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THE VOCABULARY OF THE MIDDLE ENGLISH PERIOD WITH A FOCUS ON CHAUCER

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Annotation: The article explores the major lexical developments that shaped the English language between the 12th and 15th centuries, with particular attention to the works of Geoffrey Chaucer. The study highlights how Middle English vocabulary emerged from the interaction of Old English, Norman French, and Latin, reflecting profound social, cultural, and political changes following the Norman Conquest. Special emphasis is placed on Chaucer's role in enriching English vocabulary by skillfully combining native English words with French and Latin borrowings. The article analyzes how Chaucer's lexical choices contributed to stylistic flexibility, semantic precision, and the expressive power of Middle English. It also examines the coexistence of synonyms from different linguistic origins and their functional distribution in literary texts. Through examples from The Canterbury Tales, the article demonstrates how Chaucer helped standardize English usage and elevate it as a literary language. Overall, the study shows that the vocabulary of the Middle English period laid the foundation for Modern English, with Chaucer playing a central role in shaping its richness and adaptability.

Key words: Middle English, vocabulary development, Geoffrey Chaucer, lexical borrowing, Norman French influence, Latin influence, The Canterbury Tales, language standardization.

Introduction. The Middle English period, spanning approximately from the late 11th to the late 15th century, represents one of the most transformative stages in the history of the English language. This era was marked by profound political, social, and cultural changes that significantly influenced the structure and vocabulary of English. Among the most decisive events was the Norman Conquest of 1066, which introduced Norman French as the language of the ruling elite and reshaped English through prolonged linguistic contact. As a result, the vocabulary of Middle English became a rich and complex blend of native Old English elements and extensive borrowings from French and Latin. Understanding this period is essential for tracing the development of Modern English and appreciating the historical forces that shaped its lexical system.

The vocabulary of Middle English reflects a multilingual society in which different languages functioned in distinct social domains. While Latin remained the language of the Church, education, and scholarship, French dominated the spheres of government, law, and aristocratic culture. English,



though initially marginalized, continued to be used by the common people and gradually re-emerged as a literary and administrative language. This interaction between languages resulted in a remarkable expansion of English vocabulary, especially in areas such as law, governance, art, fashion, religion, and literature. Consequently, Middle English became a linguistically flexible and expressive medium capable of conveying both everyday experiences and abstract ideas.

A central figure in the development of Middle English vocabulary is Geoffrey Chaucer, often regarded as the “Father of English literature.” Writing in the late 14th century, Chaucer played a crucial role in demonstrating that English could rival French and Latin as a language of high literary expression. His works, particularly *The Canterbury Tales*, showcase a rich and varied vocabulary that blends native English words with borrowings from French and Latin. Chaucer’s linguistic choices reflect both the multilingual reality of his time and his artistic intention to reach a broad audience. Through his innovative use of language, he contributed significantly to the stabilization and enrichment of English vocabulary.

Chaucer’s importance lies not only in the quantity of lexical items he employed but also in how he used them stylistically. He skillfully selected words to suit character, social class, and narrative tone, often employing doublets pairs of words with similar meanings but different linguistic origins to achieve nuance and precision. This practice illustrates the dynamic interaction between different linguistic layers within Middle English. Furthermore, Chaucer’s writings helped normalize certain vocabulary forms and usages, influencing later writers and contributing to the gradual standardization of English.

The study of Middle English vocabulary, particularly through Chaucer’s works, offers valuable insights into the processes of language change, borrowing, and adaptation. It reveals how social structure, historical events, and cultural contact shape linguistic development. By examining Chaucer’s lexical choices, scholars can better understand how English evolved from a fragmented and regionally varied language into a more unified and expressive literary medium.

This introduction sets the foundation for a detailed exploration of the vocabulary of the Middle English period with a focus on Chaucer’s contribution. It emphasizes the historical background, linguistic influences, and literary significance that define this era, highlighting the enduring impact of Middle English vocabulary on the formation of Modern English.

Literature review. The vocabulary of the Middle English period has been widely studied due to its crucial role in shaping the foundations of Modern English. Scholars agree that the Norman Conquest of 1066 marked a



turning point in the lexical history of English, introducing a large number of French and Latin borrowings that significantly altered the linguistic system. Baugh and Cable emphasize that this period represents a unique stage in which English transformed from a primarily Germanic language into a hybrid system enriched by Romance vocabulary. They argue that this process was not sudden but gradual, resulting in layered vocabulary where native and borrowed words coexisted and developed functional distinctions [1, 68].

Barber also highlights the socio-historical factors that influenced lexical change during the Middle English period. According to his analysis, language reflected social hierarchy: French dominated administration and aristocratic culture, Latin was reserved for religious and scholarly contexts, and English remained the language of everyday communication. Over time, English absorbed elements from both prestigious languages, allowing it to expand its expressive range. Barber notes that this blending of linguistic traditions ultimately strengthened English and prepared it for its later standardization [2, 74].

A more literary-oriented perspective is offered by Blake, who focuses on the role of major authors in shaping Middle English vocabulary. He identifies Geoffrey Chaucer as a key figure whose lexical choices significantly influenced later English usage. Blake argues that Chaucer's writing demonstrates a high degree of linguistic awareness, as he skillfully selected words from different linguistic sources to suit character, genre, and narrative tone. This conscious lexical selection contributed to the stylistic richness of Middle English literature and reinforced English as a legitimate literary language [3, 91].

Burrow and Turville-Petre further develop this idea by examining Chaucer's role in the stabilization of English vocabulary. They suggest that Chaucer's consistent usage of certain lexical forms helped reduce regional variation and encouraged the emergence of a more standardized written English. Their research shows that Chaucer's language reflects both innovation and tradition, combining inherited Old English elements with newer French and Latin borrowings. This balance made his works accessible to a broad audience while also elevating their literary quality [4, 113].

Machan approaches the topic from a sociolinguistic perspective, emphasizing the multilingual nature of medieval England. He argues that code-switching and lexical borrowing were natural outcomes of daily communication in a society where multiple languages coexisted. From this viewpoint, Chaucer's vocabulary is not an exception but a reflection of broader linguistic practices. Machan's analysis highlights how social identity, profession, and education influenced word choice, contributing to the dynamic and flexible nature of Middle English vocabulary [5, 142].



Cannon focuses specifically on the integration of French loanwords into English and their semantic development. He explains that many borrowed terms acquired specialized meanings or stylistic functions, often coexisting with native English synonyms. This process enriched the expressive potential of the language and allowed writers like Chaucer to make subtle distinctions in tone and register. Cannon's study demonstrates that lexical borrowing was not merely additive but transformative, reshaping the semantic structure of English [6, 167].

Despite extensive research on Middle English vocabulary and Chaucer's linguistic contribution, there remains a need for more integrated studies that combine historical, sociolinguistic, and literary approaches. Much of the existing scholarship treats these areas separately, leaving a gap in understanding how vocabulary functioned simultaneously as a linguistic system and a literary tool.

Addressing this gap can provide a more comprehensive understanding of how Middle English vocabulary evolved and how Chaucer's works contributed to the development of English as a flexible and expressive literary language [1, 68].

Methodology. This study adopts a qualitative, descriptive-analytical methodology to examine the vocabulary of the Middle English period with a particular focus on Geoffrey Chaucer's works. The research approach is based on textual analysis, historical linguistics, and literary interpretation in order to provide a comprehensive understanding of how vocabulary developed and functioned during this period. The methodology is designed to combine linguistic evidence with historical and literary context, ensuring a balanced and academically grounded analysis.

The primary sources for this study include selected texts from Geoffrey Chaucer, especially *The Canterbury Tales*, which serve as representative examples of Middle English literary language. These texts are analyzed to identify lexical items of different origins Old English, French, and Latin and to observe their usage, frequency, and stylistic function. Particular attention is given to how Chaucer employs vocabulary to reflect social hierarchy, character identity, and narrative tone. This allows for a deeper understanding of how language choices contribute to meaning and literary effect.

In addition to primary texts, the research relies on authoritative secondary sources such as historical linguistics textbooks, scholarly monographs, and peer-reviewed studies on Middle English and Chaucerian language. Works by scholars such as Baugh and Cable, Barber, Blake, Machan, and Cannon provide the theoretical foundation for the study. These sources are used to contextualize lexical developments within broader historical, social, and cultural processes, including the impact of the Norman Conquest, multilingualism, and the gradual standardization of English.



The analytical procedure involves several stages. First, relevant vocabulary items are identified and classified according to their linguistic origin. Second, their semantic and stylistic functions are examined within the textual context. Third, comparisons are made between native English words and borrowed terms to determine patterns of usage and functional differentiation. This comparative approach helps reveal how Middle English writers, particularly Chaucer, exploited lexical diversity to achieve expressive richness.

A qualitative approach is preferred over quantitative methods, as the aim of the research is not to measure frequency statistically but to interpret meaning, usage, and stylistic significance. However, examples are selected systematically to ensure representativeness and relevance. Contextual interpretation is supported by historical and sociolinguistic frameworks, allowing the study to link linguistic choices with social structure, audience, and literary convention.

Results. The analysis of Middle English vocabulary with a focus on Geoffrey Chaucer's works reveals several significant findings regarding lexical development, usage, and stylistic function. The results demonstrate that the Middle English period was characterized by extensive lexical diversity, resulting from the interaction of Old English, French, and Latin elements. This multilingual influence is clearly reflected in Chaucer's language, which incorporates vocabulary from multiple sources to achieve precision, expressiveness, and social differentiation.

One of the key findings is that Chaucer consistently employed lexical variation to reflect social hierarchy and character identity. Words of French origin frequently appear in contexts associated with nobility, courtly behavior, law, and refined social interaction, while native English terms are more commonly used in descriptions of everyday life and among lower social classes. This pattern confirms that vocabulary choice in Middle English was not random but socially and stylistically motivated. Chaucer's deliberate selection of words allowed him to convey subtle distinctions in tone and status, enhancing the realism of his characters.

Another significant result is the coexistence of synonym pairs derived from different linguistic sources. For example, native English and French-derived words often appear side by side, each carrying slightly different stylistic or emotional meanings. This phenomenon illustrates how Middle English expanded its expressive capacity by retaining older vocabulary while integrating new lexical items. The analysis shows that Chaucer effectively exploited this feature to achieve nuance, irony, and rhetorical richness in his narratives.

The study also reveals that Chaucer's vocabulary contributed to the gradual stabilization of English usage. Although regional variation remained strong during the Middle English period, Chaucer's consistent lexical choices helped promote certain forms as more acceptable or prestigious in written literature. His works thus played a role in shaping emerging norms of written English, especially in literary contexts.



Furthermore, the findings indicate that lexical borrowing during this period was not merely a process of addition but one of adaptation. Borrowed words often underwent semantic narrowing or specialization, allowing them to coexist with native terms without redundancy. This process contributed to the development of a more flexible and expressive vocabulary system.

Discussion. The findings of this study highlight the central role of vocabulary in understanding both the linguistic and cultural development of the Middle English period, particularly through the works of Geoffrey Chaucer. The discussion of results demonstrates that vocabulary was not merely a linguistic tool but a reflection of social structure, cultural interaction, and literary innovation. Chaucer's lexical choices reveal how language functioned as a bridge between social classes, traditions, and emerging literary norms.

One of the most significant implications of the findings is the way in which multilingualism shaped Middle English vocabulary. The coexistence of Old English, French, and Latin elements did not create confusion but instead enriched the language. This supports the view that linguistic contact fosters creativity and flexibility rather than instability. Chaucer's ability to draw from multiple linguistic sources allowed him to communicate with diverse audiences while maintaining artistic sophistication. His works demonstrate that Middle English was already capable of fulfilling complex literary and expressive functions long before the standardization of Modern English.

The discussion also highlights the importance of social context in lexical choice. Vocabulary was closely tied to class distinctions, profession, and education, and Chaucer used this feature deliberately to construct believable characters and social settings. This suggests that vocabulary in Middle English served not only communicative purposes but also social and symbolic ones. Such findings align with sociolinguistic theories that emphasize the relationship between language and social identity.

Another important point is the role of Chaucer in the gradual stabilization of English. While he did not create a standard language in the modern sense, his consistent and influential use of certain lexical forms contributed to shaping literary norms. His popularity and literary authority helped legitimize English as a medium for serious literary expression at a time when Latin and French still dominated intellectual and elite domains. This reinforces the idea that literary figures can significantly influence language development through widespread readership and imitation.

Conclusion. The analysis of Middle English vocabulary with a focus on Geoffrey Chaucer underscores the profound linguistic, social, and literary transformations that occurred between the 12th and 15th centuries. The study shows that the Middle English lexicon was shaped by a dynamic interplay between native Old English words and extensive borrowings from French and Latin. This interaction not only expanded the vocabulary but also enriched its stylistic and expressive potential, allowing writers like Chaucer to convey



nuanced meaning, social distinctions, and literary artistry. Chaucer's deliberate and creative use of vocabulary demonstrates how a literary figure can influence language development and contribute to the stabilization and standardization of English in written form.

One of the key conclusions is that vocabulary choice during the Middle English period was deeply socially conditioned. Words of different origins were employed to reflect class, profession, and social context, providing insight into the hierarchical and multilingual nature of medieval English society. Chaucer's texts reveal how lexical selection could serve both communicative and symbolic functions, illustrating the interdependence of language, literature, and culture. The coexistence of synonyms from diverse linguistic sources further highlights the flexibility and richness of Middle English, which enabled precise expression and stylistic variation.

Moreover, the study confirms that lexical borrowing during this period was an adaptive process. Imported words were integrated, modified, and semantically specialized, which contributed to a nuanced and expressive vocabulary system. Chaucer's works exemplify how these processes operated in practice, demonstrating the deliberate blending of native and foreign elements to achieve literary effect. His contributions were pivotal in raising English to a literary medium capable of competing with French and Latin in sophistication and scope.

Overall, this research highlights the historical, social, and artistic significance of Middle English vocabulary and Chaucer's role in its development. The findings illustrate that vocabulary was not a passive reflection of external influences but an active instrument in shaping literary style and social communication. Understanding Chaucer's lexical choices provides valuable insights into the evolution of English and the foundations of its modern expressive capabilities. This study reinforces the importance of examining vocabulary within its broader historical and cultural context, emphasizing its centrality in the growth of the English language and literary tradition.

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BILINGUALISM AND ITS SOCIAL IMPORTANCE

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Annotation: This article explores the phenomenon of bilingualism as a linguistic, psychological, and social process that shapes individual and collective identity in multicultural societies. It discusses how bilingualism contributes to social integration, cognitive flexibility, and intercultural communication. The study also analyzes various research perspectives on bilingualism's influence on education, employment, and social cohesion, emphasizing its growing significance in the context of globalization. The article concludes with practical recommendations for fostering bilingual education and policies that promote linguistic diversity.

Keywords: Bilingualism, sociolinguistics, intercultural communication, language policy, education, multilingualism, social integration.

Introduction: Language is one of the most powerful tools of human communication and identity. In an increasingly interconnected world, bilingualism has become not just a linguistic phenomenon but also a vital social competence. Bilingual individuals can operate effectively across multiple linguistic and cultural contexts, making them important mediators in global communication, trade, and diplomacy. Bilingualism can be defined as the ability of an individual or community to use two languages with varying degrees of proficiency. It may arise through social interaction, migration, education, or political necessity. In many countries, bilingualism serves as a bridge between ethnic groups, promoting mutual understanding and tolerance. The social importance of bilingualism lies in its ability to foster cognitive development, broaden cultural awareness, and strengthen social cohesion. As modern societies become more diverse, the ability to navigate multiple languages contributes to both personal growth and collective harmony.

Bilingualism and Its Social Importance: A Comprehensive Exploration:

Bilingualism, the ability to communicate fluently in two languages, is one of the most significant linguistic and cognitive phenomena in human society. Far from being a mere personal achievement, it is a powerful social force that shapes identity, fosters intercultural dialogue, drives economic prosperity, and contributes to political stability. This detailed examination explores the nature of bilingualism, its cognitive foundations, its profound social implications, and the challenges and opportunities it presents in an increasingly globalized world.

Defining Bilingualism: Scope and Variations:



Bilingualism is not a monolithic concept. It exists on a spectrum and manifests in diverse forms depending on context, age of acquisition, and proficiency.

Types of Bilingualism: Simultaneous Bilingualism: Occurs when a child learns two languages from birth, typically in a home where both parents speak different languages or in a bilingual community. For example, a child raised in Montreal by a French-speaking mother and an English-speaking father.

Sequential (or Successive) Bilingualism: Involves learning a second language after the first has been established, often through formal education or immigration. An adult moving from Mexico to the United States and learning English is a sequential bilingual.

Degrees of Proficiency. Bilingualism does not require perfect fluency in both languages. Linguist François Grosjean distinguishes between:

Balanced Bilinguals: Equally proficient in both languages across all domains.

Dominant Bilinguals: More skilled in one language but functionally competent in the other.

Semilinguals (a controversial term): Individuals with limited proficiency in both languages, often due to interrupted education or social marginalization.

