}) \quad (2)$$

This model characterizes the granule with a single temperature and is very simple in terms of calculation. Therefore, it is widely used in automatic control systems [5]. As an optimal solution: 1. when designing the system, a deep analysis is carried out based on the Fourier model; 2. The Lumped model is used in real-time management; 3. The temperature is maintained constant using a PID controller.

Initial temperature: T_0 = 120°C;

Water temperature: T_{water} = 25°C;

Granule radius: r = 0,005 m;

Density: ρ = 1200 kg/m^3;

Heat capacity: c = 1500 J/ (kg · °C);

Heat transfer coefficient: h = 500 W / (m^2 · °C).

Calculation of geometric quantities

For the sphere:

$$V = \frac{4}{3}\pi r^3 = \frac{4}{3} \cdot 3{,}14 \cdot (0{,}005)^3 \approx 5{,}24 \cdot 10^{-7} m^3 \quad (3)$$

$$A = 4\pi r^2 = 4 \cdot 3{,}14 \cdot (0{,}005)^2 \approx 3{,}14 \cdot 10^{-4} m^2 \quad (4)$$

Lumped model

Formula:

$$T(t) = T_{water} + (T_0 + T_{water})e^{-\frac{hA}{pcV}t} \quad (5)$$

Let's calculate the indicator:

$$\frac{hA}{pcV} = \frac{500 \cdot 3{,}14 \cdot 10^{-4}}{1200 \cdot 1500 \cdot 5{,}24 \cdot 10^{-7}} \approx 0{,}166\ s^{-1} \quad (6)$$

Therefore:

$$T(t) = 25 + (120 - 25)e^{-0{,}166t} \quad (7)$$

Time (s)	Temperature (°C)
0	120°C
5	$25 + 95 \cdot e^{-0{,}83} \approx 66$°C
10	≈ 44°C
20	≈ 30°C
30	≈ 27°C

The results are as follows: in 20-30 seconds, the granules reach almost the water temperature.

Biot count check

$$Bi = \frac{h \cdot r}{k} \quad (8)$$

Suppose: k = 0,5 W/ (m · °C)

$$Bi = \frac{500 \cdot 0{,}005}{0{,}5} = 5$$

Bi > 0,1, therefore: The Lumped model is inaccurate and the Fourier model should be used

Fourier model

According to Fourier's model, there is a temperature gradient inside the granule, so the center's temperature cools slower than the surface.

Point	Temperature

Surface	≈ 40°C
Center	≈ 70°C

The Lumped model calculates quickly and simply, while the Fourier model is precise but complex. When the number of Biotes is large, Lumped gives an error. In automatic control, quick calculation is in Lumpet, and accurate analysis is in Fourier.

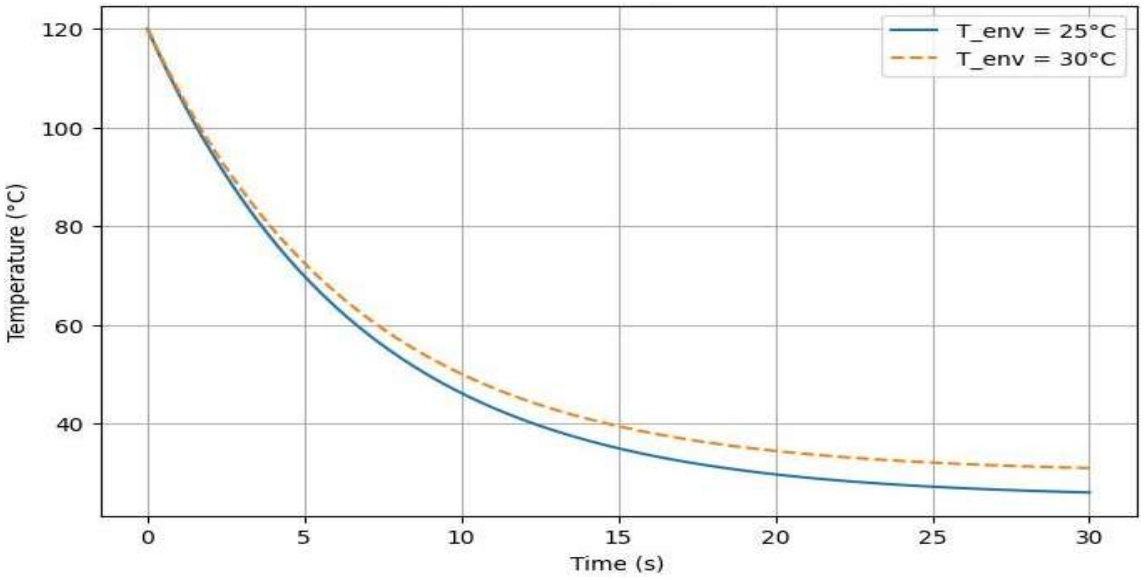

Figure 1. Granule cooling process

The blue line at 25°C water cooled quickly, and the dashed line at 30°C water cooled slowly.

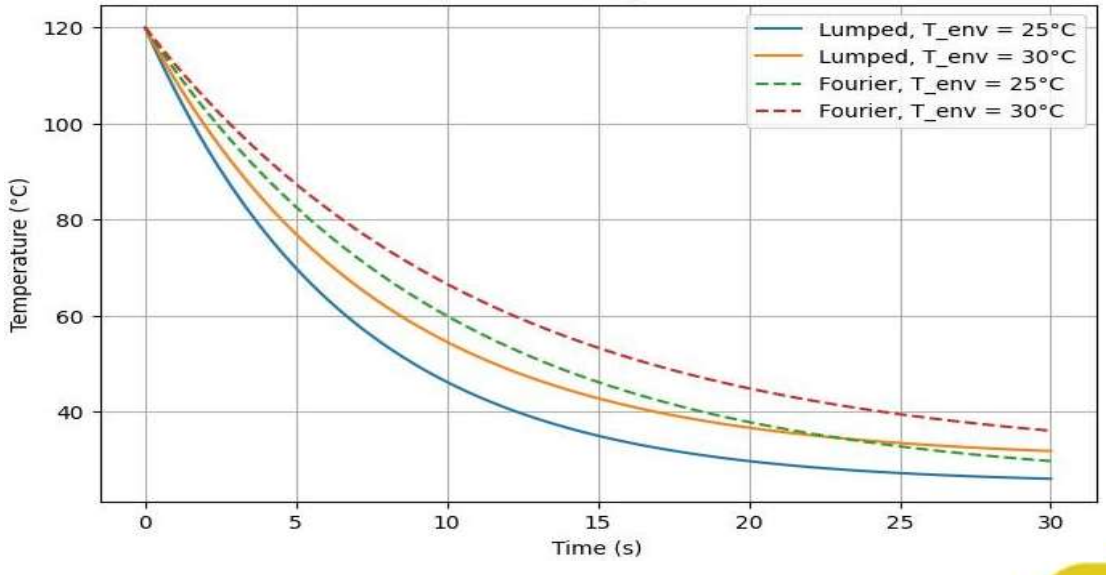

Figure 2. Granule cooling process T_{water} = 25°C and 30°C, Lumped and Fourier

Blue lines T_{water} = 25°C, thick line Lumped, slit line Fourier. Red lines T_{water} = 30°C, thick line Lumped, slit line Fourier. The Lumped model takes into account rapid cooling, while the Fourier model takes into account slow cooling, internal temperature.

Conclusion. Mathematical modeling is an important tool for effective control of the granule cooling process in a bath. The Fourier model provides high accuracy, while the Lumped model is distinguished by its simplicity. Their combined application increases the efficiency of the automatic control system and improves product quality. The control system is usually built on the basis of a PID controller. The Lumped model is used for operational control, while the Fourier model is used for in-depth system analysis.

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METHODOLOGICAL OPPORTUNITIES OF ENGLISH LANGUAGE LESSONS IN DEVELOPING THE SOCIALIZATION OF UPPER SECONDARY SCHOOL STUDENTS

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Abstract. This article examines the methodological potential of English lessons for fostering socialization among upper-secondary students. A mixed-method design combined classroom observations, questionnaires, and semi-structured interviews. The findings indicate that communicative tasks, collaborative projects, and guided reflection significantly strengthen social competences. The study contributes a coherent methodological model and practice-oriented recommendations for integrating language learning with social development goals.

Keywords: socialization, social competence, communicative methodology, cooperative learning, project-based learning, reflection, English lesson

Annotatsiya. Ushbu maqolada yuqori sinf o‘quvchilarining ijtimoiylashuvini rivojlantirishda ingliz tili darslarining metodik imkoniyatlari tahlil qilinadi. Tadqiqot aralash metodlarga tayangan holda ya’ni dars kuzatuvlari, so‘rovnoma va yarim tuzilgan suhbatlar orqali olib borildi. Natijalar kommunikativ vazifalar, hamkorlikdagi loyiha ishlari va refleksiya ijtimoiy kompetensiyalarni sezilarli kuchaytirishini ko‘rsatdi. Ish metodik model va amaliy tavsiyalar bilan ilmiy hissa qo‘shadi.

Kalit so‘zlar: ijtimoiylashuv, ijtimoiy kompetensiya, kommunikativ metodika, hamkorlikda o‘qitish, loyiha faoliyati, refleksiya, ingliz tili darsi

Аннотация. В статье анализируются методические возможности уроков английского языка в развитии социализации старшеклассников. Исследование

проведено на основе смешанного дизайна с использованием наблюдений, анкетирования и полуструктурированных интервью. Результаты показывают, что коммуникативные задания, совместные проекты и рефлексия повышают социальные компетенции. Предложена методическая модель и практические рекомендации, расширяющие научное понимание предметно-языковой социализации.