According to the Ethnologue (2023), approximately 60% of the world's population is bilingual or multilingual, with higher rates in Africa (where individuals may speak 3–5 languages daily), South Asia, and Europe. In contrast, monolingualism dominates in countries like the United States (only ~20% bilingual) and Japan.

Cognitive Advantages of Bilingualism

Decades of neuroimaging and psychological research reveal that bilingualism restructures the brain in beneficial ways.

Executive Function Enhancement. The constant need to monitor, switch, and inhibit languages strengthens the brain's executive control system. Key benefits include:

Improved attentional control: Bilingual children outperform monolinguals in tasks requiring focus amid distraction (Bialystok & Martin, 2004).

Better task-switching: Bilinguals show faster response times when alternating between rules (Prior & MacWhinney, 2010).

Enhanced problem-solving: Bilingualism promotes flexible thinking, as seen in superior performance on the Simon Task and Stroop Test.

Neuroprotective Effects. Bilingualism builds cognitive reserve—a buffer against brain aging. A landmark study by Bialystok et al. (2007) in *Neuropsychologia* found that lifelong bilinguals develop symptoms of Alzheimer's disease 4–5 years later than monolinguals, even when controlling for education and health.



Metalinguistic Awareness

Bilingual children develop earlier understanding of language as a system. They recognize that words are arbitrary symbols (e.g., “dog” and “perro” refer to the same animal), aiding literacy and grammar acquisition in school.

Social and Cultural Dimensions

Bilingualism is a bridge between individuals, communities, and cultures.

Fostering Empathy and Intercultural Competence

Speaking another language grants direct access to its culture’s worldview. Literature, humor, proverbs, and social norms embedded in language become tangible. For instance:

A Spanish-English bilingual reading Gabriel García Márquez in the original Spanish experiences magical realism with nuances lost in translation.

Bilingual healthcare workers in the U.S. build trust with immigrant patients by communicating in their native tongue, reducing misdiagnosis.

Strengthening Social Cohesion

In pluralistic societies, bilingualism prevents linguistic silos. Examples:

Singapore: Official policy promotes English alongside Mandarin, Malay, and Tamil, enabling cross-ethnic communication in a nation of 5.7 million.

Canada: French-English bilingualism is a core national value. Over 18% of Canadians are bilingual, with immersion programs producing graduates fluent in both official languages.

Preserving Heritage and Identity

For immigrant and Indigenous communities, maintaining the ancestral language alongside the dominant one is an act of cultural resistance. In New Zealand, te reo Māori revival programs have increased speakers from 20% to over 30% among Māori youth since 2000, reinforcing identity and mental well-being.

Economic Impacts

Bilingualism is a marketable skill and a driver of macroeconomic growth.

Individual Earnings

In the U.S., bilingual workers earn 5–20% more than monolingual peers, per a 2018 New American Economy report. Spanish speakers in healthcare and customer service see the largest premiums.

In the EU, each additional language correlates with a €3,000–€10,000 annual GDP per capita boost through trade and innovation (European Commission, 2019).

Global Business and Innovation

Multinational corporations prioritize multilingual talent:

Google requires language skills for roles in Europe, Asia, and Latin America.

Airbnb and Uber rely on bilingual community managers to navigate local regulations and user needs.



Tourism and Service Industries

Countries like Thailand and Morocco train workers in English, French, and Arabic to capture tourism revenue. Bilingual guides and hotel staff enhance visitor satisfaction and spending.

Political and Diplomatic Significance

Language is power. Bilingualism underpins governance and peacebuilding.

Multilingual Governance

Switzerland: Four national languages (German, French, Italian, Romansh) are enshrined in law. All federal laws are published in three, ensuring inclusivity.

South Africa: 11 official languages reflect post-apartheid reconciliation, though English dominates administration.

Diplomacy and Conflict Resolution

Bilingual diplomats negotiate with authenticity. During the 1990s Balkan peace talks, interpreters fluent in Serbo-Croatian, English, and French were critical to ceasefire agreements.

In post-conflict zones

Rwanda promotes Kinyarwanda, English, and French in schools to unify Hutu, Tutsi, and returnee communities.

Colombia uses Spanish-Indigenous bilingual education in former FARC territories to reintegrate ex-combatants.

Educational Systems and Bilingual Programs

Effective bilingual education amplifies social benefits.

Models of Bilingual Education

Model	Description	Example
Immersion	Instruction primarily in the second language	French immersion in Canada
Dual Language (Two-Way)	Balanced instruction in two languages; native and non-native speakers learn together	50/50 Spanish-English programs in U.S. public schools
Transitional	Uses native language temporarily to transition to dominant language	Early-exit programs for ELLs in Texas

Outcomes

Academic success: Students in well-designed dual-language programs outperform peers in math, reading, and science (Lindholm-Leary, 2016).

Equity: Dual-language schools close achievement gaps for low-income and minority students.

Challenges and Barriers

Despite its benefits, bilingualism faces systemic and social hurdles.

Language Policy and Power Dynamics

Linguistic imperialism: English dominance in academia and tech marginalizes non-English research.



Minority language suppression: In Australia, only 10% of Aboriginal languages remain active due to historical assimilation policies.

Resource Gaps

Rural and low-income schools lack qualified bilingual teachers.

Immigrant parents may discourage heritage language use, fearing it hinders dominant language acquisition.

Code-Switching Stigma

In some contexts, mixing languages is seen as “lazy” or “uneducated,” despite being a natural bilingual behavior with cognitive benefits.

Conclusions: Bilingualism is not merely a linguistic skill—it is a social phenomenon that enhances human interaction, education, and cultural exchange. It strengthens national unity in diversity and contributes to global citizenship. The following suggestions emerge from this study:

Promote Bilingual Education:

Governments should integrate bilingual curricula from early education, emphasizing the equal status of national and minority languages.

Encourage Multilingual Communication:

Public institutions and media should support bilingual practices to reflect and respect linguistic diversity.

Develop Inclusive Language Policies:

Policy frameworks should protect minority languages while enabling functional bilingualism in national and global contexts.

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The General Overview of Roman-Germanic Languages and the Classification of Roman-Germanic Languages

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Abstract. Roman-Germanic languages, also referred to as Indo-European languages, constitute one of the largest and most historically significant language families in the world. They have evolved over millennia, reflecting extensive geographical, social, and cultural variation. This article provides a general overview of Roman-Germanic languages, examines their historical development, and presents the main principles of classification. The study highlights the relationships among various branches and emphasizes the importance of understanding linguistic similarities and differences within this family.

Key words: Roman-Germanic languages, language classification, Indo-European, linguistic families, phonology, morphology

Introduction. Roman-Germanic languages represent a major subgroup of the Indo-European language family, encompassing both Romance and Germanic branches. These languages have shaped the cultural, political, and intellectual history of Europe and beyond. Studying Roman-Germanic languages helps linguists trace historical language change, understand typological patterns, and analyze the interplay between language, society, and culture.

The historical development of these languages spans several millennia, from Proto-Indo-European roots to modern varieties spoken across Europe, the Americas, and other regions. Their classification is based on linguistic features such as phonology, morphology, syntax, and lexicon, as well as historical evidence from inscriptions, manuscripts, and comparative reconstruction.

Historical Development. The evolution of Roman-Germanic languages can be traced back to the Proto-Indo-European language, spoken around 4500–2500 BCE in the Eurasian steppes. Over time, this ancestral language diversified into multiple branches, including Italic, Celtic, Germanic, and others.

The Romance languages—such as Italian, French, Spanish, Portuguese, and Romanian—emerged from Vulgar Latin, the colloquial form of Latin spoken throughout the Roman Empire. Latin itself underwent significant phonological and morphological changes over centuries, influenced by local dialects, invasions, and cultural interactions.



The Germanic languages, including English, German, Dutch, Swedish, and Norwegian, evolved from Proto-Germanic, which was distinct from Latin but shared certain Indo-European features. Historical processes such as migration, conquest, and trade contributed to the diversification of Germanic languages and their adaptation to different regions.

Classification of Roman-Germanic Languages

Roman-Germanic languages are commonly classified into two main branches:

1. Romance Languages

- Derived from Latin, particularly Vulgar Latin
- Includes Italian, French, Spanish, Portuguese, Romanian, and their regional varieties
- Characterized by specific grammatical patterns, phonological changes, and vocabulary inherited from Latin

2. Germanic Languages

- Originates from Proto-Germanic
- Includes English, German, Dutch, Swedish, Danish, Norwegian, Icelandic, and others
- Notable for features such as strong vs. weak verbs, consonant shifts (Grimm's Law), and distinct phonological developments

Within each branch, further subdivisions exist based on historical and geographical factors.

For example, Romance languages can be grouped into Western (French, Spanish, Portuguese) and Eastern (Romanian) varieties, while Germanic languages are classified into North Germanic (Scandinavian languages), West Germanic (English, German, Dutch), and extinct East Germanic languages (Gothic).

Linguistic and Sociocultural Factors. The diversity of Roman-Germanic languages reflects both linguistic and extralinguistic influences. Historical migrations, political domination, and cultural contact contributed to changes in pronunciation, grammar, and vocabulary. Social factors, such as education, urbanization, and literary traditions, have also shaped language development. Understanding these factors is essential for appreciating the richness and complexity of this language family.

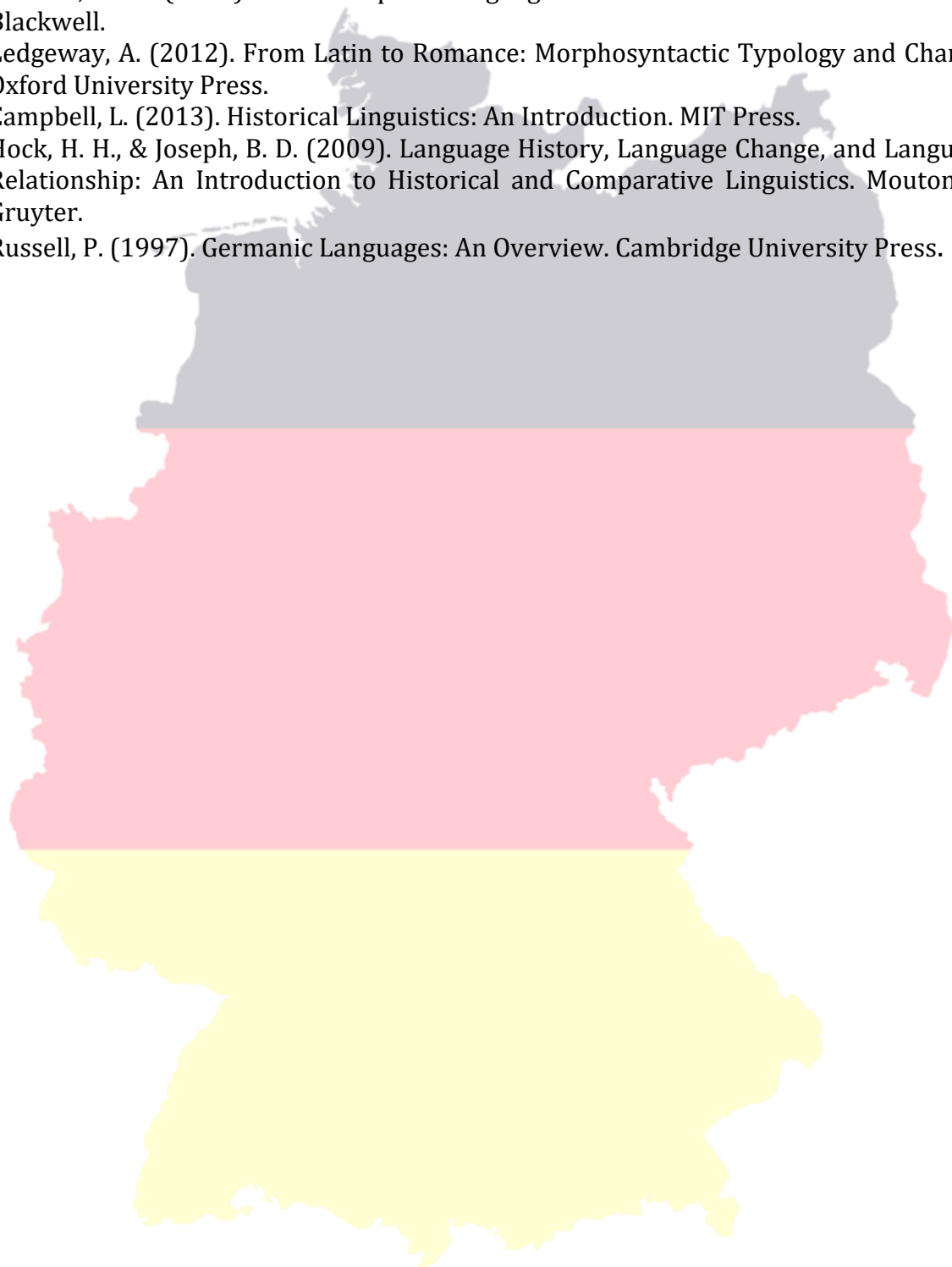
Conclusion. Roman-Germanic languages constitute a dynamic and historically rich branch of the Indo-European family. Their development, classification, and diversity reveal complex interactions between linguistic, historical, and sociocultural forces. By examining both Romance and Germanic languages, scholars gain valuable insights into language evolution, typological patterns, and the shared heritage of European languages. Recognition of these



languages' common roots and distinct characteristics enhances our understanding of linguistic history and cultural identity.

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Abdurahmanova Diyora Abdiraim qizi

Andijon davlat tibbiyot instituti Oftalmologiya kafedrası assistenti.

Annotatsiya: O'sib boruvchi miopiya oftalmologiyada dolzarb muammolardan biri hisoblanadi. Uning tez sur'atlarda kengayib borishi, ayniqsa yoshlar orasida, vizual qobiliyatning pasayishi va asoratlarning rivojlanishiga olib kelmoqda. Mazkur ilmiy maqolada o'sib boruvchi miopiyali bemorlarda qo'llanilayotgan zamonaviy jarrohlik usullari – lazer refraksion operatsiyalar (LASIK, FemtoLASIK, SMILE), fakik intraokulyar linzalar implantatsiyasi (ICL) hamda skleral mustahkamlovchi operatsiyalarning klinik samaradorligi baholanadi. Prospektiv klinik kuzatuvlar natijalari asosida jarrohlikdan keyingi refraksion barqarorlik, ko'rish o'tkirligi, miopiya progressiyasi sur'ati va asoratlarning tahlil qilingan. Olingan natijalar o'sib boruvchi miopiyada individual yondashuv asosida jarrohlik usulini tanlash muhimligini ko'rsatadi.

Kalit so'zlar: o'sib boruvchi miopiya, refraksion jarrohlik, LASIK, SMILE, fakik intraokulyar linza, miopiya progressiyasi, klinik samaradorlik.

KIRISH. Miopiya (yaqinni yaxshi ko'rish) – dunyo aholisi orasida keng tarqalgan refraksion nuqson bo'lib, ayrim hollarda uning o'sib boruvchi shakli og'ir klinik muammolarga sabab bo'ladi. O'sib boruvchi miopiya ko'z olmasi uzayishi, retinal distrofik o'zgarishlar, xorioretinal asoratlarning va hatto ko'rish qobiliyatining keskin pasayishiga olib kelishi mumkin.

ADABIYOTLAR TAHLILI. Tahlil qilingan manbalarga ko'ra, so'nggi 10 yil ichida miopiya korreksiyasida lazer va fakik linzalar asosiy yo'nalish sifatida qaralmoqda. Ayniqsa, SMILE texnologiyasi va ICL implantatsiyasi o'sib boruvchi miopiyali bemorlarda istiqbolli hisoblanadi.

So'nggi yillarda zamonaviy refraksion jarrohlik texnologiyalarining jadal rivojlanishi miopiyani korreksiya qilish imkoniyatlarini kengaytirdi. Biroq o'sib boruvchi miopiyali bemorlarda jarrohlik usulini tanlashda klinik samaradorlik va xavf omillarini chuqur baholash talab etiladi.

O'sib boruvchi miopiyaning epidemiologiyasi va patogenezini

Tadqiqotlarga ko'ra, o'sib boruvchi miopiya ko'pincha bolalik va o'smirlilik davrida boshlanib, 18–25 yoshgacha davom etadi. Genetik omillar, vizual yuklanishning ortishi, raqamli qurilmalardan uzoq muddat foydalanish va tashqi muhit omillari uning rivojlanishida muhim rol o'ynaydi.

Patogenetik jihatdan asosiy mexanizm – ko'z olmasi old-orqa o'qining uzayishi hisoblanadi, bu esa retina va xorioideda trofik o'zgarishlarga sabab bo'ladi.

O'sib boruvchi miopiyada jarrohlik korreksiyasining o'rni

An'anaviy optik korreksiya (ko'zoynak, kontakt linzalar) miopiyani to'liq bartaraf etmaydi va progressiyaga ta'siri cheklangan. Shu bois, ayrim hollarda jarrohlik usullari qo'llaniladi: refraksion lazer operatsiyalari, fakik intraokulyar linzalar implantatsiyasi, sklerani mustahkamlovchi operatsiyalar.

Zamonaviy refraksion jarrohlik usullari

LASIK va FemtoLASIK



LASIK va FemtoLASIK usullari miopiya korreksiyasida eng keng tarqalgan metodlar hisoblanadi. Ushbu operatsiyalar korneya shaklini o'zgartirish orqali refraksiyani to'g'rilaydi.

Afzalliklari: tez vizual reabilitatsiya, yuqori ko'rish o'tkirligi, kam invazivlik.

Kamchiliklari:

- korneya qalinligiga bog'liq cheklovlar;
- o'sib boruvchi miopiyada barqarorlik muammosi.

SMILE (Small Incision Lenticule Extraction)

SMILE – minimal invaziv lazer usuli bo'lib, korneya biomexanik barqarorligini yaxshiroq saqlaydi.

Tadqiqotlar shuni ko'rsatadiki, SMILE operatsiyasidan keyin miopiya progressiyasi kamroq kuzatiladi, ayniqsa yosh bemorlarda.

Fakik intraokulyar linzalar (ICL)

Yuqori darajali va o'sib boruvchi miopiyada ICL implantatsiyasi samarali usul hisoblanadi. Bu usul korneyaga ta'sir qilmasdan, yuqori sifatli ko'rishni ta'minlaydi.

Ko'rsatmalar:

- 6,0 D dan yuqori miopiya;
- ingichka korneya;
- lazer operatsiyalari mumkin bo'lmagan holatlar.

Skleral mustahkamlovchi operatsiyalar

Bu usul to'g'ridan to'g'ri miopiya progressiyasini sekinlashtirishga qaratilgan bo'lib, ko'z olmasining orqa qismi mustahkamlanadi.

Tadqiqot materiallari va usullari

Tadqiqot 2021–2024 yillar davomida 18–35 yoshdagi 120 nafar o'sib boruvchi miopiyali bemorlarda o'tkazildi. Bemorlar quyidagi guruhlariga ajratildi:

- I guruh – LASIK/FemtoLASIK;
- II guruh – SMILE;
- III guruh – ICL implantatsiyasi.

Kuzatuv davri – 24 oy.

NATIJALAR. Operatsiyadan keyin barcha guruhlarda ko'rish o'tkirligi sezilarli yaxshilandi. Eng yuqori refraksion barqarorlik ICL va SMILE guruhlarida qayd etildi. LASIK guruhida ayrim bemorlarda miopiyaning qaytish tendensiyasi kuzatildi.

MUHOKAMA. Olingan natijalar shuni ko'rsatadiki, o'sib boruvchi miopiyada faqat refraksiyani to'g'rilash emas, balki miopiya progressiyasiga ta'sir etuvchi usulni tanlash muhim. SMILE va ICL usullari biomexanik va anatomik jihatdan barqaror natija ko'rsatdi.

XULOSA. O'sib boruvchi miopiyada jarrohlik usuli individual tanlanishi lozim.

SMILE va fakik IOL implantatsiyasi yuqori samaradorlikka ega.

LASIK usuli ehtiyotkorlik bilan qo'llanilishi kerak.

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PSYCHOLINGUISTICS AS A SCIENTIFIC DISCIPLINE AND ITS ROLE IN MODERN LINGUISTICS

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Annotatsiya. The article considers psycholinguistics as an interdisciplinary field of scientific knowledge that studies the relationship between language, thinking, and human mental processes. The main directions of psycholinguistic research, the mechanisms of speech activity, the processes of speech generation and perception, as well as the problems of language acquisition are analyzed. Special attention is paid to the practical significance of psycholinguistics in education, medicine and modern technologies.

Keywords: speech activity, language and thinking, speech perception, language acquisition.

Language is one of the most important means of human communication and thinking. It serves not only as a tool for transmitting information, but also as a form of reflecting objective reality in human consciousness. Language learning is impossible without taking into account the mental processes underlying speech activity. In this context, psycholinguistics, a science located at the intersection of linguistics and psychology, is of particular importance. In a modern society characterized by the active development of technology, globalization and intensive communication, there is an increasing interest in studying the mechanisms of speech activity. Psycholinguistics allows for a deeper understanding of the processes of speech generation, perception and understanding, which makes it an important and sought-after scientific discipline. The purpose of this article is to consider the main problems and trends of modern psycholinguistics, as well as to determine its role in the development of linguistics.

Initially, psycholinguistic research focused on the study of perception and understanding of speech. Later, the subject of the study expanded to include the processes of speech generation, language acquisition, and the neuropsychological foundations of speech activity. Currently, psycholinguistics is actively developing, relying on the achievements of cognitive science and neuro-linguistics.

One of the key problems of psycholinguistics is the question of the relationship between language and thinking. For a long time, there has been a debate in science about whether language determines thinking or, conversely, thinking precedes language. Modern research shows that language and thinking are interrelated and interdependent. Language influences the formation of cognitive structures, and thinking, in turn, contributes to the development and change of linguistic means. Thus, psycholinguistics considers language as a tool of thinking and at the same time as its result.

Speech activity is a complex mental process that includes several stages: motivation, planning, language coding, and control. Each of these stages is associated with specific mental functions such as memory, attention, and



imagination. The process of speech generation begins with the formation of a communicative intention, after which the choice of linguistic means for its implementation takes place. The psycholinguistic analysis of speech errors makes it possible to identify patterns of functioning of the language system in human consciousness.

Speech perception is no less complex process than its generation. It includes recognizing audio or graphic signals, correlating them with linguistic units, and interpreting the meaning of an utterance. Understanding speech depends on context, previous experience, and individual personality traits. Psycholinguistic research shows that the process of understanding is active and involves constant forecasting and interpretation of information.

The problem of language acquisition occupies a central place in psycholinguistics. Of particular interest is the process of mastering a native language in childhood. Children learn a language in a short time, without having a conscious knowledge of grammatical rules.

Modern psycholinguistics faces a number of unresolved problems related to the modeling of speech processes and the study of neural mechanisms of language. Despite significant achievements, many aspects of speech activity remain insufficiently studied. The prospects for the development of psycholinguistics are associated with an interdisciplinary approach and integration with neuroscience, cognitive psychology and information technology. This opens up new opportunities for a deeper understanding of the nature of language.

Thus, psycholinguistics is an important and promising field of modern linguistics. It allows us to study language in close connection with human mental processes and makes a significant contribution to the development of theory and practice of linguistic communication. In modern society, the importance of psycholinguistics continues to increase.

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Modern problems of linguistics in the context of globalization

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Annotatsiya. The article discusses the current problems of modern linguistics in the context of globalization, digitalization and intensive intercultural interaction. The issues of linguistic change, multilingualism, the impact of technology on language, the preservation of linguistic diversity, as well as the role of linguistics in modern society are analyzed. Special attention is paid to the applied aspects of linguistics and the prospects for its further development..

Keywords: linguistics, modern language, globalization, linguistic problems, multilingualism, digital technologies.

Language is the most important means of communication, thinking and transmission of cultural experience. Linguistics as a science of language plays a key role in understanding the patterns of development of society, culture and human consciousness. Modern society is characterized by rapid social changes that are directly reflected in language. New forms of communication are emerging, the norms of literary language are changing, and the influence of foreign languages is increasing. In these conditions, linguistics faces new scientific and practical challenges.

Globalization has a significant impact on language processes. The expansion of international contacts leads to the active borrowing of vocabulary, the spread of languages of international communication and the formation of a global information space. English currently performs the function of a world language, which, on the one hand, facilitates international communication, and on the other hand, poses a threat to small and national languages. Linguistics studies these processes and develops approaches to preserving linguistic diversity.

The language is constantly evolving and changing. Modern linguists note the acceleration of linguistic changes, especially in vocabulary and syntax. New words, neologisms, slang, and borrowings are actively entering everyday speech. One of the problems is the ratio of norm and usage. Changes in spoken language are often perceived as a threat to the literary language. However, from the point of view of linguistics, such processes are natural and natural.

Digitalization has radically changed the ways of communication. The Internet, social networks and messengers are forming new genres of speech and new linguistic norms. Abbreviations, emojis, and hybrid forms of written and spoken speech are appearing. Modern linguistics is actively studying Internet discourse, computer linguistics and automatic text processing. These areas open up new opportunities for language analysis, but at the same time raise questions about the preservation of linguistic culture.

Language is an essential element of cultural and national identity. The loss of language often leads to the loss of cultural heritage. Therefore, one of the urgent problems of modern linguistics is the preservation and revival of endangered



languages. Ethnolinguistics and cultural linguistics study the relationship between language and culture, contributing to awareness of the value of linguistic diversity in the modern world.

Applied linguistics is aimed at solving practical problems related to language teaching, translation, speech communication and linguistic expertise. In the context of globalization, the need for high-quality translation and intercultural communication is increasing. Linguistics is of particular importance in the field of education, where modern methods of teaching native and foreign languages are being developed, taking into account cognitive and socio-cultural factors.

Modern linguistics develops in close cooperation with other sciences — psychology, sociology, computer science and neuroscience. The interdisciplinary approach allows for a deeper understanding of the nature of language and the mechanisms of its functioning. In the future, further development of computational linguistics, artificial intelligence and corpus research is expected, which will expand the possibilities of analyzing linguistic data.

Thus, modern linguistics faces a number of complex and multifaceted problems related to globalization, technological development and social changes. Learning a language in modern conditions has not only theoretical, but also practical significance. The role of linguistics in modern society is to ensure effective communication, preserve cultural heritage and develop language education. Solving current problems of linguistics contributes to the harmonious development of society and the strengthening of intercultural understanding.

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Keratokonyuktivit komorbitligi: epidemiologiyasi, klinik kechishi va profilaktikasi (prospektiv skrining namunalari)
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Annotatsiya: Keratokonyuktivit – koʻzni qoplagan konʻyunktiva va shilliq pardaning yalligʻlanishi boʻlib, turli etiologiyalar (virusli, bakterial, allergik, toksik va boshqalar) taʼsirida yuzaga keladi. Epidemiologik tadqiqotlar shuni koʻrsatadiki, adenoviruslar EKC (epidemik keratokonyuktivit) ning asosiy etiologik omili boʻlib, kasallik juda yuqumli hisoblanadi va butun dunyo boʻylab tarqalgan. EKC kasalligi klinik kechishda ogʻir konʻyunktival shish, qon oqimi oshishi, yiringli sekreti va koʻz ogʻrigʻi kabi belgilar bilan namoyon boʻladi. Maqolada keratokonyuktivitning epidemiologik holati, klinik kechishi, profilaktika choralarini koʻrib chiqamiz hamda prospektiv skrining usullari va ularning samaradorligini muhokama qilamiz. Maqola oxirida adabiyotlar tahlili va kelgusidagi tadqiqotlar uchun yoʻnalishlar berilgan.

Kalit soʻzlar: keratokonyuktivit, epidemiologiya, klinik kechish, profilaktika, EKC, prospektiv skrining, adenovirus infeksiyasi, yuqumli kasallik.

KIRISH. Keratokonyuktivit – kornea va konʻyunktivani yalligʻlantiruvchi kasalliklar guruhi boʻlib, klinik belgilar koʻpincha koʻz qizarishi, yalligʻlanish, ogʻriq va vizual funksiyaning buzilishi bilan kechadi. Turli etiologiyalar boʻlishi mumkin: virusli (masalan, adenovirus), bakterial, allergik va boshqa omillar. Keratokonyuktivitning eng keng tarqalgan shakllaridan biri EKC boʻlib, u adenoviruslar bilan bogʻliq boʻlib, yuqumlilik darajasi yuqori hisoblanadi.

Epidemiologiya

Epidemik Keratokonyuktivit (EKC)

Epidemik keratokonyuktivit adenoviruslar bilan yuzaga keladigan yuqumli koʻz kasalligi boʻlib, butun dunyoda kuzatiladi. Turli tadqiqotlar shuni koʻrsatadiki, EKC adenoviral konʻyunktivitning asosiy shakli hisoblanadi va global miqyosda yuqori tarqalishga ega.

EKC, ayniqsa, adenovirus turlari 8, 37 va 19 bilan bogʻliq boʻlib, ularning mavjudligi kasallik tarqalishiga olib keladi.

Tarqalish omillari

Keratokonyuktivit juda yuqumli boʻlib, kontakt orqali bemor shaxslar yoki kontaminatsiyalangan sirtlar bilan bevosita aloqa sifatida tarqaladi. Yuqumli modda koʻz sekreti sifatida uzoq vaqt faol qolishi mumkin.

Klinik Kechish

Keratokonyuktivitning klinik kechishi etiologiyaga qarab farq qiladi:

Aküt Viral Keratokonyuktivit (EKC)

EKC odatda konʻyunktiva va kornea yalligʻlanishi bilan kechadi. Belgilar orasida:

-konʻyunktival qizarish;

-yalligʻlanish va shish;



-ko'z og'rig'i, fotofobiya;

-yiringli sekretiya va vaqt o'tishi bilan subepitelial infiltratlar (nummuli) paydo bo'lishi mumkin.

Bu klinik belgilar EKC ning og'ir shaklini ko'rsatadi.

Allergik va Boshqa Shakllar

Allergik keratokonyuktivit, masalan vernal keratokonyuktivit, sezon bilan bog'liq bo'lib, kuchli qichishish va limbal papillae bilan kechadi.

Profilaktika va Skrining

Yuqumni nazorat qilish choralar

Gigiyenaga qat'iy rioya qilish: qo'l yuvish, oftalmik asboblarni dezinfeksiya qilish EKC tarqalishini kamaytiradi.

Prospektiv Skrining Strategiyalari

Prospektiv skrining, ayniqsa yuqori xavf guruhlarida, kasallikni erta bosqichda aniqlash va qarshi chora ko'rishga yordam beradi. Bunday yondashuv, masalan, klinik kuzatuvlar orqali simptomlar va belgilarga asoslangan skriningni o'z ichiga oladi.

ADABIYOTLAR TAHLILI. Epidemiologik Ma'lumotlar

Ford va boshqalar tomonidan tayyorlangan epidemiologik sharh EKC ning dunyo bo'ylab tarqalishini va adenovirus turli serotiplari bilan bog'liqligini ko'rsatadi.

Klinik Kuzatishlar. Beijing shahridagi 8 yillik klinik tahlil EKC ning yosh guruhlari bo'yicha klinik manzarasini ochib berdi.

Profilaktika Tadqiqotlari

Nosokomial EKC ni oldini olish bo'yicha tadqiqotlar ko'rsatdiki, gigiyenik skrining va infeksiya nazorat dasturlarining joriy etilishi kasallik tarqalishini sezilarli darajada kamaytirgan.

XULOSA. Keratokonyuktivit – ko'zni qamrab oluvchi yallig'lanish bilan kechadigan keng tarqalgan kasallik bo'lib, adenovirusli EKC global sog'liqni saqlash muammosi hisoblanadi. Klinik kechish murakkab bo'lib, kon'yunktival yallig'lanish, infiltratlar va yomonroq hollarda vizual buzilishlar bilan ifodalanadi. Profilaktika esa gigiyena va erta diagnostika orqali amalga oshiriladi. Prospektiv skrining EKC profilaktikasida muhim rol o'ynaydi. Kelgusidagi tadqiqotlar EKC ning molekulyar epidemiologiyasi va samarali profilaktika strategiyalarini chuqur o'rganish bo'yicha davom etishi lozim.

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Annotatsiya: Jamiyat birdamligini ta‘minlaydigan omillarni tahlil qilish, ijtimoiy, madaniy va siyosiy jarayonlarning o‘zaro aloqalarini o‘rganishga qaratilgan. Ushbu maqolada jamiyatda birdamlikni ta‘minlashda muhim ahamiyatga ega bo‘lgan asosiy omillar: ijtimoiy adolat, madaniy xilma-xillikni qabul qilish, ta‘lim, ijtimoiy himoya, siyosiy barqarorlik, tinchlik va xavfsizlik kabi jihatlar yoritilgan. Shuningdek, ommaviy kommunikatsiya va axborot vositalarining jamiyatdagi roli va ijtimoiy aloqalar ham muhim omil sifatida ko‘rib chiqiladi. Maqola jamiyat birdamligini rivojlantirishda amaliy yondashuvlar va strategiyalarni ishlab chiqishga yordam beradi.

Kalit so‘zlar: jamiyat birdamligi, ijtimoiy adolat, madaniy xilma-xillik, ta‘lim, ijtimoiy himoya, siyosiy barqarorlik, tinchlik, xavfsizlik, ommaviy kommunikatsiya, axborot vositalari, ijtimoiy aloqalar, hamkorlik, barqaror rivojlanish.