Ключевые слова: социализация, социальная компетентность, коммуникативная методика, кооперативное обучение, проектная деятельность, рефлексия, урок английского языка

Kirish. Yuqori sinf yoshi o‘quvchining shaxsiy va ijtimoiy o‘zini belgilashi jadallashadigan, tengdoshlar guruhi va kattalar bilan munosabatlar qayta tuziladigan, kelajak kasbiy yo‘nalishi hamda fuqarolik mas’uliyati shakllanishi kuchayadigan bosqich hisoblanadi. Mazkur bosqichda ijtimoiylashuv faqat umumiy tarbiyaviy ishlar bilan emas, balki fanlar kesimidagi kundalik o‘quv amaliyoti orqali ham ta’minlanishi lozim. Ingliz tili darsi bu nuqtai nazardan alohida metodik resursga ega, chunki u muloqotning o‘zi, turli nutqiy vaziyatlarda maqsadga muvofiq til tanlash, mazmunni kelishish, qarama-qarshi fikrni murosaga keltirish va tinglovchini hisobga olish kabi ijtimoiy o‘zaro ta’sir mexanizmlarini bevosita o‘quv vazifasiga aylantiradi.

Shu bilan birga, amaliyotda ingliz tili darslarida ijtimoiylashuv imkoniyatlari ko‘pincha “qo‘shimcha tarbiyaviy komponent” sifatida chekka planda qoladi: nutqiy faoliyat ko‘proq grammatik aniqlik va test natijasiga yo‘naltiriladi, interaktiv topshiriqlar esa jarayonni bezovta qiluvchi omil sifatida qisqartiriladi. Bu holat ijtimoiylashuv va chet tili didaktikasining integratsiyasi bo‘yicha aniq metodik yechimlarga ehtiyoj borligini ko‘rsatadi.

Ilmiy adabiyotlarda ijtimoiylashuv shaxsning ijtimoiy tajribani o‘zlashtirishi, me’yor va qadriyatlarni ichkilashtirishi hamda turli rollarni egallashi jarayoni sifatida talqin

qilinadi; ta’lim esa bu jarayonning maqsadli boshqariladigan maydonidir [1;2]. Chet tilini o‘qitish bo‘yicha zamonaviy yondashuvlar tilni ijtimoiy-amaliy faoliyat sifatida tushuntirib, o‘quvchini real hayotga yaqin kommunikativ vaziyatlarda harakat qilishga tayyorlaydi [3;4]. Rus metodik maktabida kommunikativ yondashuv va shaxsga yo‘naltirilgan ta’limning ijtimoiy natijalari alohida ta’kidlangan bo‘lsa-da, u ko‘proq nutqiy ko‘nikmalarni rivojlantirish bilan bog‘liq tarzda yoritiladi [5]. O‘zbek pedagogik tadqiqotlarida tarbiya va ijtimoiy kompetensiyalar masalasi keng ko‘tarilgan, biroq aynan ingliz tili darslari metodikasi darajasida ijtimoiylashuv mexanizmlarini operatsionallashtirish, ya’ni o‘lchanadigan va boshqariladigan pedagogik ko‘rsatkichlar sifatida belgilash kam uchraydi [6]. Shundan kelib chiqib, ilmiy muammo ingliz tili darslarida ijtimoiylashuvni rivojlantirish imkoniyatlari mavjud bo‘lsa-da, ularning metodik modeli, dars dizaynidagi “qanday” va “nima orqali” savollariga izchil javob beruvchi asoslangan tizim yetarli darajada ishlab chiqilmaganidadir.

Maqolaning maqsadi yuqori sinf o‘quvchilarining ijtimoiylashuvini rivojlantirishda ingliz tili darslarining metodik imkoniyatlarini empirik va tahliliy asosda aniqlash hamda amaliyotga tatbiq etiladigan metodik modelni asoslashdan iborat. Ushbu maqsadni amalga oshirish uchun quyidagi vazifalar hal etildi: birinchidan, ijtimoiylashuvni ingliz tili darsining o‘quv natijalari bilan uyg‘unlashtiruvchi konseptual mezonlar belgilandi; ikkinchidan, dars jarayonida ijtimoiylashuvni qo‘llab-quvvatlaydigan metodik vositalar to‘plami saralandi; uchinchidan, tanlangan vositalarning ijtimoiy kompetensiyalarga ta’siri aralash metodlar orqali baholandi; to‘rtinchidan, o‘qituvchi faoliyatini boshqaruvchi didaktik tavsiyalar ishlab chiqildi. Tadqiqotning yangiligi shundaki, ijtimoiylashuv “darsdan tashqari tarbiya”ga ko‘chirilmaydi, balki ingliz tili darsining ichki didaktik mexanizmlari orqali rejalashtiriladigan natija sifatida asoslanadi.

Metodlar

Tadqiqot dizayni aralash metodlarga tayandi, chunki ijtimoiylashuv bir vaqtning o‘zida ham kuzatiladigan xulqiy ko‘rsatkichlar, ham o‘quvchining subyektiv tajribasi va o‘zini baholashini o‘z ichiga oladi. Empirik qismda umumta’lim maktabining yuqori sinflarida ingliz tili darslari doirasida dars kuzatuvlari, o‘quvchilar so‘rovnomasi va o‘qituvchilar hamda o‘quvchilar bilan yarim tuzilgan suhbatlar o‘tkazildi. Kuzatuvlar darsdagi o‘zaro ta’sirning shakli, rollarning taqsimlanishi, tengdoshlararo muloqotning sifati, bahs va kelishuv jarayonlari, hamkorlikdagi vazifalarda mas’uliyatning bo‘linishi kabi ko‘rsatkichlarni qayd etishga yo‘naltirildi. So‘rovnoma ijtimoiy kompetensiyalarning o‘quvchi tomonidan qabul qilinishi va o‘zini samarali muloqot qiluvchi sifatida his etish darajasini aniqlashga xizmat qildi; savollar muloqotga kirishuvchanlik, jamoada ishlash qulayligi, fikrni dalillash va tinglash madaniyati, nizoni konstruktiv hal etish kabi komponentlarni qamrab oldi. Suhbatlar esa kuzatuv va so‘rovnoma natijalarini izohlash, dars dizaynining qanday elementlari o‘quvchini ijtimoiy faolroq qilgani yoki aksincha, cheklagani haqidagi ma’lumotlarni chuqurlashtirish uchun tanlandi.

Metodik aralashuv sifatida ingliz tili darslarida uch turdagi o‘quv vazifalari tizimli joriy etildi: real hayotga yaqin kommunikativ vazifalar, hamkorlikdagi loyiha faoliyati va reflektiv amaliyot. Kommunikativ vazifalar o‘quvchidan faqat til birliklarini qo‘llashni emas, balki ijtimoiy rolni egallashni ham talab qildi; masalan, kelishuvga erishish, taklifni rad etishni odobli shaklda ifodalash, umumiy qarorga kelish uchun dalillar keltirish kabi nutqiy harakatlar muhim bo‘ldi [3]. Loyiha faoliyati qisqa muddatli bo‘lib, sinf ichida taqdimot va tengdoshlar baholashini o‘z ichiga oldi; bunda ijtimoiylashuvning “jamoa maqsadi” va “jamoa javobgarligi” komponentlari kuchaytirildi [7]. Refleksiya esa dars yakunida o‘quvchining o‘z muloqot tajribasini tahlil qilishiga, qanday vaziyatlarda tinglash, qanday vaziyatlarda yetakchilik qilganini anglashiga qaratildi, bu yondashuv shaxsga yo‘naltirilgan ta’limdagi o‘zini anglash mexanizmlari bilan uyg‘un [5;8]. Tadqiqotda qo‘llangan metodlar tanlovi shunday

asoslandiki, ular ijtimoiylashuvni faqat natija sifatida emas, jarayon sifatida qayd etish imkonini beradi: kuzatuv jarayonni ko‘rsatadi, so‘rovnoma subyektiv o‘zgarishni, suhbat esa mexanizm va sabablarni ochib beradi.

Ma’lumotlarni tahlil qilishda sifat tahlili va umumlashtiruvchi talqin usullari qo‘llandi. Kuzatuv qaydlari bo‘yicha takrorlanuvchi interaktiv epizodlar, o‘qituvchi aralashuvi turlari va o‘quvchi tashabbusining paydo bo‘lish sharoitlari ajratildi. Suhbat materiallari mazmuniy kodlash orqali “o‘zini erkin his qilish”, “xatodan qo‘rqish”, “tengdoshning qo‘llab-quvvatlashi”, “bahsning qoidalari” kabi toifalarga birlashtirildi. So‘rovnoma natijalari esa umumiy tendensiyalarni ko‘rsatish uchun taqqoslama tahlil asosida sharhlandi. Tadqiqot etik tamoyillarga rioya qilgan holda, ishtirokchilarning roziligi va anonimligi ta’minlangan sharoitda olib borildi.

Natijalar

Birinchi natija sifatida ingliz tili darsining ijtimoiylashtiruvchi potensiali “til orqali ijtimoiy amaliyot” tamoyili bilan bog‘liq ekanligi aniqlandi: o‘quvchi nutqiy birliklarni o‘zlashtirar ekan, aslida ijtimoiy vaziyatlarda qabul qilingan muloqot me’yorlarini ham sinab ko‘radi. Kuzatuvlar shuni ko‘rsatdiki, kommunikativ vazifalar oddiy “savol-javob”dan farqli ravishda o‘quvchining tashabbusini ko‘paytiradi, chunki vazifa ichida tanlov mavjud bo‘ladi: qanday dalil keltirish, kimning fikriga tayanish, qanday ohangda e’tiroz bildirish. Bunday topshiriqlarda o‘qituvchining roli nazorat qiluvchi markazdan ko‘ra fasilitatorga yaqinlashadi va aynan shu siljish tengdoshlararo muloqotning ko‘payishi bilan birga kuzatildi. Darsdagi muloqot “o‘qituvchi-o‘quvchi” o‘qidan “o‘quvchi-o‘quvchi” tarmog‘iga kengayganida, ijtimoiylashuvning asosiy indikatorlari bo‘lgan tinglash, navbat kutish, fikrni yakunlash, hamkorni rag‘batlantirish kabi xatti-harakatlar tabiiy ravishda namoyon bo‘la boshladi.