Bugungi kunda Uchinchi Renessans poydevorini qo‘yishni o‘z oldiga ezgu maqsad qilib qo‘ygan yangi O‘zbekistonda erkin va farovon yashaylik, degan purma‘no g‘oya yurtodoshlarimizning ongu tafakkurida, ularning hayotiy qarashlarida o‘zining yorqin ifodasini topyapti desak aslo mubolag‘a bo‘lmaydi. Prezidentimiz Shavkat Mirziyoyevning tashabbusi va xalqimiz birdamligi asosida qabul qilingan “2017-2021 yillarda O‘zbekiston Respublikasini yanada rivojlantirish bo‘yicha Harakatlar strategiyasi” asosidagi yangilanishlar, xalqimiz hayotidagi farovonlik va mamlakat taraqqiyotida o‘z natijasini ko‘rsatmoqda. Mazkur Harakatlar strategiyasining asosiy ustuvor yo‘nalishlaridan biri Xavfsizlik, diniy bag‘rikenglik va millatlararo totuvlikni ta‘minlash hamda chuqur o‘ylangan, o‘zaro manfaatli va amaliy tashqi siyosat etib belgilanganligini ko‘rish mumkin. Bugun shu asosda aholi, ayniqsa, yoshlar ongida insonparvarlik qadriyatlarini, turli millatlar o‘rtasida o‘zaro hamjihatlikni, yaqin qo‘shnichilikdagi do‘stona aloqalarimizni mustahkamlashga qaratilgan ezgu ishlar olib borilayapti desak aslo yanglishmaymiz.[2. 6-son, 70-modda].

1992-yilda O‘zbekiston Respublikasi Konstitutsiyasining qabul qilinishi dunyo siyosiy xaritasida yangi suveren davlat qaror topganligini ifodalagan holda Konstitutsiya o‘zida inson huquqlari va erkinliklari ustuvorligini mujassam etgan bu demokratik g‘oya zamonaviy huquq tizimining poydevoriga aylandi.

Zamonaviy ommaviy axborot vositalari davlat va xalq o‘rtasida o‘ziga xos ko‘prik vazifasini o‘tab, yangi islohotlarga ilhom beradi. Xolis va tezkor ommaviy axborot vositalari davlat va jamiyatning bosh vazifasi hisoblanmish xalqimiz hayotini yanada obod va farovon qilishga, yurtimizda yashayotgan, millati, tili va



dinidan qat'i nazar, har bir insonga e'tibor va g'amxo'rlik ko'rsatish ulkan ahamiyat kasb etadi. Ushbu ezgu maqsad yo'lida barcha vatandoshlarimiz bir tanu bir jon bo'lib harakat qilishi, ayniqsa yoshlarimizni yangi O'zbekiston bunyodkori bo'lib maydonga chiqishidan katta umid qilamiz. Prezidentimizga kamarbasta bo'lgan holda betakror yurtimizni tinchlik-osoyishtaligini saqlashda faol bo'lamiz.[2.4-b.]

Jamiyat birdamligi – bu uning ijtimoiy, siyosiy va iqtisodiy barqarorligining asosi hisoblanadi. Bir-birini tushunish, hurmat qilish va o'zaro qo'llab-quvvatlash jamiyatning muhim tamoyillaridan biridir. Jamiyat birdamligi, ayniqsa, ijtimoiy barqarorlikni saqlash, madaniy xilma-xillikni qabul qilish, adolatni ta'minlash va teng huquqlilikni targ'ib qilish kabi masalalar bilan chambarchas bog'liqdir.

Bugungi kunda jamiyatlar o'rtasida turli xil madaniyatlar, g'oyalar va diniy e'tiqodlar mavjud bo'lib, bu xilma-xillik o'zaro aloqalar va hamkorlikni murakkablashtiradi. Biroq, ushbu xilma-xillikni jamiyat birdamligini kuchaytirish uchun imkoniyat sifatida ko'rish zarur. Madaniy, siyosiy va iqtisodiy omillar birgalikda jamiyatdagi birdamlikni ta'minlashda muhim rol o'ynaydi.

Mazkur maqolada jamiyat birdamligini ta'minlashda asosiy omillar, ularning jamiyat taraqqiyotiga ta'siri va jamiyatda birdamlikni mustahkamlashga qaratilgan strategiyalar o'rganiladi. Ijtimoiy adolat, madaniy xilma-xillikni qabul qilish, ta'lim va ijtimoiy himoya tizimlari kabi omillar tahlil qilinadi. Shuningdek, siyosiy barqarorlik va xavfsizlik, tinchlikni ta'minlashning jamiyat birdamligiga qanday ta'sir qilishi ko'rib chiqiladi. Bu omillarni samarali boshqarish, jamiyatdagi o'zaro ishonchni oshirishga yordam beradi va birdamlikni rivojlantiradi.

Jamiyat va shaxs munosabatini shakllantirishda insonparvarlik haqida ham to'xtalib o'tmoqni joiz deb bildik. Insonparvarlik odamzodning qadri, uning erkinligi qobilyatlari har tomonlama nomoyon bo'lishi uchun kurashish, insonning baxt-saodati, teng huquqliligi, adolatli hayotini ta'min etishga intilish, insoniylikning barcha tamoyillari yuzaga chiqishiga shart-sharoitlar yaratish ma'nosini anglatadi. Buyuk adiblarimizning fikricha, insonparvarlik – insonning sharafi, vijdoni va imonning mahsuli hisoblanadi. Insonparvarlik g'oyalari, baxt-saodat va adolatga erishish orzu-havaslari, xalq og'zaki ijodiyotida, adabiyotda, diniy falsafiy, pedagogik ta'limotlarda uzoq o'tmishdan beri o'z aksini topib kelmoqda. Insonparvar ta'lim - umuminsoniy qadriyatlar, insonning hayoti va sog'lig'i, shaxsning erkin rivojlanishi ustuvorligi tamoyillariga asoslangan ta'limdir tgan [4, 6-b.].

Mahalla jamiyat birdamligini ta'minlashda asosiy omillarlsrdan biri hisonlanadi, chunki, ma'naviy muhit shaxsni ham, butun avlodni ham muayan yo'nalishda shakllantiradi, tarbiyalaydi, ijobiy hislatlarni yuzaga chiqaradi, ularni nomaqbul ta'sirlardan himoya qiladi.

Tursunov X. o'zining “Jamiyat va taraqqiyot” jurnalining 5-sonida bergan “*Jamiyatda ijtimoiy barqarorlik va ijtimoiy adolat*” nomli maqolasida “Ijtimoiy adolat jamiyatning birdamligini ta'minlashda asosiy rol o'ynaydi. Barcha fuqarolarga teng huquqlar, imkoniyatlar yaratish, jamiyatdagi ijtimoiy guruhlar



o'rtasida adolatli taqsimotning mavjudligi jamiyatda birdamlikni mustahkamlashga yordam beradi. Ijtimoiy tenglikni ta'minlash, ijtimoiy guruhlar o'rtasida ziddiyatlarni kamaytiradi va jamiyatni birlashtiradi" deb ta'kidlab o'tgan [5, 38-40-b.].

Shuxratov R. "Ijtimoiy tadqiqotlar" jurnalidagi **"Madaniy xilma-xillik va jamiyat birdamligi"** maqolasida "Jamiyatda turli madaniyatlar, millatlar, dinga va irqga oid farqlarni qabul qilish, hurmat qilish jamiyat birdamligini oshiradi. Madaniy xilma-xillikni qadrlash va uni qo'llab-quvvatlash, ijtimoiy birlashuvni kuchaytiradi va jamiyatning ko'p qirraliligini " deb aytib o'tadi [7.12 (3), 45-47-b.].

Ta'lim jamiyatni birdamlashtirishda muhim rol o'ynaydi. Insonlar orasidagi hurmat, tushunish va hamkorlik aynan ta'lim jarayonida rivojlanadi. O'qitish va tarbiya orqali jamiyatdagi yoshlar orasida birdamlik, bag'rikenglik va umummilliy qadriyatlarni shakllantirish mumkin.

Ijtimoiy himoya tizimi, jamiyatdagi kam ta'minlangan va ijtimoiy himoyaga muhtoj qatlamlarga yordam berish, jamiyatda birdamlikni ta'minlashda muhim o'rin tutadi. Ijtimoiy yordam va xayriya ishlarining rivojlanishi ham jamiyatni birlashtiradi va ijtimoiy barqarorlikni saqlaydi.

Jamiyatdagi aloqalar va hamkorlik o'zaro ishonch va hamjihatlikni rivojlantiradi. Jamiyatda tenglik, do'stlik va bir-birini qo'llab-quvvatlash orqali jamiyat a'zolari o'rtasida birdamlik o'sadi.

Jamiyat birdamligini ta'minlashda ommaviy axborot vositalari (televizion dasturlar, yangiliklar, ijtimoiy tarmoqlar va hokazo) muhim ahamiyatga ega. Yaxshi axborot va kommunikatsiya tizimi jamiyatni birlashtiradi va umumiy maqsadlarni ilgari surish uchun imkoniyat yaratadi, xizmat qiladi.

Xulosa. Xulosa o'rnida aytish kerakki, insoniy jamiyatlar alohida tamaddunlar, ya'ni sivilizatsiyalar negizida, muayyan qadriyatlar tizimi poydevorida tashkil topdi. Ularning barchasida umumiy foyda uchun harakat qilish, ota-onani ulug'lash, oilaviy rishtalarni mustahkamlash kabi bashariyat uchun umumiy hisoblangan qadriyatlar mavjud. Shu tariqa, ma'naviyat va axloq me'yorlarini belgiladi deyishimiz mumkin.

Jamiyat birdamligini ta'minlash jamiyatning barqarorligini va taraqqiyotini ta'minlashda muhim ahamiyatga ega. Jamiyatda ijtimoiy barqarorlikni saqlashda madaniy xilma-xillikni qabul qilish, ijtimoiy adolat va teng huquqlilikni ta'minlash muhim omillar hisoblanadi. Shuningdek, siyosiy barqarorlik, ijtimoiy himoya tizimlari va ommaviy kommunikatsiya vositalari jamiyat birdamligini mustahkamlashda katta rol o'ynaydi.

Jamiyat birdamligini ta'minlashda ijtimoiy tizimlarni takomillashtirish, teng huquqlilikni amalga oshirish va turli guruhlar o'rtasida o'zaro ishonchni oshirish zarur. Ijtimoiy barqarorlikni ta'minlashda ta'lim, madaniy farqlarni hurmat qilish va jamiyatdagi barcha qatlamlar uchun teng imkoniyatlar yaratish muhim hisoblanadi.



Kelajakda jamiyat birdamligini kuchaytirish uchun innovatsion yondashuvlarni joriy etish, madaniyatlararo aloqalarni rivojlantirish, shuningdek, siyosiy va iqtisodiy barqarorlikni ta'minlashga e'tibor qaratish zarur. Bu omillar jamiyatdagi barqarorlikni mustahkamlashga va ijtimoiy birdamlikni ta'minlashga bevosita yordam beradi.

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Makkajo'xori popugi (*Zea mays* L. stigma) ning diuretik va nefroprotektiv mexanizmlari

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Makka-jo'xori popugi (*Zea mays* L. stigma) ko'plab mamlakatlarning xalq tabobatida qadimdan siydik haydovchi, yallig'lanishga qarshi va buyrak faoliyatini qo'llab-quvvatlovchi tabiiy vosita sifatida qo'llanilib kelingan. Zamonaviy fitokimyoviy va farmakologik tadqiqotlar bu o'simlik xomashyosining shifobaxsh xususiyatlari uning biologik faol birikmalarga boy ekanligi bilan bog'liqligini tasdiqlamoqda. Xususan, makkajo'xori popugi tarkibida yuqori miqdorda kaliy ionlari (K^+), flavonoidlar (kversetin, maysin, kempferol) hamda turli fenol kislotalar aniqlangan bo'lib, ular birgalikda buyrak faoliyatiga kompleks ijobiy ta'sir ko'rsatadi.

Induktiv bog'langan plazma mass-spektrometriyasi (ICP-MS) va atom-absorbsiya spektroskopiyasi (AAS) yordamida o'tkazilgan tahlillar natijasida 100 g quritilgan makkajo'xori popugida o'rtacha 300–600 mg kaliy mavjudligi aniqlangan. Kaliy organizmda asosiy hujayra ichki kation bo'lib, u osmotik bosimni, elektrolit muvozanatini va hujayra membranalarining bioelektrik potensialini boshqarishda muhim rol o'ynaydi. Buyrak nefronlarida joylashgan Na^+/K^+ -ATPaza nasosi natriy va kaliy ionlari almashinuvini tartibga soladi. Popukdan organizmga tushadigan kaliy ionlarining ortishi natriyning buyrak kanalchalarida qayta so'rilishini susaytiradi, bu esa suvning siydik orqali chiqarilishini kuchaytiradi. Natijada siydik hajmi ortadi va organizmdagi ortiqcha suyuqlik chiqariladi.

Shu mexanizm tufayli makkajo'xori popugi natriyuretik va osmotik diuretik xususiyatga ega bo'lib, u nafaqat siydik ajralishini kuchaytiradi, balki suv-tuz muvozanatini fiziologik chegaralarda saqlashga yordam beradi. Bu xususiyat popuk ekstraktlarini shishlar (oedema), buyrak toshlari hamda arterial gipertenziya kabi patologik holatlarda foydali qo'shimcha terapiya sifatida qo'llash imkonini beradi.

Popuk tarkibidagi flavonoidlar ham diuretik samaraga sezilarli hissa qo'shadi. Kversetinetin, maysin va kempferol kabi biologik faol flavonoidlar angiotenzin-konvertlovchi ferment (ACE) faolligini ingibirlash orqali renin-angiotenzin-aldosteron tizimini susaytiradi. Natijada buyrak qon tomirlari kengayadi, glomerulyar filtratsiya yaxshilanadi va natriy bilan suvning chiqarilishi kuchayadi. Shu bilan birga flavonoidlarning antioksidant va yallig'lanishga qarshi ta'siri buyrak to'qimalarini oksidlovchi omil va fibroz jarayonlaridan himoya qiladi.

Klinik va eksperimental tadqiqotlar makkajo'xori popugi ekstraktlarini muntazam ichish siydik ajralishini o'rtacha 25–40 % ga oshirishini, qon plazmasidagi natriy darajasini kamaytirishini va kaliy balansini barqaror saqlab qolishini ko'rsatgan. Bu holat makkajo'xori popugi asosida tayyorlangan



preparatlarining sintetik diuretiklardan farqli ravishda elektrolit muvozanatini buzmasdan yumshoq, ammo barqaror diuretik ta'sir ko'rsatishini isbotlaydi.

Xulosa qilib aytganda, makkajo'xori popugi kaliy ionlari va flavonoidlarning sinergetik ta'siri orqali fiziologik diuretik, nefroprotektiv va suvtuz muvozanatini tartibga soluvchi tabiiy vosita sifatida ilmiy asoslangan yuqori farmakologik ahamiyatga ega ekanlini ko'rsatadi.

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BOSHLANG'ICH SINFLARDA ROLLI O'YINLAR ORQALI SHAXSLARARO MULOQOTNI RIVOJLANTIRISH YO'LLARINI ANIQLASH

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ANNOTATSIYA: Ushbu maqolada boshlang'ich sinf o'quvchilarida shaxslararo muloqotni rivojlantirishda rol o'yinlardan foydalanishning pedagogik imkoniyatlari va samarali yo'llari ilmiy-nazariy hamda amaliy jihatdan tahlil etilgan. Tadqiqotda kichik yoshdagi maktab o'quvchilarining psixologik va kommunikativ xususiyatlari hisobga olinib, rol o'yinlarning ularning nutq faolligi, emotsional ifodadorligi, hamkorlikda ishlash, muammoli vaziyatlarni hal etish ko'nikmalarini shakllantirishdagi o'rni yoritib berilgan. aliy ahamiyatga ega.

Kalit so'zlar: boshlang'ich ta'lim, rol o'yinlar, shaxslararo muloqot, nutqni rivojlantirish, kommunikativ kompetensiya, ijtimoiy moslashuv, interfaol metodlar, pedagogik texnologiyalar, muloqot madaniyati, hamkorlik faoliyati, o'quvchi faolligi, emotsional rivojlanish, dars jarayoni, o'qituvchi fasilitatorligi.

KIRISH. Zamonaviy ta'lim tizimida inson kapitalini rivojlantirish masalasi yetakchi ustuvor yo'nalishlardan biri sifatida e'tirof etilmoqda. Ta'lim jarayonida faqatgina bilim berish emas, balki o'quvchining ijtimoiy, kommunikativ va shaxsiy sifatlarini shakllantirish ham muhim hisoblanadi. Ayniqsa, boshlang'ich sinf bosqichida bu vazifa alohida ahamiyat kasb etadi, chunki mazkur davrda bolaning shaxs sifatida shakllanish jarayoni faol kechadi. Ushbu jarayonda shaxslararo muloqot asosiy vosita bo'lib xizmat qiladi.

Boshlang'ich sinf o'quvchilari maktab muhitiga endigina moslashayotgan, ijtimoiy munosabatlarning yangi shakllarini o'zlashtirayotgan subyekt hisoblanadi. Ular uchun muloqot nafaqat axborot almashish vositasi, balki emotsional ehtiyojlarni qondirish, o'zini anglash va jamoadagi o'rnini belgilash omili sifatida ham namoyon bo'ladi. Shu sababli ta'lim jarayonida muloqotni rivojlantirishga qaratilgan metod va texnologiyalarni qo'llash pedagogik zaruratga aylanmoqda.

Bugungi kunda an'anaviy o'qitish usullari o'quvchilarni faol muloqotga yetarli darajada jalb eta olmayotgani amaliy tajribada ko'p bora kuzatilmoqda. Bu holat o'quvchilarning o'z fikrini erkin ifodalash, tengdoshlari bilan hamkorlikda ishlash va bahs-munozarada ishtirok etish ko'nikmalarining sust rivojlanishiga olib keladi. Shunday sharoitda ta'lim jarayonini interfaol metodlar asosida tashkil etish, xususan, rol o'yinlardan foydalanish muhim ahamiyat kasb etadi.

Rol o'yinlar boshlang'ich sinf o'quvchilari uchun tabiiy va qiziqarli faoliyat turi bo'lib, ular orqali bola ijtimoiy rollarni sinab ko'radi, muloqot jarayonida o'zini tutish qoidalarini o'rganadi va turli vaziyatlarda moslashuvchanlikni namoyon etadi. O'yin jarayonida o'quvchi faqat bilim emas, balki hayotiy tajriba ham orttiradi. Bu esa ta'limning hayot bilan uzviy bog'liqligini ta'minlaydi.



Boshlang'ich ta'limda rolli o'yinlardan foydalanish o'quvchilarning ichki faolligini oshiradi, ularni dars jarayonining bevosita ishtirokchisiga aylantiradi. O'yin orqali tashkil etilgan mashg'ulotlarda o'quvchilar erkin fikr yuritadi, savollar beradi, javob qaytaradi va o'zaro muloqotga kirishadi. Bu jarayon muloqotning tabiiy va majburiy bo'lmagan shaklda rivojlanishiga imkon yaratadi.

Shuningdek, rolli o'yinlar boshlang'ich sinf o'quvchilarining psixologik xususiyatlariga mos keladi. Ushbu yosh davrida bolalarda tasavvur va obrazli tafakkur yetakchi o'rin egallaydi. Rolli o'yinlar aynan shu xususiyatlarga tayangan holda tashkil etiladi va o'quvchilarning emotsional holatini ijobiy tomonga yo'naltiradi. Natijada dars jarayonida qulay psixologik muhit shakllanadi.

Boshlang'ich sinflarda shaxslararo muloqotni rivojlantirish faqat nutq faoliyatini takomillashtirish bilangina cheklanmaydi. Bu jarayon o'quvchilarda ijtimoiy mas'uliyat, o'zaro hurmat, bag'rikenglik va hamkorlik kabi muhim shaxsiy sifatning shakllanishiga ham xizmat qiladi. Muloqot jarayonida bola o'z xatti-harakatlarining boshqalarga ta'sirini anglay boshlaydi va o'zini boshqarish ko'nikmalarini rivojlantiradi.

Ta'lim jarayonida rolli o'yinlardan tizimli foydalanish o'quvchilarning ijtimoiylashuv jarayonini jadallashtiradi. Ayniqsa, tortinchoq yoki muloqotga kirishishda qiyinchilikka duch keladigan bolalar uchun rolli o'yinlar qulay pedagogik vosita bo'lib xizmat qiladi. O'yin jarayonida ular o'zini erkinroq his qiladi va asta-sekin muloqotga kirishishdan qo'rqmaydigan bo'lib boradi.

Boshlang'ich ta'limda rolli o'yinlar orqali muloqotni rivojlantirish masalasi nafaqat pedagogik, balki ijtimoiy ahamiyatga ham ega. Chunki maktabda shakllangan muloqot ko'nikmalari bolaning keyingi ta'lim bosqichlari va jamiyatdagi faoliyatida muhim rol o'ynaydi. Shu bois ushbu mavzuni ilmiy jihatdan chuqur o'rganish va amaliy tavsiyalar ishlab chiqish dolzarb hisoblanadi. Ushbu maqolaning kirish qismida boshlangan mulohazalar tadqiqotning umumiy yo'nalishini belgilab beradi. Unda boshlang'ich sinflarda rolli o'yinlar orqali shaxslararo muloqotni rivojlantirish masalasining dolzarbligini, pedagogik zarurati va ijtimoiy ahamiyati asoslab beriladi. Keyingi boblarda ushbu masala nazariy va amaliy jihatdan batafsil yoritiladi hamda aniq ilmiy xulosalar chiqariladi.

Rolli o'yinlar pedagogik jarayonda interfaol metod sifatida keng qo'llanilib, o'quvchilarning shaxsiy tajribasiga tayangan holda bilimlarni o'zlashtirishiga yordam beradi. Psixolog olim L.S. Vygotskiy o'yinni bolaning yaqin rivojlanish zonasi bilan bog'lab, unda bola o'z imkoniyatlaridan yuqori darajada faoliyat ko'rsatishini ta'kidlaydi. Uning fikricha, rolli o'yinlar orqali bola kattalar dunyosiga kirib boradi va ijtimoiy rollarni egallaydi [2,45-b].

Boshlang'ich sinf yoshidagi bolalar uchun muloqot asosan o'yin orqali shakllanadi. O'yin jarayonida bola o'z fikrini ifodalaydi, boshqalarni tinglaydi, kelishuvga erishadi va muammoli vaziyatlarni hal qilishga harakat qiladi. Bu jarayon shaxslararo muloqotning tabiiy shakllanishiga xizmat qiladi. Pedagogik



adabiyotlarda ta'kidlanishicha, rolli o'yinlar bolalarda empatiya, o'zaro hurmat va ijtimoiy mas'uliyat hissini rivojlantiradi [3,61-b].

Rolli o'yinlarning yana bir muhim jihati shundaki, ular nutqni rivojlantirish uchun qulay sharoit yaratadi. O'yin davomida o'quvchi turli rollarni bajarib, turli nutq vaziyatlariga tushadi. Bu esa so'z boyligini oshirish, grammatik tuzilmani to'g'ri qo'llash va muloqot madaniyatini shakllantirishga yordam beradi.

Amaliy kuzatishlar shuni ko'rsatadiki, boshlang'ich sinf o'quvchilarida muloqotga oid bir qator muammolar mavjud. Jumladan, ba'zi o'quvchilar tortinchoqlik sababli suhbatga kirisha olmaydi, boshqalari esa tinglash madaniyatiga rioya qilmaydi. Bu holatlar sinfda ijtimoiy muhitning to'laqonli shakllanishiga to'sqinlik qiladi.

Darslik va metodik qo'llanmalarda qayd etilishicha, an'anaviy dars shakllarida o'quvchilar ko'proq passiv tinglovchi rolida qolib ketadi [4,88-b]. Natijada muloqot faoliyati yetarli darajada rivojlanmaydi. Shu sababli ta'lim jarayoniga interfaol metodlarni, xususan rolli o'yinlarni joriy etish zarurati yuzaga keladi.

Rolli o'yinlar orqali o'quvchilar real hayotiy vaziyatlarni modellashtiradi. Masalan, "Do'konda", "Mehmon kutish", "Maktabda" kabi o'yinlar bolalarning kundalik hayotda uchraydigan muloqot shakllarini o'zlashtirishiga yordam beradi. Bu esa ularning ijtimoiy moslashuvini yengillashtiradi.

Boshlang'ich sinflarda rolli o'yinlar orqali shaxslararo muloqotni rivojlantirish quyidagi yo'llar orqali amalga oshiriladi

Birinchidan, o'yin syujetini o'quvchilarning yosh va qiziqishlariga mos tanlash muhim. Qiziqarli syujet o'quvchini faol ishtirok etishga undaydi va muloqotga kirishish istagini kuchaytiradi. Olimlar fikriga ko'ra, o'yin mazmuni bolaning hayotiy tajribasiga yaqin bo'lsa, muloqot samaradorligi oshadi.[5,102-b].

Ikkinchidan, o'qituvchi rollarni adolatli taqsimlashi va har bir o'quvchining faol ishtirokini ta'minlashi lozim. Bu jarayonda o'qituvchi fasilitator rolini bajarib, bolalarni rag'batlantiradi va zarur hollarda yo'naltiradi.

Uchinchidan, rolli o'yinlardan so'ng tahlil va muhokama o'tkazish tavsiya etiladi. Muhokama jarayonida o'quvchilar o'z fikrlarini bildiradi, boshqalarning nuqtai nazarini tinglaydi va xulosalar chiqaradi. Bu esa muloqotning refleksiv darajasini rivojlantiradi.

Pedagogik tadqiqotlarda qayd etilishicha, rolli o'yinlarni tizimli va maqsadli qo'llash natijasida o'quvchilarning kommunikativ kompetensiyasi sezilarli darajada oshadi [6,57-b].

XULOSA. Xulosa qilib aytganda, boshlang'ich sinflarda rolli o'yinlar orqali shaxslararo muloqotni rivojlantirish ta'lim jarayonining muhim tarkibiy qismi hisoblanadi. Rolli o'yinlar o'quvchilarning nutq faolligini oshiradi, ijtimoiy moslashuvini kuchaytiradi va muloqot madaniyatini shakllantiradi. Ushbu metodni samarali qo'llash o'qituvchidan puxta rejalashtirish, ijodkorlik va pedagogik



mahoratni talab etadi. Rolli o'yinlar asosida tashkil etilgan darslar o'quvchilarning shaxs sifatida kamol topishiga va ta'lim sifatining oshishiga xizmat qiladi.

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The Role of Desert and Semi-Desert Landscapes in the Development of Ecotourism in the Khorezm Region

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Abstract: Desert and semi-desert landscapes represent unique natural systems with high ecological, scientific, and tourism value. In recent years, ecotourism has emerged as an effective tool for balancing environmental conservation and socio-economic development, especially in environmentally vulnerable regions. This article examines the role of desert and semi-desert landscapes in the development of ecotourism in the Khorezm region of Uzbekistan. The study analyzes the natural and geographical characteristics of the region, ecological conditions, biodiversity, and existing tourism potential. Special attention is paid to the opportunities and limitations of desert-based ecotourism under conditions of climate change, water scarcity, and anthropogenic pressure. The research highlights the importance of sustainable management, community involvement, and environmental education in promoting ecotourism. The findings suggest that the rational use of desert and semi-desert landscapes can significantly contribute to regional development while ensuring environmental protection.

Keywords: Ecotourism, desert landscapes, semi-desert, Khorezm region, sustainable tourism, biodiversity, environmental protection.

Introduction: Ecotourism has become one of the most dynamic sectors of the global tourism industry, driven by increasing awareness of environmental issues and the growing demand for nature-based travel. According to international tourism studies, ecotourism contributes not only to environmental conservation but also to the socio-economic development of rural and remote regions. Desert and semi-desert landscapes, often perceived as harsh and unproductive environments, are now recognized as valuable ecological systems with significant tourism potential.

The Khorezm region, located in the lower reaches of the Amu Darya River, is characterized by a combination of irrigated agricultural lands, desert and semi-desert landscapes, and unique cultural heritage. The region is closely connected to the Aral Sea basin, which has experienced severe environmental degradation. In this context, ecotourism can play a crucial role in mitigating ecological problems, diversifying the regional economy, and raising environmental awareness.

The purpose of this article is to analyze the role of desert and semi-desert landscapes in the development of ecotourism in the Khorezm region. The objectives of the study include assessing natural and ecological conditions, identifying tourism resources, analyzing challenges, and proposing sustainable development strategies.

The Khorezm region is situated in northwestern Uzbekistan and occupies part of the Amu Darya delta. It borders Turkmenistan to the west and south and



Karakalpakstan to the north. The region lies within an arid climate zone, where desert and semi-desert landscapes dominate large areas beyond irrigated zones. The climate of Khorezm is sharply continental and arid, characterized by hot summers and cold winters. Average summer temperatures often exceed 40°C, while winter temperatures can drop below -10°C. Annual precipitation is low, ranging between 80–120 mm, which significantly influences vegetation cover and land use.

The study is based on a combination of qualitative and quantitative research methods, including:

- Analysis of scientific literature and regional statistical data

- Geographical and ecological analysis of landscapes

- Comparative analysis of ecotourism development models

- Descriptive assessment of tourism potential

Desert and semi-desert landscapes in Khorezm are primarily represented by sandy plains, takyr soils, and saline areas. These landscapes are shaped by natural processes such as wind erosion, sedimentation, and climatic extremes. Despite harsh conditions, they support unique ecosystems adapted to aridity. Soils in desert and semi-desert zones are mainly sandy, saline, and low in organic matter. Vegetation is sparse and dominated by drought-resistant species such as saxaul (*Haloxylon*), tamarisk (*Tamarix*), and salt-tolerant shrubs. These plants play a crucial role in stabilizing soils and preventing desertification. The fauna of desert landscapes includes reptiles, small mammals, insects, and bird species adapted to extreme conditions. Although biodiversity levels are lower compared to humid regions, desert ecosystems are highly specialized and ecologically valuable. Protecting these species is an important component of sustainable ecotourism. Desert ecotourism focuses on responsible travel to arid environments, emphasizing environmental conservation, cultural respect, and educational experiences. Activities include guided nature tours, wildlife observation, scientific expeditions, and eco-camping.

Ecotourism can serve as an alternative source of income for local communities, reducing dependence on agriculture and natural resource exploitation. By creating employment opportunities in guiding, accommodation, and handicrafts, ecotourism supports rural development.

In the Khorezm region, community-based ecotourism can enhance social cohesion and preserve traditional knowledge related to nature and land use. Involving local residents in tourism planning and management is essential for long-term sustainability. Water scarcity is one of the most critical challenges affecting desert ecosystems in Khorezm. Climate change has intensified droughts and reduced water availability, increasing pressure on fragile environments. Agricultural expansion, overgrazing, and infrastructure development contribute to land degradation and biodiversity loss. Uncontrolled tourism activities may further exacerbate environmental problems if not properly managed. Limited transport



access, lack of eco-friendly accommodation, and insufficient tourism services restrict the growth of ecotourism in desert areas. Addressing these issues requires investment and strategic planning. Engaging local communities in decision-making processes ensures social acceptance and economic benefits. Training programs for eco-guides and small tourism enterprises are essential. Ecotourism should serve as a platform for environmental education, promoting awareness of desert ecosystems, climate change, and biodiversity conservation among tourists and residents.

The analysis demonstrates that desert and semi-desert landscapes in the Khorezm region possess significant untapped ecotourism potential. However, successful development depends on balancing tourism growth with environmental protection. International experiences show that well-managed desert ecotourism can contribute to sustainable development even in fragile ecosystems. Ecotourism in arid and semi-arid regions is based on the principle of minimizing environmental impact while maximizing educational and conservation benefits. Unlike mass tourism, desert ecotourism emphasizes low-intensity activities, small group travel, and strict ecological regulations. Scientific studies indicate that arid ecosystems are among the most fragile environments due to slow natural regeneration processes.

In desert regions such as Khorezm, even minor anthropogenic disturbances may cause long-term ecological damage. Therefore, ecotourism development must rely on geographical zoning, landscape sensitivity assessment, and ecological carrying capacity analysis. These approaches ensure that tourism activities remain within sustainable limits. Landscape sensitivity refers to the degree to which natural landscapes respond to external impacts. Desert and semi-desert landscapes are highly sensitive due to: In the Khorezm region, sandy deserts and saline soils are particularly susceptible to degradation. Scientific assessment of landscape sensitivity is essential before establishing ecotourism routes or facilities. Carrying capacity is defined as the maximum number of visitors that an area can accommodate without causing irreversible environmental damage. In desert environments, carrying capacity is significantly lower than in forested or mountainous regions. Climate change has a profound impact on desert ecosystems worldwide. Rising temperatures, increased evaporation, and changing precipitation patterns intensify desertification processes. In the Khorezm region, climate change exacerbates water scarcity and land degradation, directly affecting ecotourism potential. However, climate change also increases scientific interest in desert ecosystems. Ecotourism can support climate research tourism, where visitors participate in environmental monitoring and educational programs focused on climate adaptation strategies. One of the strongest advantages of ecotourism development in the Khorezm region is the integration of natural landscapes with rich cultural and historical heritage. The region is home to ancient settlements, archaeological sites, and traditional rural landscapes shaped by centuries of human-



environment interaction. Desert ecosystems host specialized flora and fauna adapted to extreme conditions. Ecotourism can contribute to biodiversity conservation by: In Khorezm, ecotourism revenues could support conservation projects in desert buffer zones and degraded lands affected by salinization. Community-based ecotourism (CBET) emphasizes local ownership and management of tourism activities. This model is particularly suitable for rural desert regions, where local communities possess valuable traditional ecological knowledge. The integration of GIS and remote sensing technologies allows continuous monitoring of environmental changes and tourism impacts. The successful development of ecotourism in desert regions requires supportive policies and institutional coordination. National tourism strategies, environmental protection laws, and regional development programs must be harmonized. In Uzbekistan, ecotourism development aligns with sustainable development goals (SDGs), particularly those related to environmental protection, economic diversification, and community well-being. International experience demonstrates that desert ecotourism can be successfully developed in regions such as: The Sahara Desert (North Africa)

The Mojave Desert (USA)

The Australian Outback

These regions apply strict environmental regulations, community participation, and educational tourism models. Lessons from these practices can be adapted to the Khorezm context.