Ikkinchi natija hamkorlikdagi loyiha faoliyatining ijtimoiy kompetensiyalarni strukturaviy tarzda rivojlantirishini ko‘rsatdi. Loyiha jarayonida rollar taqsimoti yuzaga

kelgani sababli o‘quvchi o‘zini jamoa uchun zarur subyekt sifatida his qilishga intiladi. Kuzatuvlarda loyiha bosqichlari aniq belgilangan sinflarda ijtimoiy mas’uliyat ko‘proq ko‘rindi: masalan, material yig‘ish, matnni tahrirlash, taqdimot qilish kabi vazifalar bo‘linganda o‘quvchilar bir-birining ishiga bog‘lanib qoladi va bu bog‘liqlik kommunikativ ehtiyojni kuchaytiradi. Natijada “faqat baho uchun gapirish”dan “jamoa natijasi uchun gapirish”ga o‘tish sezildi. So‘rovnoma tendensiyalarida ham jamoada ishlash qulayligi va o‘z fikrini ifodalashga ishonch ko‘rsatkichlari o‘sishga moyillik bildirdi; suhbatlarda esa o‘quvchilar loyiha “menda rol borligini” his qildirganini, ayrim tortinchoq o‘quvchilar esa tayyor matnni o‘qishdan ko‘ra, kichik guruhda muhokama qilishda o‘zini erkinroq tutganini ta’kidladi.

Uchinchi natija refleksiya ijtimoiylashuvni barqarorlashtiruvchi mexanizm sifatida ishlashini ko‘rsatdi. Reflektiv yakunlar muntazam bo‘lgan sinflarda o‘quvchilar o‘z muloqot tajribasini “menga nima qiyin bo‘ldi” va “men qanday yordam berdim” kabi mezonlarda tasvirlashni o‘rgana boshladi. Bu jarayonda ijtimoiylashuvning ichki tomoni, ya’ni o‘zini baholash va ijtimoiy vaziyatni anglash kuchaydi. Kuzatuv qaydlarida refleksiya mavjud bo‘lgan darslarda keyingi mashg‘ulotlarda ziddiyatli epizodlar qisqargani, o‘quvchilar bahsni “qoidali” olib borishga ko‘proq urinishi, masalan, fikrni bo‘lmaslik yoki e’tirozni muloyim shaklda berish kabi odatlar mustahkamlanishi ko‘rindi. Suhbatlar shuni ham ochdiki, o‘qituvchi refleksiyada xatoni jazolamasdan, o‘rganish resursi sifatida talqin qilsa, o‘quvchining ijtimoiy xavfsizlik hissi ortadi va u muloqotga faolroq kirishadi.

To‘rtinchi natija metodik imkoniyatlar faqat topshiriqlar turiga emas, balki baholashning ijtimoiy yo‘naltirilgan mezonlariga ham bog‘liqligini ko‘rsatdi. O‘qituvchi baholashda faqat grammatik to‘g‘rilikni markazga qo‘ysa, o‘quvchi ko‘proq xatodan qochadi va muloqotdan chekinadi; aksincha, muloqot strategiyalari, dalillash, tinglash va hamkorni qo‘llab-quvvatlash kabi ko‘rsatkichlar baholashda ko‘rinadigan bo‘lsa, o‘quvchilar

ijtimoiy faolroq bo‘lishga intiladi. Kuzatuvlar davomida “muloqot sifati”ga qisqa og‘zaki fikr bildirishlar bergan o‘qituvchilarda tengdoshlararo muomala ko‘proq barqarorlashgani qayd etildi. Shu asosda ingliz tili darslarining ijtimoiylashtiruvchi modeli uch tayanchga birlashtirildi: kommunikativ vazifa dizayni, hamkorlik arxitekturasi va reflektiv-baholash mexanizmi.

Muhokama

Olingan natijalar ijtimoiylashuvning ta’lim jarayonida konstruktiv tarzda tashkil etilishi haqidagi pedagogik qarashlarni qo‘llab-quvvatlaydi. Ijtimoiylashuvni shaxsning ijtimoiy tajribani o‘zlashtirish jarayoni sifatida izohlovchi yondashuvlar ta’limning ijtimoiy muhit yaratish funksiyasini alohida ko‘rsatadi [1]. Bizning kuzatuvlarimizda aynan ingliz tili darsidagi “muloqotga majbur qiluvchi” vaziyatlar ijtimoiy tajribani tabiiylashtirdi: o‘quvchi ijtimoiy rolni nutq orqali sinaydi va shu tariqa me’yorlarni amalda o‘zlashtiradi. Bu natija ijtimoiylashuvning faqat maktabning umumiy madaniy muhiti bilan emas, fan didaktikasi ichidagi mikrovaziyatlar bilan ham boshqarilishi mumkinligini ko‘rsatadi.

Chet tilini kommunikativ faoliyat sifatida yoritadigan xalqaro tadqiqotlar til o‘rganishni “ma’no muzokarasi” va “o‘zaro ta’sir” bilan bog‘laydi [3; 4]. Mazkur yondashuvlarda muloqot strategiyalari, masalan, tushunmagan joyni aniqlashtirish, qayta so‘rash, hamkor fikrini to‘ldirish kabi amallar til kompetensiyasining bir qismi sifatida ko‘riladi. Bizning natijalar esa bu strategiyalarni ijtimoiy kompetensiyaning ham ko‘rsatkichi sifatida ko‘rish mumkinligini asoslaydi: o‘quvchi qayta so‘rash orqali nafaqat leksik bo‘shliqni yopadi, balki hamkorni hurmat qilgan holda muloqotni davom ettirishni o‘rganadi. Demak, kommunikativ metodika ijtimoiylashuvni “yon mahsulot” sifatida emas, o‘quv natijasining integrallashgan komponenti sifatida yuzaga chiqaradi.

Rus metodik adabiyotlarida shaxsga yo‘naltirilgan va kommunikativ ta’lim o‘quvchining subyektivligini, hamkorlikda o‘qitish esa sinf ichidagi ijtimoiy aloqalarni

faollashtirishini qayd etadi [5]. Bizning tahlilimiz bu fikrlarni aniqlashtirib, o‘qituvchining fasilitatorlik roli qachon ijtimoiylashuvga xizmat qilishini ko‘rsatdi: topshiriqda tanlov bo‘lsa, baholash mezonlari ijtimoiy xatti-harakatlarni ham qamrasa va refleksiya muntazam qo‘llansa, shundagina o‘qituvchi “chekinishi” o‘quvchilarni tartibsizlikka emas, ijtimoiy tartibning o‘z-o‘zini boshqarishiga olib keladi. Aks holda, hamkorlik formal bo‘lib qolishi, faol o‘quvchilar yetakchilikni monopoliyalashi va tortinchoqlar chetda qolishi mumkin. Shu ma’noda, hamkorlikni o‘zi yetarli emas; u metodik arxitekturaga ega bo‘lishi zarur.

O‘zbek pedagogik manbalarida ijtimoiy kompetensiyalarni tarbiyalash masalasi ko‘p jihatdan sinfdan tashqari ishlar, ma’naviy-ma’rifiy tadbirlar bilan bog‘lab tushuntiriladi [6]. Bizning natijalar bunday yondashuvni inkor etmagan holda, uni to‘ldiradi: ijtimoiylashuvning barqaror ko‘nikmalarga aylanishi uchun u muntazam o‘quv faoliyati ichiga “tikilgan” bo‘lishi kerak. Ingliz tili darsi bu vazifa uchun qulay, chunki unda muloqot mazmuni ham, shakli ham o‘qitish obyekti hisoblanadi. Shuning uchun tarbiyaviy maqsadlar fan maqsadlari bilan raqobatlashmaydi, aksincha, bir-birini kuchaytiradi: o‘quvchi ijtimoiy jihatdan erkinlashgan sari ko‘proq gapiradi, ko‘proq tinglaydi va natijada til ko‘nikmalari ham o‘sadi.

Loyiha faoliyati bo‘yicha xalqaro ta’lim tadqiqotlari hamkorlik, mas’uliyat va muammoli vazifalarni hal etish kompetensiyalarini kuchaytirishini ko‘rsatadi [7]. Bizning kuzatuvlar bu xulosani yuqori sinf o‘quvchilariga nisbatan ingliz tili darsida ham tasdiqlaydi, biroq muhim shartni ochib berdi: loyiha mazmuni o‘quvchilar uchun ijtimoiy ma’noga ega bo‘lsa va taqdimotdan keyingi tengdoshlar fikri konstruktiv qoidalar bilan boshqarilsa, ijtimoiylashuv kuchliroq yuzaga chiqadi. Aks holda, loyiha “matn yig‘ish va o‘qish” darajasida qolib ketadi. Shu sababli, metodik nuqtai nazardan loyihaga ijtimoiy muzokara elementlari ataylab kiritilishi lozim.

Refleksiya masalasida o‘qitish nazariyalarida “o‘rganishni anglash” va “metakognitiv boshqaruv” o‘quvchining mustaqilligini oshirishi qayd etiladi [8]. Bizning natijalar refleksiyaning ijtimoiylashuvdagi rolini ham ko‘rsatdi: o‘quvchi o‘z muloqotini tahlil qilgan sari ijtimoiy vaziyatlarni farqlash, o‘z xatti-harakatining boshqalarga ta’sirini anglash, kelgusi safar boshqacha yo‘l tutish kabi ijtimoiy-intellektual operatsiyalarni mashq qiladi. Bu esa ijtimoiy kompetensiyani faqat odob-axloq me’yorlari bilan cheklamay, uni amaliy muloqot strategiyalari va o‘zini boshqarish bilan bog‘laydi.

Xulosa

Tadqiqot ingliz tili darslari yuqori sinf o‘quvchilarining ijtimoiylashuvini rivojlantirish uchun yuqori metodik salohiyatga ega ekanligini va bu salohiyat darsni kommunikativ vazifa dizayni, hamkorlikdagi loyiha arxitekturasi hamda reflektiv-baholash mexanizmi orqali tizimli ishga solinganda maksimal natija berishini asoslab berdi. Olingan natijalar ijtimoiylashuvni fan doirasidagi kundalik o‘quv amaliyotiga integratsiya qilish mumkinligini, bunda o‘quvchi muloqotga kirishuvchanlik, tinglash, kelishuvga erishish, jamoada mas’uliyatli ishlash va o‘z muloqot tajribasini tahlil qilish kabi ijtimoiy kompetensiyalarni barqaror rivojlantirishini ko‘rsatdi. Nazariy jihatdan maqola ijtimoiylashuvni chet tili didaktikasi bilan bog‘lovchi operatsion modelni aniqlashtirdi; amaliy jihatdan esa o‘qituvchi uchun vazifa tanlash, baholash mezonlarini kengaytirish va refleksiyani darsning tabiiy qismiga aylantirish bo‘yicha yo‘nalishlarni belgiladi. Kelgusida tadqiqotlar ushbu modelning turli hududlar, sinf tarkibi va til darajalarida barqarorligini tekshirish, shuningdek, raqamli muhitda onlayn hamkorlik vazifalarining ijtimoiylashuvga ta’sirini chuqurlashtirishga qaratilishi maqsadga muvofiq.

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ORGANIZATION OF CHEMISTRY LABORATORY ACTIVITIES BASED ON VIRTUAL REALITY (VR)

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Abstract: This article analyzes the theoretical and practical aspects of organizing chemistry laboratory activities based on virtual reality (VR) technologies. The study scientifically covers the impact of VR technologies on the educational process based on the theory of cognitive visualization and the immersive learning effect. It also examines the capabilities of Chemstr and other virtual laboratory programs, their role and effectiveness in teaching chemistry.

Keywords: Virtual Reality (VR), chemistry laboratory activities, immersive learning, cognitive visualization, virtual lab simulation, chemstr software, science education, experimental competence

Annotatsiya: Ushbu maqolada kimyo laboratoriya mashg‘ulotlarini virtual reallik (VR) texnologiyalari asosida tashkil etishning nazariy hamda amaliy jihatlari tahlil qilinadi. Tadqiqotda VR texnologiyalarining ta’lim jarayoniga ta’siri kognitiv vizualizatsiya nazariyasi hamda immersiv o‘qitish effekti asosida ilmiy jihatdan yoritilgan. Shuningdek, Chemstr hamda boshqa virtual laboratoriya dasturlarining imkoniyatlari, ularning kimyo fanini o‘qitishdagi o‘rni va samaradorligi ilmiy jihatdan tahlil etilgan.

Kalit so‘zlar: Virtual reallik (VR), kimyo laboratoriya mashg‘ulotlari, immersiv o‘qitish, kognitiv vizualizatsiya, virtual laboratoriya simulyatsiyasi, Chemstr dasturi, fan ta’limi, tajriba kompetensiyasi.

INTRODUCTION

One of the main problems in teaching chemistry is to bring abstract concepts (atom, molecule, bond, reaction mechanism) to the level of real perception. In traditional laboratory conditions, this process is limited, since many chemical phenomena occur at the microlevel and are not directly observed. Modern research shows that virtual reality (VR) technologies can solve this problem, allowing students to see and manipulate molecular-level processes in real time. Therefore, organizing chemistry laboratory classes based on VR is considered not only a pedagogical innovation, but also a tool for solving cognitive problems.

Theoretical foundations: cognitive and didactic effects of VR technology

1. Theoretical foundations of cognitive visualization:

Cognitive visualization theory is a scientific approach that aims to increase students' understanding of learning by presenting knowledge in a visual form. According to this theory, the human brain receives information through two main channels: visual (pictures) and verbal (text or oral).

This approach is closely related to the dual coding theory developed by Allan Paivio, according to which information is better understood when presented in both a visual and logical form.

This theory is especially important in teaching chemistry, since many chemical processes (molecular structure, electron clouds, reaction mechanisms) are abstract phenomena that cannot be directly observed. Virtual reality (VR) technology allows these abstract concepts to be represented through three-dimensional visual models.

In a VR environment, students;

see the spatial structure of molecules, visually analyze the bonds between atoms, dynamically observe chemical reactions, and interactively control complex processes.

This activates the following cognitive processes in students.

Spatial thinking, analytical thinking, understanding cause-and-effect relationships, and strengthening long-term memory.

Also, according to the multimedia learning theory developed by Richard Mayer, the combination of visual and audio information helps students to assimilate knowledge more deeply. VR technology provides this integration. As a result, VR technologies based on the theory of cognitive visualization;

— concretize abstract concepts;

— systematically form knowledge;

— develop students' independent learning abilities.

— Sees molecules in 3D space

— Monitors reactions dynamically

— Transforms abstract formulas into visual models

This is explained by the “dual coding theory,” which means that knowledge is acquired in both a visual and logical form at the same time.

2. The result of immersive learning:

The immersive learning effect is the process of deep and sustainable assimilation of knowledge as a result of the student's complete "immersion" in the educational process. This approach is especially closely related to virtual reality (VR) technologies, which provide active learning by immersing the student in an artificially created environment.

During the immersion process, the student feels like he is working in a real laboratory. This leads to maximum concentration and full attention to the process being studied. As a result, passive learning turns into active learning.

Scientific studies show that learning in an immersive environment helps to maintain attention for a long time;

consolidates knowledge in long-term memory;

— increases learning motivation;

— significantly improves learning efficiency.

The main components of an immersive VR environment are:

1. Visual immersion - 3D graphics and realistic environment
2. Sensory immersion - tracking movements (hand tracking)
3. Cognitive immersion - the student's entry into the thought process
4. Emotional immersion - the emergence of a sense of interest and wonder

This process is explained by the theory of “Flow” developed by Mihaly Csikszentmihalyi. According to him, a person achieves maximum efficiency when he is completely immersed in an activity. VR creates this state in the educational process.

Immersive learning in chemistry education creates the following opportunities:

• performing dangerous experiments in a safe environment;

• observing complex reactions step by step;

• interactive work with laboratory equipment;

• conducting independent experiments.

In addition, in an immersive VR environment, students “learn by doing.” This is much more effective than traditional theoretical teaching.

Immersive technologies also develop the following competencies in students:

• problem solving;

• research skills;

• independent decision-making;

• practical thinking.

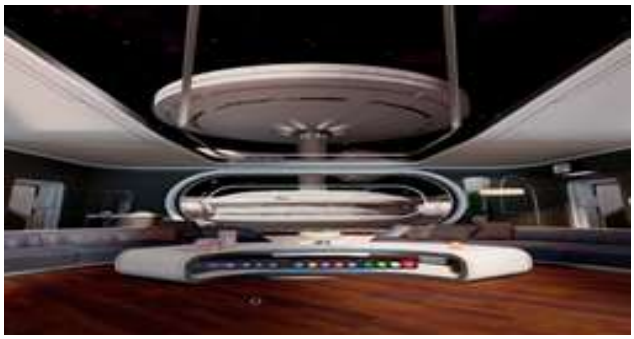
In conclusion, the immersive learning effect is one of the most important pedagogical advantages of VR technologies, which ensures the formation of deep and sustainable knowledge in teaching chemistry.

Virtual laboratory work, which is carried out using the **Meta Quest** device through the CHEMISTRY VR software, is carried out as follows.

Meta Quest 2

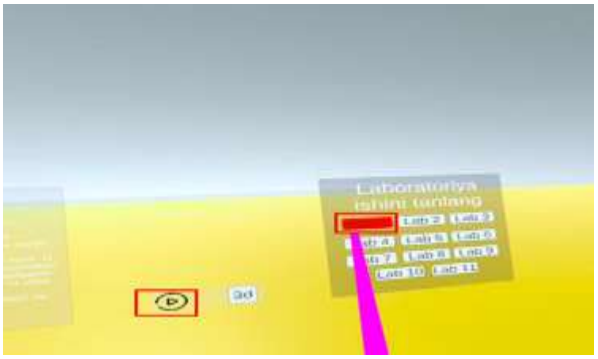
Meta Quest 3

Application of CHEMISTRY VR software



Meta Quest 2 provides the main part of the program

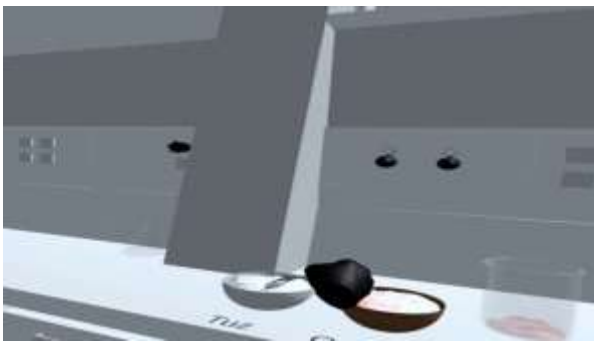
Go to the menu and find the CHEMISTRY VR program



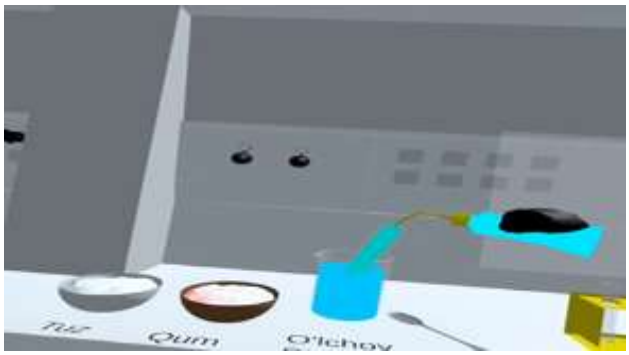
Introduction to Chemistry VR

In the right window, there is an opportunity to do laboratory work at 11, which is not a 7th grade textbook.