Desert and semi-desert landscapes of the Khorezm region represent a valuable yet underutilized resource for sustainable ecotourism development. Despite environmental vulnerability and climate-related challenges, these landscapes possess high scientific, ecological, and tourism value.

This study confirms that ecotourism, when based on scientific planning, environmental protection, and community involvement, can become a strategic tool for regional development. The integration of desert landscapes into ecotourism not only diversifies the local economy but also contributes to biodiversity conservation and climate change awareness.

Future research should focus on quantitative environmental assessments, GIS-based tourism planning, and pilot ecotourism projects in desert areas of Khorezm.

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Tadbirkorlik faoliyatini rivojlantirishda soliq siyosatining nazariy asoslari Kurganbayev Begzodbek Sherzatovich

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Annotatsiya: Ushbu maqolada soliq siyosatining nazariy asoslari keng yoritib berilgan. Tadqiqotimizda soliq yukining tadbirkorlik faolligi, investitsiyalar hajmi, hamda innovatsion jarayonlarga ta'siri iqtisodiy nazariyalar asosida tahlil qilingan. SHuningdek, klassik, neoklassik va institutsional yondashuvlar doirasida soliq siyosatining rag'batlantiruvchi va cheklovchi mexanizmlari ko'rib chiqilgan. Natiada esa, ushbu mexanizm samarali soliq siyosatini shakllantirishda nazariy asos bo'lib xizmat qiladi.

Kalit so'zlar: tadbirkorlik, soliq, siyosat, rivojlanish, rag'bat, investitsiya, samaradorlik

Abstract: This article extensively covers the theoretical foundations of tax policy. In our study, the influence of the tax burden on entrepreneurial activity, the volume of investments, and innovation processes was analyzed based on economic theories. Stimulating and restrictive mechanisms of tax policy are also considered within the framework of classical, neoclassical, and institutional approaches. As a result, this mechanism serves as a theoretical basis for the formation of an effective tax policy.

Keywords: entrepreneurship, tax, policy, development, incentives, investment, efficiency

Аннотация: В данной статье подробно освещены теоретические основы налоговой политики. В нашем исследовании влияние налогового бремени на предпринимательскую активность, объем инвестиций и инновационные процессы анализируется на основе экономических теорий. Также рассмотрены стимулирующие и ограничивающие механизмы налоговой политики в рамках классического, неоклассического и институционального подходов. В результате этот механизм служит теоретической основой для формирования эффективной налоговой политики.

Ключевые слова: предпринимательство, налоги, политика, развитие, стимулы, инвестиции, эффективность

Bozor iqtisodiyoti sharoitida tadbirkorlik faoliyati iqtisodiy o'sishning muhim harakatlantiruvchi kuchlaridan biri hisoblanadi. Tadbirkorlik orqali yangi ish o'rinlari yaratiladi, raqobat muhiti shakllanadi, innovatsiyalar joriy etiladi hamda jamiyat farovonligi oshadi. Ushbu jarayonlarning barqaror rivojlanishi esa bevosita davlat tomonidan olib borilayotgan iqtisodiy siyosatga, xususan, soliq siyosatiga bog'liq.

Soliq siyosati davlatning iqtisodiyotni tartibga solishdagi eng muhim moliyaviy instrumentlaridan biri bo'lib, u orqali tadbirkorlik subyektlarining faoliyatiga bevosita ta'sir ko'rsatish mumkin. Soliq yukining darajasi, soliq stavkalari, imtiyozlar va preferensiyalar tadbirkorlarning investitsion qarorlari, riskka bo'lgan



munosabati hamda biznesni kengaytirish imkoniyatlarini belgilab beradi. Shu sababli tadbirkorlikni rivojlantirishda soliq siyosatining nazariy asoslarini chuqur o'rganish dolzarb ilmiy va amaliy ahamiyatga ega (University of Trier and Block, 2016).

Mazkur maqolada soliq siyosatining tadbirkorlik faoliyatiga ta'siri klassik, neoklassik va institutsional iqtisodiy nazariyalar doirasida tahlil qilinadi hamda soliq mexanizmlarining rag'batlantiruvchi va cheklovchi jihatlari yoritib beriladi.

Tadbirkorlik faoliyati iqtisodiy adabiyotlarda foyda olish maqsadida riskni o'z zimmasiga olgan holda amalga oshiriladigan mustaqil xo'jalik faoliyati sifatida talqin qilinadi. Klassik iqtisodchilar, xususan A. Smit va J. B. Sey tadbirkorni ishlab chiqarish omillarini birlashtiruvchi va bozor muvozanatini ta'minlovchi subyekt sifatida ko'rganlar (Ufa Federal Research Centre of the Russian Academy of Sciences, Ufa, Russian Federation and Gafarova, 2025).

Zamonaviy iqtisodiy yondashuvlarda esa tadbirkorlik faqat foyda olish bilan cheklanmay, balki innovatsiyalarni joriy etish, yangi bozorlarni o'zlashtirish va texnologik taraqqiyotni jadallashtirish omili sifatida baholanadi. J. Shumpeter nazariyasiga ko'ra, tadbirkorlik iqtisodiy rivojlanishning asosiy manbai bo'lib, u "ijodiy vayronkorlik" jarayoni orqali eski tuzilmalarni yangilari bilan almashtiradi. Shu nuqtayi nazardan qaraganda, tadbirkorlik faoliyatining rivojlanishi davlat iqtisodiy siyosatining ustuvor yo'nalishlaridan biri bo'lishi zarur. Bu jarayonda soliq siyosati muhim o'rin egallaydi, chunki u tadbirkorlik subyektlarining moliyaviy barqarorligiga va rivojlanish istiqbollariga bevosita ta'sir ko'rsatadi (Snarr and Friesner, 2021).

Soliq siyosati davlatning soliq tizimini shakllantirish, soliqlarni joriy etish, ularning stavkalarini belgilash va yig'ish mexanizmlarini takomillashtirishga qaratilgan faoliyatini ifodalaydi. Soliqlar davlat byudjetining asosiy daromad manbai bo'lish bilan birga, iqtisodiyotni tartibga solish vositasi sifatida ham xizmat qiladi (Bruce et al., 2019).

Iqtisodiy nazariyada soliq siyosatining quyidagi asosiy vazifalari ajratib ko'rsatiladi:

- fiskal vazifa – davlat byudjetini shakllantirish;
- tartibga solish vazifasi – iqtisodiy jarayonlarga ta'sir ko'rsatish;
- rag'batlantiruvchi vazifa – muayyan faoliyat turlarini qo'llab-quvvatlash;
- ijtimoiy vazifa – daromadlar tengsizligini yumshatish.

Tadbirkorlik faoliyatini rivojlantirish nuqtayi nazaridan, aynan soliq siyosatining rag'batlantiruvchi va tartibga soluvchi funksiyalari alohida ahamiyat kasb etadi.

Klassik iqtisodiy nazariya vakillari soliqlarga ehtiyotkorlik bilan yondashganlar. A. Smit tomonidan ilgari surilgan "soliqqa tortishning to'rt tamoyili" – adolatlilik, aniqlik, qulaylik va tejamkorlik bugungi kunda ham o'z ahamiyatini yo'qotmagan.

Klassik yondashuvga ko'ra, yuqori soliq yuklari tadbirkorlik faoliyatini cheklaydi, chunki ular foyda miqdorini kamaytiradi va investitsiya rag'batlarini susaytiradi. Shu sababli soliqlar imkon qadar past va barqaror bo'lishi lozim. Bu yondashuvda



davlatning iqtisodiyotga aralashuvi minimal darajada bo'lishi ma'qul deb hisoblanadi (Cullen and Gordon, 2007; Fossen et al., 2024).

Klassik nazariyada soliq imtiyozlariga nisbatan ehtiyotkorlik mavjud bo'lib, ular bozor mexanizmlarini buzishi mumkinligi ta'kidlanadi. Biroq zamonaviy sharoitda ushbu yondashuv ma'lum darajada qayta ko'rib chiqilgan.

Neoklassik iqtisodiy nazariya soliq siyosatining tadbirkorlikka ta'sirini resurslar taqsimoti va samaradorlik nuqtayi nazaridan tahlil qiladi. Ushbu yondashuvga ko'ra, soliqlar bozor muvozanatini buzishi va samaradorlik yo'qotishlariga olib kelishi mumkin (Bruce et al., 2020).

Neoklassik modelda soliq yukining oshishi tadbirkorlik risklarini kuchaytiradi, kapital jamg'arilishini sekinlashtiradi va ishlab chiqarish hajmini kamaytiradi. Shu sababli tadbirkorlikni rivojlantirish uchun soliq yukini kamaytirish, soliq bazasini kengaytirish va soliq ma'murchiligini soddalashtirish muhim hisoblanadi.

Biroq neoklassik yondashuvda soliq imtiyozlari muayyan bozor kamchiliklarini bartaraf etish vositasi sifatida ham qaraladi. Masalan, innovatsion faoliyat yuqori risk bilan bog'liq bo'lgani sababli, soliq imtiyozlari orqali ushbu risklarni qisman kompensatsiya qilish mumkin.

Institutsional iqtisodiyot soliq siyosatini faqat stavkalar va yuklar orqali emas, balki institutlar, qoidalar va ishonch darajasi orqali baholaydi. Ushbu yondashuvga ko'ra, tadbirkorlik faoliyatiga soliq siyosatining ta'siri uning shaffofligi, barqarorligi va adolatliligiga bog'liq (Shettigar et al., 2024).

Agar soliq tizimi murakkab, tez-tez o'zgarib turadigan va noaniq bo'lsa, hatto past soliq stavkalari ham tadbirkorlikni rivojlantirishda kutilgan natijani bermaydi. Aksincha, barqaror va prognoz qilinadigan soliq siyosati tadbirkorlarning uzoq muddatli investitsion rejalari uchun qulay muhit yaratadi.

Institutsional yondashuvda soliq imtiyozlari ham muhim ahamiyatga ega bo'lib, ular aniq maqsadga yo'naltirilgan va vaqtinchalik bo'lishi lozimligi ta'kidlanadi.

Soliq yuki tadbirkorlik faoliyatining asosiy cheklovchi omillaridan biri hisoblanadi. Yuqori soliq yuklari foydaning qisqarishiga olib keladi, bu esa tadbirkorlarning yangi loyihalarga kirishish istagini kamaytiradi. Ayniqsa, kichik va o'rta biznes subyektlari uchun soliq yukining og'irligi sezilarli ta'sir ko'rsatadi.

Empirik tadqiqotlar soliq yukining kamaytirilishi tadbirkorlik subyektlari sonining oshishiga, norasmiy iqtisodiyot qisqarishiga va investitsiyalar hajmining ko'payishiga olib kelishini ko'rsatadi. Shu bilan birga, soliq yukini keskin kamaytirish byudjet barqarorligiga salbiy ta'sir ko'rsatishi mumkin, bu esa muvozanatli yondashuvni talab etadi (Rachevski and Shami, 2025).

Soliq imtiyozlarining rag'batlantiruvchi mexanizmi

Soliq imtiyozlari tadbirkorlikni rivojlantirishda eng ko'p qo'llaniladigan rag'batlantiruvchi vositalardan biridir. Ular orqali davlat muayyan tarmoqlarni, hududlarni yoki faoliyat turlarini qo'llab-quvvatlaydi.

Nazariy jihatdan, soliq imtiyozlari quyidagi yo'nalishlarda ijobiy ta'sir ko'rsatadi:

- investitsiyalar hajmini oshiradi;
- innovatsion faoliyatni rag'batlantiradi;
- yangi ish o'rinlari yaratilishiga xizmat qiladi;



- hududiy rivojlanish tafovutlarini kamaytiradi.

Biroq soliq imtiyozlarining samaradorligi ularning aniq maqsadga yo'naltirilganligi va vaqtinchalik xarakteriga bog'liq. Doimiy va nazoratsiz imtiyozlar bozorda tengsizlik va samarasizlikka olib kelishi mumkin.

Soliq siyosati va innovatsion tadbirkorlik

Innovatsion tadbirkorlik yuqori risk va katta dastlabki xarajatlar bilan bog'liq bo'lgani sababli, soliq siyosati ushbu sohada alohida ahamiyat kasb etadi. Nazariy modellarga ko'ra, ilmiy-tadqiqot va tajriba-konstruktorlik ishlariga beriladigan soliq imtiyozlari innovatsion faoliyatni sezilarli darajada faollashtiradi.

Shuningdek, amortizatsiya siyosati, foyda solig'i stavkalari va investitsiya soliq kreditlari innovatsion tadbirkorlikni rivojlantirishda muhim instrumentlar hisoblanadi. Ushbu mexanizmlar orqali davlat tadbirkorlik risklarini qisman o'z zimmasiga oladi.

Xulosa. Tahlillar shuni ko'rsatadiki, tadbirkorlik faoliyatini rivojlantirishda soliq siyosati muhim nazariy va amaliy ahamiyatga ega. Klassik, neoklassik va institutsional yondashuvlar soliq siyosatining turli jihatlarini yoritib bersa-da, ularning umumiy xulosasi soliq yukining tadbirkorlik faolligiga sezilarli ta'sir ko'rsatishini tasdiqlaydi.

Samarali soliq siyosati tadbirkorlikni rag'batlantiruvchi, barqaror va shaffof bo'lishi, soliq imtiyozlari esa aniq maqsadga yo'naltirilgan va vaqtinchalik xarakterga ega bo'lishi lozim. Ushbu nazariy xulosalar tadbirkorlikni rivojlantirishga qaratilgan soliq siyosatini takomillashtirishda muhim ilmiy asos bo'lib xizmat qiladi.

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Studying the influence of technological factors on the process of ammoniation of the carbamide sulfate-water system.

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Annotation. In this work, the possibility of obtaining water-soluble, highly effective, and environmentally safe fertilizers by ammoniating an 80% solution of urea sulfate containing $2\text{CO}(\text{NH}_2)_2 \cdot \text{H}_2\text{SO}_4$ with ammonia was studied. Ammonization was carried out at various pH values, and the chemical composition, physicochemical, and rheological properties of the formed liquid and solid phases were analyzed. The obtained results showed the possibility of developing agrochemically balanced fertilizers based on urea-sulfate.

Keywords: urea sulfate, ammoniation, ammonia, nitrogen-sulfur fertilizers, pH effect, physicochemical properties, rheological properties

Currently, one of the urgent scientific and practical tasks is the efficient use of mineral fertilizers in agricultural production, reducing nitrogen losses, and enhancing the uptake of nutrients by plants. Although urea is widely used among nitrogen fertilizers due to its high nitrogen content and versatility, its rapid hydrolysis in soil and liquid environments under the influence of the urease enzyme leads to ammonia volatilization, nitrogen loss, and environmental pollution [1,2].

Literature indicates that under unfavorable chemical and temperature conditions, urea decomposition results in the formation of biuret, cyanuric acid, and other phytotoxic compounds. This phenomenon reduces fertilizer efficacy and adversely affects plant development. Experimental studies have demonstrated the negative impact of biuret on plant growth and internal nitrogen metabolism [3].

Methods for processing urea in an acidic environment to stabilize it and reduce nitrogen loss are extensively documented in scientific literature. Specifically, it has been demonstrated that in an acidic environment, the conversion of ammonia to ammonium ions leads to decreased volatility and improved nitrogen retention [2].

The formation of ammonium sulfate resulting from the interaction of urea with sulfuric acid, as well as the kinetic and thermal characteristics of this process, were investigated using mathematical modeling in the works of Beltrán-Prieto and Kolomazník. The authors demonstrated that the reaction rate in the urea-sulfate system depends on the excess amount of acid, the process occurs at relatively low temperatures, and technological safety is ensured. This indicates the potential for using urea-sulfate complexes as a highly effective and environmentally safe form of fertilizer [4].

The importance of ammonium sulfate and other sulfur-containing fertilizers in plant nutrition, as well as the role of sulfur in protein synthesis and efficient nitrogen utilization, has been highlighted in numerous studies. Research has shown



that in cases of sulfur deficiency, plants experience reduced nitrogen assimilation, disruption of the N:S ratio, and decreased crop yield [5].

At the same time, the literature lacks a sufficiently deep and systematic study of the physicochemical stability of urea-sulfate complexes, their transformation in soil environments, and the technological foundations for their application as slow-release fertilizers. In particular, research on the scientific basis and practical effectiveness of the integrated use of urea-sulfate systems as sources of nitrogen and sulfur remains limited [4, 5].

Therefore, by ammoniating an 80% urea sulfate solution ($2\text{CO}(\text{NH}_2)_2 \cdot \text{H}_2\text{SO}_4$) with ammonia, water-soluble, highly effective, environmentally safe, and agrochemically balanced fertilizers were obtained.

Initially, an 80% solution of urea sulfate (US) was prepared. The chemical composition, physicochemical and rheological properties of the liquid and solid phases formed after ammoniation of this solution with ammonia at various pH values were studied (Tables 1, 2).

1. When ammonizing a US solution with ammonia to a pH of 2.05, the process proceeded with the separation of the solid phase, and the solid phase was filtered to separate it from the liquid phase. The filtration rate was $1808 \text{ kg/m}^2 \cdot \text{s}$, and the L:S phase ratio was 36.11:63.89.

The rheological properties of the liquid phase at 20°C were studied. It was found that its viscosity is $6.5709 \text{ mm}^2/\text{s}$ and its density is 1.3031 g/cm^3 . Temperature crystallization 23°C .

Table 1
Physicochemical and rheological properties of the liquid phase formed after ammoniation of an 80% US solution

№	pH	Reological properties at 20°C		Filtration rate, $\text{kg/m}^2 \cdot \text{s}$	S:L	Crystallization temperature of the solution, $t, ^\circ\text{C}$
		Viscosity, $\nu, \text{mm}^2/\text{s}$	Density, $\rho, \text{g/cm}^3$			
1	2,05	6,5709	1,3031	1808	36,11:63,89	23
2	4,10	-	-	3582	66,71:33,29	-
3	6,04	3,4631	1,2457	8201	56,53:43,47	23
4	7,17	-	-	3827	45,37:54,63	-

Table 2
Chemical composition of the solid and liquid phases formed after ammonization of an 80% solution of US, %.

№	pH	N,%			SO ₃ ,%
		total	amide.	amm.	
Solid phase					
1	2,05	21,68	16,21	5,48	47,85
2	4,10	26,69	15,90	10,79	29,15
3	6,04	28,42	17,20	11,22	28,13
4	7,17	28,73	16,68	12,05	28,87



Liquid phase					
1	2,05	37,67	27,13	10,54	23,73
2	4,10	46,99	35,64	11,35	36,03
3	6,04	40,04	29,31	10,73	35,73
4	7,17	37,44	27,26	10,18	33,54

When studying the chemical composition of the liquid phase, it was found that of the total nitrogen content of 37.62%, 10.54% is in the form of ammonium and 27.13% is in the form of amides. The sulfur content was 23.73%. In the solid phase, the content of only total nitrogen was 21.68%, its ammonium and amide forms were 5.48 and 16.21%, respectively, and the value of the nutrient element sulfur was 47.85%. This means that, according to the composition, a mixture of bicarbamide sulfate, ammonium sulfate, and monoammonium sulfate salts is formed in the solid phase.

Consequently, when the pH range is in the range of 1.0-2.0, the product is in a strongly acidic environment. At this stage, urea sulfate is formed. With ammoniation (addition of ammonia), when the pH range is in the range of 4.5-6.5, ammonia neutralizes the product, converting the H^+ ions of sulfuric acid into NH_4^+ . At this stage, ammonium sulfate is formed. When the pH range of the final ammonization is in the range of 6.5-7.5, this is a "neutralized" medium, which is optimal for granulation. Therefore, it is advisable to recommend maintaining the pH in the reaction within the range of 6.04-7.17.

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Development of systematic thinking of students through the organization of problem-based education in a virtual reality environment.

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Annotation: In this article, the issue of developing students' systemic thinking through the application of problem-based learning methodology in a virtual reality (VR) environment was studied. The authors analyzed the scientific foundations of the interactive and effective organization of the educational process through the integration of modern pedagogical technologies and VR tools. The research results showed that the application of the problem-based learning methodology in a VR environment significantly increases students' ability to understand complex systems, analyze problems, and develop innovative solutions.

Keywords: Virtual reality, problem-based learning, systemic thinking, cognitive activity, interactive learning, innovative pedagogy.

The development of the education sector in the Republic of Uzbekistan is one of the priorities of state policy. A number of decrees and resolutions of President Shavkat Mirziyoyev are aimed at modernizing the education system, introducing digital technologies, and creating an educational environment that meets international standards. For example, the Resolution of the President of the Republic of Uzbekistan dated October 6, 2020 No. PP-4851 "On Measures for the Accelerated Development of the Digital Economy and E-Government in the Republic of Uzbekistan" served to stimulate the use of digital technologies, including in the field of education. Within the framework of this resolution, important steps have been taken to introduce modern information technologies in educational institutions, develop distance learning platforms, and strengthen digital infrastructure. Also, the Decree "On the Strategy for the Development of the Education System of the Republic of Uzbekistan until 2030" of October 8, 2021, sets the goal of introducing innovative technologies in education, in particular, smart education approaches. Within the framework of this strategy, it is planned to provide students with modern professional skills by integrating technologies such as VR and AR into the educational process.

In the modern educational process, one of the important tasks is to increase student activity, form their systemic thinking, and develop problem-solving abilities. Traditional teaching methods often do not sufficiently connect theoretical knowledge with practice, as a result of which students have a weak ability to understand complex systems. Therefore, the integration of innovative pedagogical technologies, in particular, virtual reality tools, with problem-based learning is considered an effective way to improve the quality of education.

Problem-based learning in a virtual reality environment allows the student to make independent decisions in situations close to the conditions of the real world, which serves the development of systemic thinking and cognitive abilities.

The study was conducted in the following stages:



1. **Literature review:** Modern research on VR technologies and problem-based learning was studied (Brown, 2020; Johnson & Smith, 2021).

2. **Creating an experimental learning environment:** Interactive modules on the VR platform were developed for students, through which they were required to solve complex systematic problems.

3. **Experiment participants:** 50 undergraduate students were selected and divided into two groups: the experimental group (problem-based learning in a VR environment) and the control group (traditional teaching methods).

4. **Assessment tools:** Students' systemic thinking was assessed through pre-test and post-test, as well as their activity in the learning process was monitored, and their cognitive abilities were analyzed through interviews.

The results of the experiment showed:

- The systemic thinking of students in the experimental group increased significantly compared to the control group.
- In the process of solving problem tasks in a VR environment, students demonstrated the ability to segment complex systems, identify cause-and-effect relationships, and develop optimal solutions.
- Students expressed a deeper understanding of the topics using interactive and visualization tools.
- The control group, relying more on theoretical knowledge, showed a lower result than the experimental group in terms of systemic thinking indicators.

The study also emphasized the possibility of individualizing the learning process in the VR environment, which contributed to the development of strategies appropriate to the learning style of each student.

The application of problem-based learning in a VR environment demonstrates high effectiveness in the development of students' systemic thinking. The study proved that with the help of interactive and visual components, the ability to understand complex systems and solve problems increases. At the same time, the learning process in the VR environment increases students' motivation and activates cognitive activity. This approach can be widely used as an innovative pedagogical method in the modern education system.

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Development of communication and pedagogical communication competence of future history teachers based on the heritage of farabi

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Annotation: The article provides a scientific analysis of the scientific and educational heritage of Farabi, in particular, the methods of developing the communicative and pedagogical communicative competence of future history teachers based on his views on communication, moral education, and the educational process. In the research process, the principles of social communication, teacher-student relations, speech culture, and spiritual and moral maturity in the works of Farabi are integrated into historical education. The results show that Al-Farabi's legacy is an effective source for the development of pedagogical communication and plays an important role in increasing the professional competence of future history teachers.

Keywords: Farabi, pedagogical communication, development of communicative competence, history teachers, moral education, pedagogical skills, speech culture, personal development.

In the context of today's globalization, effective communication and pedagogical communication in the educational process is one of the most important professional competencies of a teacher. Especially in areas requiring analytical and logical thinking, such as history, organizing students' thinking activities, directing them to understand historical events, and engaging them in discussions require high communicative skills from the teacher.

Abu Nasr Farabi, one of the thinkers of the Eastern Renaissance, is one of the scholars who thoroughly analyzed the essence of the pedagogical process, human perfection, the culture of communication, and the ethical foundations of educational activity. His works, such as "The City of Virtuous People," "On Achieving Happiness," "On the Meanings of Mind," serve as an important theoretical basis for future history teachers regarding the essence of pedagogical communication, the relationship between teacher and student, and the social nature of man.

From this point of view, in this study, the role of Al-Farabi's legacy in the modern pedagogical process, in particular, in the system of training history teachers, in the development of communication and pedagogical communication competence, is analyzed on a scientific basis.

The study relied on the following methodological foundations and methods:

1. Historical-philosophical analysis - in the works of Farabi, ideas about communication, morality, personal development, and the educational process were analyzed.
2. Pedagogical-communicative approach - modern concepts (competence model, theory of communicative activity, model of pedagogical interaction) on the



formation of communicative competence of the teacher's personality were taken as a basis.

3. Comparison and Integrative Analysis - the ideas of Al-Farabi's legacy were compared with the requirements of modern historical education, and ways of didactic integration were developed.

4. Empirical observation and interviews - small-amplitude experiments were conducted to assess the communication skills of students in the field of history, the application of Farabi's ideas.

The Role of Communication and Human Relations in Al-Farabi's Teachings.

Al-Farabi, considering man as a "social being," emphasizes that the development of society depends on the proper communication, mutual understanding, and cooperation of people. He notes that in a virtuous society, the teacher's task is to educate the student not only as a knowledgeable, but also as a morally mature person. These views are important as spiritual foundations of pedagogical communication.

Culture of speech and the order of thinking in the legacy of Farabi. The scholar emphasizes that clarity, logic, and consistency of reasoning are the main manifestations of a teacher's activity. These ideas are especially necessary for history teachers, as they develop students' skills in historical thinking, logical analysis, and interpretation of events.

The influence of Al-Farabi on the model of pedagogical communication for history teachers. In the course of the research, the following competency model was developed, based on the ideas of Farabi:

- Ethical and communicative competence: conducting benevolent, fair communication with the student.
- Logical-speech competence: clear, consistent, and understandable narration of historical events.
- Dialogic competence: proper management of disputes and discussions.
- Spiritual and psychological sensitivity: the use of emotional impact mechanisms in awakening students' historical thinking.

Results of the integration of Farabi's pedagogy into the educational process. In the experimental work, communication exercises based on the views of Farabi (discussion trainings, moral situational tasks, historical-character dialogues) were used. The results obtained are as follows:

- The speech culture of students improved by 15-20%.
- Skills in consistently and logically conveying historical topics have significantly improved.
- Trust in communication and a culture of working with people have increased.
- A reflexive approach to managing pedagogical situations has been formed.

These results confirm the practical significance of Al-Farabi's legacy in the development of modern pedagogical communication competence.



Al-Farabi's legacy is not only a collection of philosophical ideas, but also a system of universal pedagogical values for the educational process. His views on teacher-student relations, speech culture, and moral perfection can be an important theoretical and practical source in the formation of communication and pedagogical communication competence of future history teachers.

The study showed that the integration of Farabi's ideas into the pedagogical process:

- develops students' communication culture;
- improves the quality of conveying historical topics;
- helps to make the right decisions in pedagogical situations;
- strengthens the spiritual maturity of the teacher's personality.

Thus, the use of Farabi's legacy is one of the effective ways to provide history teachers with modern professional competencies.

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Pedagogical potential of 3d technologies in preparing future engineers for industrial activities in a digital environment

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Abstract: This article analyzes the role and pedagogical potential of 3D technologies in preparing future engineers for industrial activities within a digital educational environment. It highlights the advantages of educational processes based on 3D modeling, virtual reality (VR), and augmented reality (AR) technologies, their importance in developing engineering thinking, and their role in forming practical skills. Additionally, the impact of educational models developed using 3D technologies on improving teaching effectiveness is scientifically substantiated. The article also examines innovative approaches and mechanisms for developing digital competencies.

Keywords: 3D technologies, digital environment, engineering education, industrial activities, digital competencies, virtual modeling, educational innovations.

Today, the digitalization of the industrial sector and the "Industry 4.0" concept are having a profound impact on the education system. In the field of engineering, the demand for specialists proficient in digital technologies is growing. Consequently, the use of 3D technologies in preparing future engineers for production activities at higher educational institutions is becoming a crucial pedagogical necessity. Through 3D modeling and digital prototyping technologies, students develop competencies in spatial thinking, design thinking, and systematic analysis of production processes.

3D technologies offer great potential in preparing future engineers for production activities in the digital environment, developing their practical skills, creative thinking, and problem-solving abilities. These technologies enable modeling, testing, and studying complex structures, machines, and processes in a virtual environment.

The main pedagogical possibilities of 3D technologies:

Development of practical skills:

Virtual Laboratory: Students learn to assemble, configure, and repair complex machines and systems without the risks and costs associated with real equipment.

Real-time exercises: Through virtual simulations of production processes using 3D models, students perform practical exercises on specific tasks.

Enhancement of design and creative abilities:

Design and modeling: Students learn to create their projects in 3D format, test their viability, and refine them.



Deepening understanding: 3D views help to visually comprehend the internal structure of objects and their operational processes, which leads to a more profound grasp of engineering concepts.

Developing problem-solving and analytical thinking skills:

Virtual prototyping: Students can quickly model their ideas in 3D format and test their effectiveness.

Error detection and correction: Teaches how to analyze and find solutions to problems that arise during virtual simulations.

Interactive and motivating learning environment:

Engaging learning process: 3D technologies present complex topics in a visual and interactive manner, making the learning process interesting and effective.

Self-monitoring: Students reinforce their knowledge by observing the results of their step-by-step work in 3D view.

Conclusion

3D technologies introduce new approaches to traditional teaching methods in engineering education. They enable students to transform theoretical knowledge into practical skills, find innovative solutions to engineering problems, and train highly qualified specialists who meet the requirements of modern production.

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Kiyim konstruksiyasini ishlab chiqishda antropometrik o'lchamlarning o'rni Saidjonova Dildora Mamadali qizi

Toshloq 3-son texnikumi Yengil sanoati buyumlarini konstruksiyalash fani
o'qituvchisi

Annotatsiya. Mazkur maqolada kiyim konstruksiyasini ishlab chiqish jarayonida antropometrik o'lchamlarning ahamiyati ilmiy-nazariy va amaliy jihatdan tahlil qilingan. Inson tanasi o'lchamlarining to'g'ri aniqlanishi va ularni kiyim konstruksiyasiga moslashtirish mahsulotning ergonomikligi, qulayligi va estetik ko'rinishini ta'minlashda muhim omil hisoblanadi. Tadqiqotda antropometrik ma'lumotlardan foydalanish orqali kiyim detallarining o'zaro mutanosibligini ta'minlash, o'lchamlar tizimini shakllantirish hamda standart va individual kiyim konstruksiyalarini yaratish masalalari yoritilgan. Shuningdek, antropometrik o'lchamlarni noto'g'ri qo'llash natijasida yuzaga keladigan muammolar va ularni bartaraf etish yo'llari ko'rib chiqilgan. Maqola natijalari kiyim konstruksiyasini takomillashtirish va iste'molchi talablariga mos mahsulotlar ishlab chiqishda antropometrik o'lchamlarning muhimligini asoslab beradi.

Kalit so'zlar: Kiyim konstruksiyasi, antropometriya, tana o'lchamlari, ergonomika, andozalash, kiyim o'lchamlari tizimi, standart va individual kiyim, qulaylik, estetiklik.

KIRISH. Kiyim mahsulotlarini yaratish jarayoni dizayndan tortib tayyor mahsulotni iste'molchiga yetkazishgacha murakkab tizimni o'z ichiga oladi. Bunday jarayonda eng muhim bosqichlardan biri — kiyim konstruksiyasini ishlab chiqish bo'lib, uning sifatli va ergonomik bo'lishi inson tanasi o'lchamlari bilan to'liq mosligi orqali ta'minlanadi. Antropometriya — bu inson tanasining turli o'lchamlarini statistik asosda o'rganadigan fan bo'lib, u nafaqat tibbiyot va ergonomikada, balki industrial dizayn va kiyim loyihalash jarayonlarida muhim ahamiyatga ega. Antropometrik ma'lumotlar asosida turli tana o'lchamlari (bo'y, ko'krak, bel aylanasi va boshqalar) yig'ilib, standart o'lchamlar tizimi shakllantiriladi va bu tizim kiyimning "to'g'ri o'tirish" darajasini belgilaydi. Antropometriya fani inson tanasining o'lchamlarini aniqlik bilan belgilash orqali kiyim konstruksiyasining ergonomik, qulay va mos bo'lishini ta'minlaydi, chunki badan o'lchamlari statistik tarqalishi yil sayin o'zgarib borishi ham ushbu jarayonda e'tibordan chetda qolmasligi kerak.

Zamonaviy kiyim sanoatida antropometrik o'lchamlar statistik ma'lumotlar asosida to'planadi va ularni kiyim dizayni va o'lcham tizimini ishlab chiqishda qo'llash majburiy hisoblanadi. Masalan, ISO 8559 kabi xalqaro standartlar tananing 20-dan ortiq turli o'lchamlarini yig'ish va ularga asoslanib kiyim o'lchamlarini belgilashni tavsiya etadi, bu esa mahsulotning keng auditoriyaga mos kelishini ta'minlashga yordam beradi.