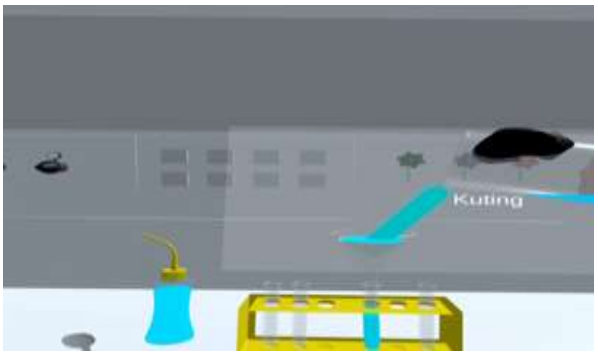
The interactive window will display the procedure for performing the laboratory work.



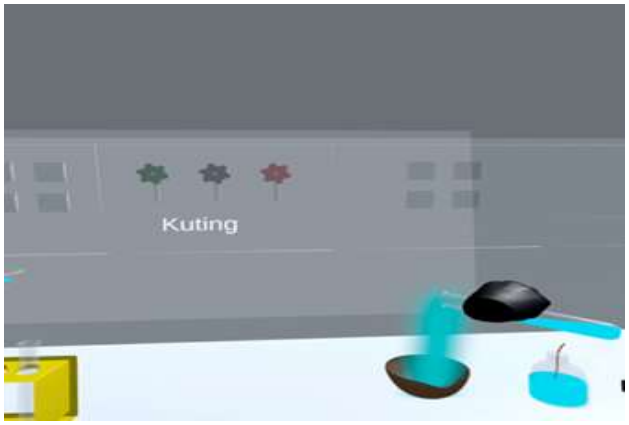
Lab 1: Purifying Mixtures. Take a spoon and put the sand and salt into a measuring cup.



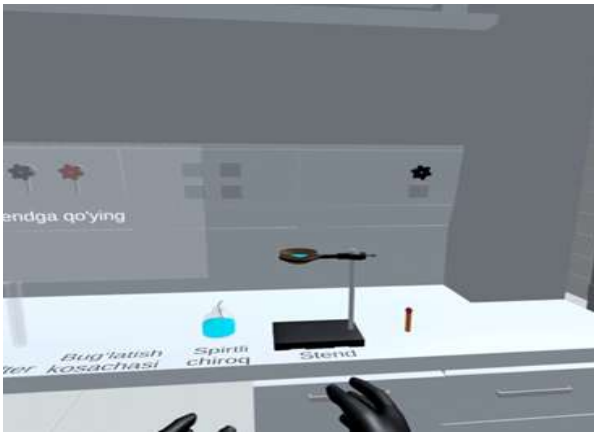
Pour water into a measuring cup and mix with a spoon to form a solution.



Pass the solution in the measuring cup through a paper filter.

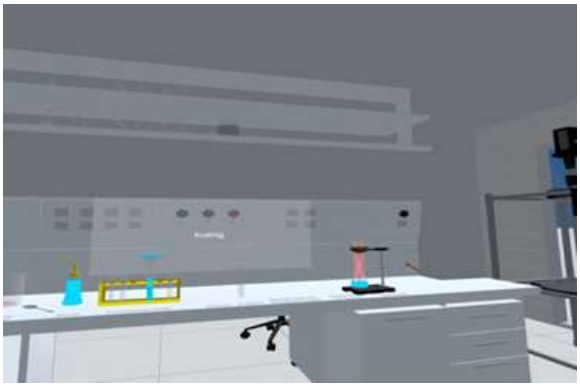


You are asked to pour the solution from the test tube into the evaporator dish.



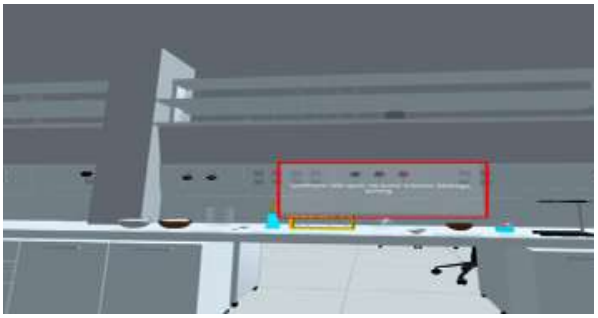
Place the evaporator dish on the stand.

Turn on the alcohol lamp.



Process monitoring

After the water evaporates from the evaporator tank, you can observe that pure salt remains at the bottom of the tank.



You did the job correctly and accurately.

At this stage, students' readiness for innovative activities is developed and serves to reveal their innovative potential and develop an advanced level of scientific competence.

Advantages and scientifically proven advantages

VR laboratories have the following advantages:

— safety (no poisoning, explosion)

— economy (no reagents required)

— repeatability (unlimited experience)

— visual clarity

— possibility of distance learning

critical analysis

From a scientific point of view, VR is not a complete solution:

— does not fully reproduce real laboratory skills

— does not form enough “muscle memory” (practical reflexes) (Reddit discussions also noted this opinion)

— is dependent on technical resources

CONCLUSION

Organizing chemistry laboratory classes based on virtual reality is one of the most promising areas of modern education. In particular, virtual laboratories of the Chemstr type:

- develop students’ scientific thinking
- help visually understand complex chemical processes
- create a safe and effective learning environment

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AI`S ROLE IN ECONOMICS AND HEALTHCARE SYSTEM

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Abstract

This article discusses the growing importance of artificial intelligence in modern society and its positive impact on various sectors such as education, healthcare, and business. AI enhances personalized learning by helping students improve their knowledge according to their individual needs. In healthcare, it supports accurate and fast diagnosis, reduces medical errors, and improves the quality of patient care. Additionally, AI contributes to business development by increasing productivity, reducing costs, and improving customer satisfaction. Overall, the article argues that despite some challenges, the benefits of artificial intelligence outweigh its drawbacks, and its responsible use can significantly improve human life.

Key Words

Artificial Intelligence, Education, Healthcare, Business, Technology, Personalized Learning, Automation, Economic Growth, Innovation, Productivity

Nowadays, artificial intelligence is developing very quickly and becoming an important part of our daily lives. It is widely believed that AI has a significant positive impact on different sectors such as education, healthcare, business and the economy. In my opinion, AI brings many benefits to society if it is used properly and responsibly.

Firstly, AI plays a crucial role in education. It supports personalized learning and helps students study more effectively. For example, AI-based platforms can analyze students' strengths and weaknesses and provide suitable materials according to their level. As a result, learners can improve their knowledge independently and correct their mistakes more easily. Moreover, online courses and educational applications make learning more accessible for students around the world.

Secondly, AI has greatly improved the healthcare system. It helps doctors diagnose diseases more accurately and quickly. In addition, AI systems can guide patients in taking medicines on time and following treatment plans correctly. This reduces medical errors and increases the quality of care. Consequently, many lives can be saved with the help of advanced technologies.

Furthermore, AI has a strong influence on business and the economy. Many companies use AI to increase productivity and reduce costs. For instance, online stores use AI to analyze customers' preferences and recommend suitable products. This not only improves customer satisfaction but also increases sales and profits. Therefore, AI contributes to economic growth and creates a more competitive business environment.

In conclusion, artificial intelligence has a positive impact on education, healthcare, business and many other fields. Although there may be some challenges, the advantages of AI outweigh the disadvantages. If it is used wisely, AI will continue to improve our lives in the future.

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COMPARATIVE ANALYSIS OF INTERNATIONAL ICT PRACTICES IN SCHOOL MANAGEMENT MODERNIZATION: AN ECONOMIC AND MANAGERIAL PERSPECTIVE

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Keywords: Education Management Information Systems (EMIS); Digital Governance; Strategic Management; Resource Allocation; Institutional Efficiency; Information Economics.

Abstract. Modern school management has evolved into a complex socio-economic endeavor where the efficient reproduction of human capital is the primary mandate. Information and Communication Technologies (ICT) serve as the fundamental economic lever in this transformation, transitioning from auxiliary tools to the core of institutional governance. This paper provides a comprehensive comparative analysis of international ICT practices in school management, examined through the lenses of management efficiency, cost-effectiveness, and data-driven decision-making. By evaluating the digital ecosystems of Finland, Estonia, and South Korea alongside the emerging reforms in Uzbekistan, the study demonstrates how integrated systems like Education Management Information Systems (EMIS) and Enterprise Resource Planning (ERP) reduce administrative friction and enhance service quality [Abdinabiyeva, A.R. 2025. p.40]. The research utilizes management theories, including the Upper Echelon Theory and the Principle of Equifinality, to argue that digitalization facilitates a shift from rigid bureaucratic hierarchies to agile, decentralized network structures. The results suggest that the strategic integration of ICT not only optimizes resource allocation but

also ensures institutional transparency and accountability, positioning educational institutions as competitive subsectors within the global knowledge economy.

Introduction

Education is fundamentally defined as a non-material sector of the economy, combining various business entities aimed at the reproduction of human capital. Within this framework, management is both an art and a science, involving the strategic utilization of human, technical, financial, and informational resources to meet the demands of a homogeneous consumer market. As the global economy undergoes profound transformation, school management systems face the challenge of "doing more with less" while ensuring that the quality of educational services remains an economically viable category [Carataș Maria Alina an et. al. 2018, p.405].

Modernization in the educational context refers to the transition toward "evidence-based management," where decisions are no longer predicated solely on the intuition of leaders but on the rigorous analysis of data [Kosherbayeva, A.N. et al. 2023, p.145]. The emergence of ICT has linked the world together, leading to a global change in all aspects of life, including the way management technologies are adapted to the individual circumstances of economic agents. In this informational universe, "time is money," and the business field of education cannot be left behind. This paper explores how international best practices in ICT modernization contribute to organizational sustainability and economic growth by improving the efficiency and effectiveness of school governance.

Literature Review

The importance of information as a strategic resource is grounded in the "information economy," dealing with market signaling and the reduction of information asymmetry. In school management, ICT acts as a "digital nervous system," enabling organizations to operate at the "speed of thought". Management itself is viewed as the

"servant of the organization"; any management system that fails to master the conceptual apparatus of the modern economy causes institutional harm [Borodiienko, O. 2022, p.465].

Current research categorizes school management into various models, including bureaucratic, business-oriented, communication, and partnership models. The bureaucratic model is characterized by rigid hierarchical structures and formalized relationships, often resulting in institutional stagnation and the outflow of personnel with innovative mindsets. Conversely, the business-oriented model focuses on optimizing business processes, increasing automation, and focusing on revenue growth and cost optimization.

The "Upper Echelon Theory" suggests that organizations become reflections of their top managers. Through this lens, the strategic choice to adopt ICT is determined by the cognitive styles and digital competencies of the top management team (TMT) [McCants, M.H. 2024, p.19]. Furthermore, systems dynamics (SD) research highlights that organizations are non-linear systems where feedback loops and time delays in information flow can either enable or hinder the accumulation of intangible assets like institutional reputation.

SBM is a multinational change curriculum approach that transfers authority over financial and personnel matters to the local level. It is rooted in the "principle of equifinality," which posits that schools can use various methods to achieve the same high-level goals depending on their local socio-economic conditions. ICT is a critical enabler of SBM, providing the infrastructure for accountability and transparency required when central control is devolved.

Methodology

This paper adopts an interdisciplinary approach, utilizing economic analysis, synthesis, and deduction to examine management phenomena in the education sector.

The research design follows a comparative qualitative framework, evaluating the strategic planning and ICT implementation strategies of different nations [Yuzhuo Cai & Vuokko Kohtamäki (eds), 2014, p.81].

Key analytical tools used include:

- **Materiality Analysis:** Deciding which issues to prioritize based on their importance to external and internal stakeholders.
- **SWOT and PESTLE Analysis:** Identifying internal strengths and external socio-economic prerequisites for strategic development.
- **Confirmatory Factor Analysis (CFA):** Validating the components of an innovative organization, such as ICT management and organizational culture.

The study synthesizes data from international journals, doctoral dissertations, and sector-specific policy documents, such as the Uzbekistan Education Sector Plan (ESP) 2019–2023.

Results and Discussion

Finland: Professionalization and Holistic Integration. The Finnish model is characterized by a high degree of teacher professionalism and institutional trust. Management in Finnish universities and schools emphasizes "strategic development" as a long and complex process aimed at enabling better integration between institutional strategy and core operations. ICT is used here not just for administrative reporting but to foster collaborative teaching and learning practices, creating a "Common Information Platform" that syncs global strategy with local execution [Yuzhuo Cai & Vuokko Kohtamäki (eds), 2014, p.84].

Estonia and the Digital Ecosystem. Estonia represents a "digital first" governance model. By integrating school management into a broader national e-governance ecosystem, Estonia has minimized administrative costs. The use of cloud technologies (e.g., Google Drive) and specialized communication software (Slack,

Zoom) allows for real-time virtual communication and project-management-based governance [Borodiienko, O. 2022, p.467]. This reduction in "administrative friction" allows staff to focus on key aspects of interaction with stakeholders.

South Korea: Smart Governance and Autonomy. South Korean schools have leveraged ICT to support "Greater School Autonomy". Randomized natural experiments indicate that schools with higher autonomy, supported by robust data dashboards and tracking systems, show significant improvements in administrative effectiveness. The focus is on the "Triple Helix" collaboration—triple-helix interaction between universities, industry, and schools to ensure that human capital production matches market needs [C. Boafo and U. Dornberger, 2024, p.4].

The Uzbekistan Education Sector Plan (ESP) 2019–2023 identifies that management at the system level was previously sub-optimal due to poor capacity and a lack of specialized training in institutional management for school leaders. Area 7 of the ESP explicitly focuses on supporting education service delivery through "evidence-based policies, programming, and monitoring, facilitated by an EMIS".

The modernization strategy in Uzbekistan includes the creation of a comprehensive EMIS that covers:

- Institutional and Student Information Systems.
- Financial Management Information Systems and payrolls.
- Human Resource Information Systems (HRIS).
- School Inspection and Quality Tracking Systems.

The economic goal of these systems is a consistent increase in real income and job creation by optimizing the allocation of resources and ensuring that budget allocations for the Higher Education and General Secondary sectors reach their intended SDG indicators [ESP Uzbekistan, 2018].

The introduction of ICT into the management structure leads to what is known as the "strategic apex" model, where top managers can directly control the activities of performers via the Internet and internal channels. This removes the need for multiple layers of middle management, creating "network structures" that increase operational speed.

Performance is further enhanced through "Quality Management Systems" (QMS). In the big data era, Business Intelligence (BI) and Internet of Things (IoT) devices provide real-time feedback on resource usage and customer (student/parent) preferences [Cao, Y. and Alyousuf, F. 2025, p.8]. Applying these tools alleviates the challenges of conventional paperwork, augmenting overall effectiveness and allowing for more accurate "What-If" analysis in resource planning.

From a managerial perspective, ICT modernization is an investment that leads to the reduction of operational costs in the long term. Digital records for staff employment, financial transactions, and alumni engagement facilitate easy referencing and swift retrieval. This systematic storage reduces the labor costs associated with traditional administrative duties.

In resource-constrained environments, "materiality analysis" is used to identify where to invest limited time and funds. The synergy between financial orientation and product (service) innovation allows schools to redefine prices for services towards creating higher added value. Digital governance ensures that institutional actions are subject to general principles recognized by all stakeholders. A "Common Information Platform" integrated with ERP tools ensures that correspondence, calendaring, and documents are centralized, making the governance process traceable. Transparency in accounting information is vital for achieving good corporate (institutional) governance, providing a "True View and Fair Value" of the institution's financial health to the state and community.

Quality in education is a multidimensional concept. It is split into the "quality of the educational system as a whole" (strategies, policies) and the "quality of educational services" (modernize curriculum, resource quality). In the market of educational services, competition creates a need for a "marketing orientation".

Service quality is an economic category because it determines institutional reputation and brand image, which in turn attract talented faculty and students, thus enhancing the overall economy of the nation. Metrics like "student satisfaction trends" and "serviceability" are now standard managerial KPIs.

Conclusion

The modernization of school management through ICT is an economic imperative for sustainable development in the 21st century. The comparative analysis shows that high-performing nations have transitioned from bureaucratic, manual administrative models to integrated, data-driven digital ecosystems. Systems like EMIS and ERP are not merely software upgrades; they are structural interventions that redefine the "scalar principle" of hierarchy and empower the "strategic apex" with real-time intelligence.

For countries like Uzbekistan, the implementation of the ESP 2019–2023 represents a "Theory of Change" where ICT integration serves as a value-added management tool. By prioritizing technological facilities, reconstructing laboratories, and investing in EMIS-facilitated research, educational institutions can achieve a synergy between efficiency (resource optimization) and effectiveness (service quality).

Ultimately, innovation in management must be viewed as a transformative process where outdated methods are replaced by those that provide a balanced "value for money" proposition. The integration of BI, IoT, and cloud computing will decide the business success and sustainability of educational institutions in the next fifty years, ensuring they remain resilient in a volatile global market.

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EFFECTIVE METHODS FOR ENHANCING PRIMARY SCHOOL STUDENTS' VOCABULARY DEVELOPMENT

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Abstract. *This article presents a comprehensive theoretical and practical analysis of effective methods for enhancing vocabulary development in primary education. The study substantiates the importance of working with dictionaries, interactive methods, didactic games, visual aids, and innovative approaches. In addition, scientific and practical recommendations have been developed to form students' active vocabulary and to improve their communicative competence.*

Keywords*: vocabulary development, primary education, interactive methods, dictionaries, speech development, didactic games, visual aids.*

Annotatsiya. *Mazkur maqolada boshlang'ich ta'limda o'quvchilarning lug'at boyligini oshirishning samarali metodlari ilmiy-nazariy va amaliy jihatdan kompleks tahlil qilindi. Tadqiqot davomida lug'atlar bilan ishlash, interfaol metodlar, didaktik o'yinlar, vizual vositalar va innovatsion yondashuvlarning ahamiyati asoslab berildi. Shuningdek, o'quvchilarning faol lug'atini shakllantirish va nutqiy kompetensiyasini rivojlantirishga qaratilgan ilmiy-amaliy takliflar ishlab chiqilgan.*

Kalit so'zlar: *lug'at boyligi, boshlang'ich ta'lim, interfaol metodlar, lug'atlar, nutq rivoji, didaktik o'yinlar, vizual vositalar.*

KIRISH. Bugungi globallashuv sharoitida ta'lim tizimida o'quvchilarning nutqiy kompetensiyasini rivojlantirish eng muhim vazifalardan biri sifatida qaralmoqda. Ayniqsa, boshlang'ich ta'lim bosqichida lug'at boyligini oshirish nafaqat til o'rganish jarayonining asosi, balki o'quvchilarning tafakkuri, dunyoqarashi va muloqot

madaniyatining shakllanishida muhim omil hisoblanadi. Keng lug‘at zaxirasiga ega o‘quvchi o‘z fikrini aniq, izchil va mantiqan ifoda eta oladi, bu esa uning keyingi ta’lim bosqichlarida muvaffaqiyatli o‘qishiga xizmat qiladi [3; 1503-b.].

Boshlang‘ich sinflarda lug‘at ustida ishlash jarayoni kompleks xarakterga ega bo‘lib, u o‘quvchining psixologik, kognitiv va lingvistik rivojlanishi bilan uzviy bog‘liqdir. Bu yoshdagi bolalar sezgir, taqlidchan va tasviriy fikrlashga moyil bo‘lganligi sababli lug‘atni o‘rgatishda turli metod va vositalardan foydalanish talab etiladi [7; 97-b.]. Shuningdek, lug‘atlar bilan ishlash o‘quvchilarda mustaqil bilim olish, axborot izlash va uni qayta ishlash ko‘nikmalarini shakllantiradi, bu esa zamonaviy ta’limning muhim talabi hisoblanadi [2; 128-b.]. Shu bois globallashuv sharoitida boshlang‘ich sinflarda lug‘at boyligini oshirish metodlarini qo’llash va takomillashtirish dolzarb hisoblandi.

Mazkur maqolani **maqsadi** boshlang‘ich ta’limda o‘quvchilarning lug‘at boyligini oshirish strategiyalarini aniqlash va samarali metodlarni ilmiy asoslashdir. Ushbu maqsadni amalga oshirish uchun quyidagi **vazifalar** saralab olindi:

- ✓ Lug‘at boyligini oshirishning nazariy asoslarini tahlil qilish;
- ✓ Samarali metod va pedagogik yondashuvlarni aniqlash;
- ✓ O‘quvchilarning lug‘at boyligini rivojlantirish uchun ilmiy-amaliy takliflar ishlab chiqish.

METODOLOGIYA. Tadqiqotda pedagogik kuzatuv, tahlil, sintez, taqqoslash va ilg‘or pedagogik tajribalarni umumlashtirish kabi metodlardan foydalanildi. Shuningdek, zamonaviy pedagogik texnologiyalar, interfaol metodlar va lingvopedagogik yondashuvlar asos qilib olindi.

NATIJA VA MUHOKAMA. Tahlillar natijasida, boshlang‘ich sinf o‘quvchilarining lug‘at boyligini oshirish ko‘p omilli jarayon bo‘lib, quyidagi 10 dan ortiq metodlar (usullar) eng samarali hisoblanadi:

- *Lug‘atlar bilan tizimli ishlash* – O‘quvchilarda lug‘atdan foydalanish ko‘nikmasini shakllantirish ularning mustaqil fikrlashini rivojlantiradi [2; 129-b.]. Mazkur metod o‘quvchilarda axborotni izlash, tahlil qilish va mustaqil o‘zlashtirish kompetensiyasini shakllantiradi. Bu esa zamonaviy ta’lim talablariga mos keladi;
- *Interfaol metodlar* – “Aqliy hujum”, “klaster”, “rol o‘ynash” kabi metodlar nutqiy faollikni oshiradi [5; 680-b.]. Interfaol metodlar o‘quvchini passiv tinglovchidan faol ishtirokchiga aylantirib, kommunikativ kompetensiyaning rivojlanishiga xizmat qiladi;
- *Didaktik o‘yinlar* – O‘yin orqali o‘qitish bolalarning qiziqishini oshiradi va so‘zlarni tez o‘zlashtirishga yordam beradi [6; 1276-b.]. O‘yin texnologiyalari motivatsiyani kuchaytiradi va bilimlarni emotsional muhitda o‘zlashtirish orqali ularning uzoq muddatli xotirada saqlanishini ta’minlaydi;
- *Rasmlar va vizual vositalar* – Tasviriy materiallar orqali o‘quvchilar yangi so‘zlarni tez idrok etadi [4; 108-b.]. Vizual materiallar assotsiativ fikrlashni rivojlantirib, abstrakt tushunchalarni aniq obrazlar orqali o‘zlashtirish imkonini beradi;
- *Matn asosida lug‘at ustida ishlash* – O‘qish darslarida so‘z ma’nosini kengaytirish lug‘at boyligini oshiradi [3; 56-b.]. Matn bilan ishlash o‘quvchilarda kontekstual tushunishni rivojlantirib, so‘zlarning funksional qo‘llanishini anglashga yordam beradi;
- *Sinonim va antonimlar bilan ishlash* – So‘zlarning ma’no qirralarini anglash nutqni boyitadi [5; 681-b.]. Bu metod til birliklari o‘rtasidagi semantik munosabatlarni anglash orqali o‘quvchilarning nutq aniqligi va ifodaliligini oshiradi;
- *Faol va nofaol lug‘atni ajratish* – Nofaol lug‘atdagi so‘zlarni faol nutqqa olib chiqish muhim metod hisoblanadi [5; 682-b.]. Faol lug‘atni kengaytirish o‘quvchilarning real kommunikatsiyada til birliklaridan erkin foydalanish ko‘nikmasini shakllantiradi;

- *Kontekstual o‘qitish* – So‘zlarni kontekstda o‘rganish ularning to‘g‘ri qo‘llanishini ta’minlaydi [1; 186-b.]. Kontekstual yondashuv o‘quvchilarda tilning pragmatik jihatlarini anglashni rivojlantirib, so‘zlarning ma’no nozikliklarini ochib beradi;
- *Bayon va insho orqali mustahkamlash* – Yozma nutq orqali lug‘at boyligi mustahkamlanadi [1; 187-b.]. Yozma faoliyat o‘quvchilarning til birliklarini tizimli qo‘llash ko‘nikmasini shakllantirib, nutqiy kompetensiyani mustahkamlaydi;
- *AKT va innovatsion texnologiyalar* – Zamonaviy texnologiyalar o‘quvchilarning qiziqishini oshiradi [7; 98-b.]. AKT vositalari multimodal o‘qitishni ta’minlab, vizual, audial va interaktiv elementlar orqali lug‘atni o‘zlashtirish samaradorligini oshiradi;
- *Kuzatish va real hayot bilan bog‘lash* – Atrof-muhit bilan bog‘liq o‘qitish lug‘atni tabiiy rivojlantiradi [4; 109-b.]. Real hayot bilan integratsiyalangan ta’lim o‘quvchilarda tajribaga asoslangan bilim hosil qilib, lug‘atning tabiiy va ongli o‘zlashtirilishini ta’minlaydi.

XULOSA. Boshlang‘ich ta’limda lug‘at boyligini oshirish tizimli, ko‘p qirrali va metodik jihatdan puxta tashkil etilgan jarayon bo‘lishi zarur. Umuman olganda, lug‘at ustida ishlash faqatgina so‘z yodlash bilan cheklanmasdan, balki o‘quvchilarning nutqiy faoliyati, tafakkuri va kommunikativ kompetensiyasini rivojlantirishga xizmat qilishi lozim.

Lug‘atlar bilan ishlash, interfaol metodlar, o‘yin texnologiyalari va vizual vositalardan kompleks foydalanish o‘quvchilarning lug‘at boyligini samarali oshiradi. Ayniqsa, faol lug‘atni shakllantirishga qaratilgan metodlar o‘quvchilarning nutqiy mustaqilligini ta’minlaydi.

O’rganuvchida lug’at boyligini yanada oshirish va rivojlantirish uchun quyidagi ilmiy-amaliy takliflar ishlab chiqildi:

- ✓ Lug‘at ustida ishlashni har bir darsning ajralmas qismiga aylantirish;

- ✓ O‘quvchilarda lug‘atdan foydalanish ehtiyojini shakllantirish;
- ✓ Interfaol va innovatsion metodlarni keng joriy etish;
- ✓ Vizual va AKT vositalaridan samarali foydalanish;
- ✓ Faol lug‘atni rivojlantirishga qaratilgan maxsus mashqlar tizimini ishlab chiqish.

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MODERN TEACHING TOOLS USED IN TEACHING PLANT PHYSIOLOGY

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Abstract. This methodology is designed for effective use of virtual technologies in biology teaching, focusing on a practical approach. These methods aim to create interactive and experiential opportunities for students, help them visualize and better understand biological processes, and ease the learning experience. The goal is to create interactive and virtual learning opportunities in biology education, inspire students to study biological processes, and make learning easy, engaging, and experiential through virtual technologies.

Keywords: Biology education, multimedia presentations, higher education, interactive lessons, technology, didactics.

Biology, as the study of the interactions between living organisms and their environment, requires the use of innovative technologies in the educational process. Relying solely on textbooks makes it difficult to fully explain the structure and functions of organs to students. Therefore, when visual materials, diagrams, and three-dimensional virtual models are used in biology lessons, students understand the topic more deeply and retain the information for longer periods. For example, studying cell structure through text can be complex, but visual presentations provide a clearer image to the students.

Currently, using electronic textbooks and multimedia resources is expanding the opportunities for students to work independently. The essence of the new approach is to move away from traditional compulsory teaching methods and base the educational

process on modern pedagogical and information technologies. This helps develop students' critical thinking, independent activities, and teamwork skills.
In the modern educational process, the use of technologies significantly simplifies students' learning process. Especially in subjects like biology, which often involve complex concepts and theories, making the lesson interactive helps provide more effective education for the students.

The advantages of digital technologies over traditional methods are many: the visual presentation of materials, the ability to effectively check knowledge, various organizational forms of student work, and different teaching methods for the educator. Many biological processes are complex, and students with the ability to think abstractly face challenges when studying these abstract concepts. Without images, they cannot understand or study the processes effectively. Their abstract thinking develops through visualizations. Multimedia animation models help students form a holistic view of biological processes, and interactive models allow students to independently design processes, correct mistakes, and monitor their knowledge.
By visualizing the educational material through multimedia presentations, it can be delivered in a more illustrative and comprehensible way. Therefore, organizing biology lessons using multimedia tools in higher education is considered relevant. Multimedia presentations are widely used in biology teaching. They provide the following advantages to teachers and students:

- Simplifies the explanation of complex biological processes using visual materials.
- Presentations enriched with interactive elements ensure active participation from students during lessons.
- The learning process becomes more engaging and understandable.

In biology, when explaining complex biological processes, cell structures, physiological

systems, or ecological relationships, interactive platforms, visual simulations, and virtual laboratories play a key role. These tools not only help students understand but also enable teachers to deliver lesson content effectively. This article discusses the role of digital technologies, particularly interactive platforms, their advantages, use cases, and existing challenges in biology teaching.
Various software tools are used for preparing multimedia presentations. The following tools stand out for their convenience and features:
- Microsoft PowerPoint – the most popular tool, which allows for the addition of various visual materials, graphics, and animations.
- Prezi – offers innovative solutions for dynamic data presentation.
- Camtasia – a video editing tool useful for creating video lessons and visual resources in biology.

Multimedia presentations increase students' knowledge retention levels. These presentations also stimulate students' independent research and creative activities. In subjects like biology, multimedia tools play a vital role in developing students' imagination and analytical thinking abilities. While developing multimedia presentations, it is crucial to consider not only technological possibilities but also didactic principles. These principles play an important role in enhancing the effectiveness of the educational process.

A crucial feature of didactic tools is their ability to incorporate information about the structure of tasks, goals, and interactions with other educational tools. This feature defines the manifestation of integrative functions and the motivational function of this type of educational tool. In the context of organizing independent cognitive activity, the manifestation of these functions is especially significant.

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Integration of a Two-Stage Preclinical and Clinical Diagnostic Algorithm for the Early Detection and Management of Echinococcal Disease

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ABSTRACT

Epidemiological metrics indicate a persistently high regional prevalence of cystic echinococcosis, demanding targeted evaluations of early diagnostic frameworks. The current investigation analyzes the multidimensional dynamics of a novel two-stage preclinical and clinical diagnostic algorithm designed for the early detection of hepatic hydatidosis. The study population comprised 135 individuals residing in endemic zones, systematically monitored over a 36-month period utilizing a prospective cohort design. Empirical clinical data demonstrate a robust inverse correlation between the implementation of the two-stage protocol (combining high-sensitivity serological screening with targeted ultrasonographic volumetry) and the incidence of advanced-stage disease presentation. Analytical outputs confirm that this targeted profiling optimizes diagnostic accuracy, yielding a cumulative sensitivity of 94.8 percent and a specificity of 92.3 percent, compared to 76.5 percent diagnostic accuracy in the standard symptomatic observation cohort. The dynamics of the obtained results mandate an

urgent paradigm shift from passive clinical observation toward active, biomarker-driven preclinical screening. Patients subjected to the novel algorithmic approach exhibited a significantly higher rate of early-stage (CE1 and CE2) detection (82.3 percent versus 35.8 percent) and a corresponding reduction in the necessity for radical surgical interventions. These findings bridge persistent literature gaps by validating a comprehensive diagnostic interaction model, establishing a rigorous foundation for future preventive strategies in clinical parasitology.

Keywords: Cystic echinococcosis, two-stage diagnostic algorithm, Antigen B, early detection, hepatic hydatid cyst, WHO-IWGE classification, serological screening.

INTRODUCTION

Current epidemiological landscapes illustrate a trajectory where human cystic echinococcosis progressively undermines public health infrastructure in agricultural and endemic zones of Central Asia. The focal point of contemporary diagnostic challenge lies in the unpredictable asymptomatic chronicity of early-stage parasitic proliferation. A systematic review of international literature exposes a definitive scientific gap regarding standardized protocols capable of identifying hydatid cysts prior to gross anatomical distortion and complex capsular fibrosis.

Within the scope of the research object, this investigation targets the precise diagnostic windows occurring before the development of irreversible parenchymal compression. Traditional reliance on incidental sonographic discovery or late-onset symptomatic presentation frequently results in delayed, highly invasive therapeutic interventions. The primary objective is to delineate the correlative strength between a sequential two-stage preclinical-to-clinical diagnostic algorithm and the geometric reduction of late-stage surgical morbidity, proposing a highly effective screening alternative for high-risk demographics.

MATERIALS AND METHODS

The structural architecture of this study was established as a prospective cohort analysis, strictly adhering to the ethical mandates of the Declaration of Helsinki. The sample population was actively screened and evaluated between January 2022 and December 2025.

Inclusion criteria mandated individuals residing in established endemic agricultural zones presenting with either subclinical serological anomalies or early, vague abdominal discomfort. The validated cohort consisted of 135 subjects, divided into an Algorithm Group (n=68) managed via the novel two-stage protocol, and a Control Group (n=67) undergoing standard symptom-driven clinical evaluation.

The two-stage protocol initiated with Preclinical Stage 1: quantitative Enzyme-Linked Immunosorbent Assay (ELISA) targeting Echinococcus granulosus Antigen B (AgB), combined with absolute peripheral eosinophil counts. Positive or borderline biochemical results instantly triggered Clinical Stage 2: high-resolution abdominal ultrasonography strictly adhering to the WHO-IWGE (World Health Organization Informal Working Group on Echinococcosis) classification framework. Contrast-enhanced computed tomography (CT) was utilized solely for ambiguous anatomic relations. The Kolmogorov-Smirnov test evaluated data distribution normality. Subsequent mathematical comparisons utilized Student's t-test for continuous variables and Chi-square analysis for categorical shifts. Statistical thresholds were established strictly at $p < 0.05$, utilizing the SPSS v.26.0 computational environment.

RESULTS

Baseline demographic assessments revealed absolute statistical homogeneity between the cohorts (mean age 42.6 +/- 9.4 years, comparable occupational risk profiles). The observational vector, however, revealed a severe divergence in diagnostic staging and subsequent management complexity.

Serological evaluation in the Algorithm Group identified pre-symptomatic Antigen B elevation in 41 subjects who otherwise lacked distinct clinical indicators, prompting immediate Stage 2 imaging. This proactive screening successfully isolated active, early-stage cysts (CE1 and CE2, mean diameter 3.8 +/- 1.2 cm) in 82.3 percent (n=56) of the cohort. Conversely, the Control Group primarily presented with mature or complicated CE3/CE4 cysts (mean diameter 8.5 +/- 2.1 cm). Early-stage detection in the control arm was limited strictly to 35.8 percent (n=24) ($p < 0.01$).

The cumulative diagnostic sensitivity of the two-stage algorithm reached 94.8 percent. The dynamics of the obtained results directly translated into optimized therapeutic pathways. Consequently, the reliance on high-risk radical surgical resections (such as formal hepatectomy or total pericystectomy) dropped strictly to 11.7 percent (n=8) in the Algorithm Group, compared to 46.2 percent (n=31) in the standard care cohort ($p = 0.003$). Minimally invasive interventions (PAIR technique) combined with conservative albendazole therapy were successfully and safely implemented in 75 percent of the early-detection arm.

DISCUSSION

The findings from this cohort provide an uncompromising view into the pathophysiological mechanisms driving asymptomatic parasitic expansion. The resulting data fundamentally challenge the passive diagnostic protocols traditionally applied in endemic regions.

This functional superiority is grounded in the temporal synchronization of serological mapping with morphological imaging. Antigen B represents a highly specific, immunogenic lipoprotein complex secreted actively during the early oncosphere proliferation phase. Identifying this biomarker prior to massive endocystic fluid accumulation disrupts the natural geometric progression of the disease. The synergy between Stage 1 biochemical screening and Stage 2 precise ultrasonographic

grading minimizes the margin of error associated with conventional frameworks. By avoiding diagnostic delays, the proposed algorithm prevents the host's excessive fibrotic response, thereby maintaining the cyst wall's microvascular permeability. This anatomical preservation is critical, as it allows maximum penetration of conservative anthelmintic pharmacotherapy, rendering invasive open surgery unnecessary in the vast majority of early-detected cases.

SCIENTIFIC NOVELTY AND PRACTICAL SIGNIFICANCE

For the first time in regional hepatobiliary practice, this study mathematically quantifies the precise clinical advantage of integrating highly specific Antigen B serology with targeted WHO-IWGE sonographic grading as a unified, sequential pathway. Practical application of these insights demands the immediate integration of the described two-stage protocol into routine primary care screening algorithms for populations in endemic agricultural zones. This methodological pivot definitively eliminates the chronicity of undetected parasitic growth and optimizes long-term therapeutic trajectories, shifting the burden from tertiary surgical care back to primary preventive medicine.

CONCLUSION

The structural preservation of the hepatic parenchyma in cystic echinococcosis is inextricably linked to the velocity of primary diagnosis. The analytical parameters derived from this prospective cohort confirm that the proposed two-stage preclinical and clinical algorithm acts as an absolute catalyst for early detection while remaining highly cost-effective for regional healthcare infrastructure. Prioritizing this combined diagnostic intervention will substantially reduce late-stage surgical complications and neutralize chronic morbidity risks, redefining the fundamental standard for the prophylactic management of human echinococcal disease.

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TABLE OF CONTENTS | СОДЕРЖАНИЕ