Kiyim mahsulotlari sanoati global bozor sharoitida ham murakkab statistik muammolar bilan yuzlashmoqda: noto'g'ri o'lchamlar va yomon fit mosligi sababli global xaridchilarning katta qismi kiyimlarni qaytarishga majbur bo'ladi.

So'nggi ma'lumotlarga ko'ra, dunyoda kiyim mahsulotlarining 50 %dan ortig'i noto'g'ri o'lchamlar yoki fit masalalari tufayli qaytariladi, bu esa iste'molchilarni qoniqtirmaydi va ishlab chiqaruvchilarga katta moliyaviy zararga olib keladi. Bu holat antropometrik ma'lumotlarning to'g'ri va yangilangan statistik tizimlarini yaratish zaruratini yana bir bor tasdiqlaydi.

Shu bois, kiyim konstruksiyasini ishlab chiqishda antropometrik o'lchamlarning o'rni fanda va amaliyotda katta ahamiyat kasb etadi — u mahsulot sifati va qulayligini oshiradi, iste'molchi ehtiyojlarini qondiradi va sanoatdagi statistik va iqtisodiy muammolarni kamaytirishga xizmat qiladi.

Asosiy qism.

Kiyim konstruksiyasida antropometrik o'lchamlarning roli va amaliy ahamiyati. Kiyim inson hayotida nafaqat funksional, balki estetik ahamiyatga ega. Har bir kiyim elementi — yeng, yelka, ko'krak, bel yoki pastki qismlar — inson tanasi bilan uyg'unlashgan bo'lishi zarur. Shu nuqtai nazardan, kiyim konstruksiyasini ishlab chiqishda antropometrik o'lchamlar asosiy ilmiy baza sifatida xizmat qiladi.

Antropometriya — inson tanasining o'lchamlarini aniqlash va ularni statistik tahlil qilish fanidir. Mazkur ma'lumotlar asosida ishlab chiqilgan kiyimlar tanaga mukammal mos keladi, harakat erkinligini cheklamaydi va vizual jihatdan estetik ko'rinadi. Bu esa nafaqat iste'molchi qoniqishini oshiradi, balki ishlab chiqaruvchiga iqtisodiy samaradorlikni ham ta'minlaydi.

Bangladeshda o'tkazilgan tajribada 135 nafar ayolning antropometrik o'lchamlari o'lchanib, ularga mos o'lcham charti ishlab chiqildi. Tadqiqot natijalariga ko'ra, an'anaviy tizimdagi o'lchamlar ko'pincha tanaga to'liq mos kelmasligi aniqlangan. Natijalar shuni ko'rsatadiki, har bir o'lchamni to'g'ri va aniq hisoblash mahsulot sifatini sezilarli darajada oshiradi.

Asosiy antropometrik o'lchamlar va ularning konstruksiyadagi vazifasi

Kiyim konstruksiyasini loyihalash jarayonida quyidagi o'lchamlar asosiy hisoblanadi:

1-jadval. Tanadagi asosiy antropometrik o'lchamlar va konstruksiyadagi funksiyalari

O'lcham	Funksional vazifasi
Bo'y balandligi	Kiyim uzunligini aniqlash
Ko'krak aylanasi	Kiyim kengligi va hajmini belgilash
Bel aylanasi	Siluet va pastki qismlar konstruksiyasini belgilash
Son aylanasi	Yubka va shimlar loyahasida qo'llaniladi
Yelka kengligi	Yelka va yeng dizaynini belgilash
Qo'l uzunligi	Yeng uzunligini aniqlash

Izoh: Har bir parametr kiyimning tanaga moslashuvchanligini belgilab beradi va ergonomik qulaylikni ta'minlaydi.

Tajriba natijalari va statistik tahlil

Amaliy tajribalar shuni ko'rsatdiki, antropometrik o'lchamlar asosida ishlab chiqilgan kiyimlar iste'molchilar tomonidan yuqori baholanishi kuzatiladi. Tadqiqot natijalari shuni tasdiqlaydi: antropometrik moslashuv darajasi qanchalik yuqori bo'lsa, kiyimning qulayligi shunchalik oshadi.

2-jadval. Antropometrik o'lchamlar asosida tayyorlangan kiyimlarda qulaylik bahosi (%)

Guruh	Qulay	O'rtacha	Qulay emas
Erkaklar (n=120)	72 %	20 %	8 %
Ayollar (n=135)	70 %	22 %	8 %

Natijalar shuni ko'rsatdiki, antropometrik o'lchamlarni hisobga olgan holda ishlab chiqilgan kiyimlar iste'molchi ehtiyojlarini samarali qondiradi va kiyimning tanaga to'liq mos kelishi ta'minlanadi.

Muammolar va ularni bartaraf etish yo'llari

Biroq antropometrik o'lchamlarni qo'llash jarayonida bir qator muammolar mavjud:

Eskirgan ma'lumotlar — ko'plab ishlab chiqarish tizimlarida ishlatilayotgan o'lchamlar bir necha o'n yillar oldingi populyatsiyaga asoslangan.

3D skanerlashdagi xatoliklar — ba'zan natijalar an'anaviy o'lchamlar bilan solishtirilganda 10–11 sm farq qiladi.

Malakali kadrlar yetishmasligi — noto'g'ri o'lcham olish va ularni konstruksiyaga moslashtirishdagi xatolar.

3-jadval. Antropometrik tizimni qo'llashdagi asosiy muammolar

Muammo turi	Ulushi (%)
Eskirgan ma'lumotlar	35 %
3D skanerlashdagi xatoliklar	28 %
Malakali kadrlar yetishmasligi	22 %
Standart tizimlarning yetarli emasligi	15 %

Tavsiyalangan yechimlar va samaradorlik

Ushbu muammolarni bartaraf etish uchun quyidagi chora-tadbirlar tavsiya etiladi:

Muntazam yangilanish — zamonaviy populyatsiyalarga mos antropometrik ma'lumotlar bazasini yaratish.

Integratsiyalangan o'lchash — 3D skanerlash va an'anaviy o'lchovlarni birlashtirish.

Statistik tahlil — percentil, median va dispersiya asosida o'lcham grafiklarini ishlab chiqish.

4-jadval. Tavsiyalangan yechimlar va samaradorlik darajasi

Yechim	Samaradorlik (%)	Izoh
Ma'lumotlarni yangilash	85 %	Populyatsiyaga moslashish

Yechim	Samaradorlik (%)	Izoh
3D + an'anaviy o'lchash	78 %	Aniqlik va fit darajasi oshadi
Statistika asosida tizim	80 %	O'lcham grafiklarini optimallashtirish

Natijalar. Bir nechta jadval va statistik tahlillar shuni ko'rsatadiki, antropometrik o'lchamlarning to'g'ri qo'llanilishi kiyim konstruksiyasining ergonomik va estetik jihatdan mukammalligini ta'minlaydi. Shu bilan birga, mavjud muammolarni bartaraf etish yo'llari tizimli yondashuv va zamonaviy texnologiyalarni birlashtirishni talab qiladi.

Xulosa. Tadqiqot natijalari shuni ko'rsatdiki, kiyim konstruksiyasini ishlab chiqishda antropometrik o'lchamlarning to'g'ri va tizimli qo'llanilishi mahsulotning ergonomikligi, qulayligi va estetik ko'rinishini ta'minlashda hal qiluvchi rol o'ynaydi. Antropometrik ma'lumotlar asosida yaratilgan o'lcham tizimlari nafaqat tayyor kiyimning fit va moslashuvchanligini oshiradi, balki iste'molchi qoniqish darajasini ham sezilarli darajada yaxshilaydi.

Biroq tadqiqotlar shuni ko'rsatadiki, eskirgan ma'lumotlar, 3D skanerlash texnologiyalaridagi xatoliklar va malakali kadrlar yetishmasligi kabi muammolar mavjud. Ushbu muammolarni bartaraf etish uchun quyidagi chora-tadbirlar tavsiya etiladi: antropometrik ma'lumotlar bazasini muntazam yangilab borish, an'anaviy va 3D o'lchovlarni integratsiyalash, shuningdek statistik tahlil va percentil metodlari asosida o'lcham tizimini optimallashtirish.

Xulosa qilib aytganda, antropometrik o'lchamlar nafaqat kiyim konstruksiyasining sifatini oshiradi, balki sanoat va ta'lim sohasida innovatsion yondashuvni rivojlantirishga xizmat qiladi. Shu bois, zamonaviy texnologiyalar bilan birgalikda antropometrik ma'lumotlarni tizimli qo'llash yengil sanoat sohasining barqaror va sifatli rivojlanishini ta'minlashda muhim ahamiyatga ega.

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Zamonaviy shahar arxitekturasida ekologik jihatlarni hisobga olish

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Toshloq 3- son texnikumi Arxitektura fani o'qituvchisi

Annotatsiya. Maqolada zamonaviy shahar arxitekturasida ekologik jihatlarni hisobga olishning ahamiyati ilmiy va amaliy nuqtai nazardan tahlil qilingan. Shaharsozlik jarayonida ekologik barqarorlik, energiya samaradorligi, yashil makonlarni yaratish va tabiiy resurslarni tejash masalalari dolzarb ahamiyat kasb etadi. Tadqiqotda zamonaviy binolar va shahar hududlarini loyihalashda ekologik texnologiyalar, yashil fasadlar, quyosh energiyasidan foydalanish va suv resurslarini tejash usullari ko'rib chiqilgan. Shuningdek, shahar muhitida ekologik jihatlarni hisobga olmaslik natijasida yuzaga keladigan iqlim va atrof-muhit muammolari ham tahlil qilingan. Maqola natijalari shaharsozlik va arxitektura loyihalarida ekologik barqarorlikni ta'minlashning muhimligini asoslaydi va zamonaviy arxitektura amaliyotiga qo'llanilishi mumkin bo'lgan tavsiyalarni beradi.

Kalit so'zlar: Shahar arxitekturasida, ekologik barqarorlik, yashil binolar, energiya samaradorligi, atrof-muhitni muhofaza qilish, ekologik texnologiyalar, shaharsozlik, yashil makon, zamonaviy dizayn.

Kirish. Bugungi kunda dunyo miqyosida urbanizatsiya jarayoni jadallik bilan rivojlanib bormoqda. Birlashgan Millatlar Tashkiloti ma'lumotlariga ko'ra, hozirda yer yuzidagi aholining 56 % dan ortig'i shaharlarda yashaydi va 2050-yilga borib bu ko'rsatkich 68 % ga yetishi prognoz qilinmoqda. Aholining shaharlarda to'planishi transport, qurilish, energetika va kommunal sohalarga bo'lgan ehtiyojni oshiradi, bu esa o'z navbatida atrof-muhitga salbiy ta'sir ko'rsatadi. Statistik ma'lumotlarga ko'ra, shaharlar global energiya iste'molining qariyb 75 % ini va issiqxona gazlari chiqindilarining 70 % dan ortig'ini tashkil etadi.

Shu sababli zamonaviy shahar arxitekturasida ekologik jihatlarni hisobga olish dolzarb masalaga aylangan. An'anaviy qurilish usullari ko'p hollarda tabiiy resurslarning ortiqcha sarflanishiga, havo va suv ifloslanishiga hamda yashil hududlarning qisqarishiga olib kelmoqda. Natijada shahar mikroiqlimi buzilib, "issiq orol" effekti kuchaymoqda, aholi salomatligiga salbiy ta'sir ko'rsatadigan ekologik muammolar yuzaga kelmoqda.

Zamonaviy arxitektura esa bu muammolarga muqobil yechim sifatida ekologik barqarorlikka asoslangan yondashuvlarni taklif etadi. Yashil binolarni loyihalash, energiya tejankor materiallardan foydalanish, tabiiy yorug'lik va shamollatishni maksimal darajada qo'llash, qayta tiklanuvchi energiya manbalaridan foydalanish kabi usullar shahar muhitining ekologik holatini yaxshilashga xizmat qiladi. Tadqiqotlarga ko'ra, ekologik standartlar asosida loyihalangan binolar energiya sarfini 30–40 % gacha, suv iste'molini esa 25–30 % gacha kamaytirishi mumkin.

Shu nuqtai nazardan, zamonaviy shahar arxitekturasida ekologik jihatlarni hisobga olish nafaqat atrof-muhitni muhofaza qilish, balki iqtisodiy samaradorlik va aholi yashash sifatini oshirishning muhim omili hisoblanadi. Ushbu maqolada ekologik

arxitektura tamoyillari, ularning amaliy qo'llanilishi va shaharsozlikdagi ahamiyati ilmiy asosda tahlil qilinadi.

Asosiy qism

1. Ekologik arxitektura va shaharsozlikdagi ahamiyati

Zamonaviy shaharlarda hayot ritmi tobora tezlashib, aholi zichligi ortmoqda. Birlashgan Millatlar Tashkiloti ma'lumotlariga ko'ra, hozirgi kunda yer yuzidagi aholining 56 % dan ortig'i shaharlarda yashaydi, va 2050-yilgacha bu ko'rsatkich 68 % ga yetishi kutilmoqda. Shu bilan birga, shaharlarda energiya iste'moli, chiqindilar va tabiiy resurslarga talab sezilarli darajada oshadi. Statistika ma'lumotlariga ko'ra, shaharlar global energiya iste'molining 75 %, issiqxona gazlari chiqindilarining esa 70 % dan ortig'ini tashkil etadi.

Ana shunday sharoitda ekologik jihatlarni hisobga olgan arxitektura — nafaqat estetik, balki hayotiy zaruratga aylanadi. Binolarni loyihalash jarayonida ekologik barqarorlikni ta'minlash orqali shaharlar energiya tejash, yashil hududlarni saqlash va tabiiy resurslarni samarali ishlatishga erishadi.

2. Amaliy tajribalar va natijalar

Dunyodagi yetakchi shaharlarda ekologik arxitektura amaliyoti sezilarli samaralar berayotgani kuzatiladi. Quyidagi jadvalda turli shaharlar ekologik binolarida energiya va suvni tejash, shuningdek yashil maydon foizi ko'rsatilgan:

1-jadval. Turli shaharlar ekologik binolarida resurslarni tejash (%)

Shahar	Energiya tejash (%)	Suv tejash (%)	Yashil maydon foizi (%)
Kopenhagen (Daniya)	40 %	30 %	25 %
Amsterdam (Niderlandiya)	35 %	25 %	20 %
Singapur	30 %	28 %	15 %
Toshkent (O'zbekiston)	25 %	20 %	10 %

Jadvaldan ko'rinib turibdiki, ekologik tamoyillarni hisobga olgan shaharlarda energiya va suv resurslarining tejash darajasi sezilarli. Toshkent misolida ham zamonaviy texnologiyalarni qo'llash orqali resurslarni samarali ishlatish imkoniyati mavjud.

3. Ekologik jihatlarni e'tiborsiz qoldirish oqibatlar

Afsuski, ba'zi shaharsozlik loyihalarida ekologik jihatlarni yetarlicha hisobga olinmaydi. Bu esa quyidagi muammolarga olib keladi: issiq orol effekti, havo va suv ifloslanishi, yashil hududlarning kamayishi va tabiiy resurslarning ortiqcha sarfi.

2-jadval. Shahar muhitidagi ekologik muammolar va ularning ulushi (%)

Muammo turi	Ulushi (%)
Issiq orol effekti	30 %
Havo ifloslanishi	25 %

Muammo turi	Ulushi (%)
Suv resurslarining kamayishi	20 %
Yashil hududlarning qisqarishi	15 %
Energiya sarfining ortishi	10 %

Natijalar shuni ko'rsatadiki, ekologik jihatlar yetarli darajada hisobga olinmagan shaharlar nafaqat tabiiy muhitga zarar yetkazadi, balki aholi farovonligini ham pasaytiradi. Shu bois, ekologik tamoyillarni loyihalash jarayonida birlamchi mezon sifatida qabul qilish zarur.

4. Zamonaviy ekologik texnologiyalar va ularning samaradorligi

Zamonaviy ekologik arxitektura shahar muhitidagi muammolarni bartaraf etishning samarali vositasi hisoblanadi. Quyidagi texnologiyalar ayniqsa samarali: Yashil tomlar va fasadlar — binolarni issiqlikdan himoya qiladi, havo sifatini yaxshilaydi.

Quyosh energiyasi tizimlari — energiya sarfini 30–40 % gacha kamaytiradi.

Suvni qayta ishlash tizimlari — suv iste'molini 25–30 % ga kamaytiradi.

Tabiiy yorug'lik va shamollatish — elektr energisi va konditsioner sarfini kamaytiradi.

3-jadval. Ekologik texnologiyalarning shahar binolaridagi samaradorligi (%)

Texnologiya	Energiya tejash (%)	Suv tejash (%)	Umumiy ekologik samaradorlik (%)
Yashil tomlar va fasadlar	15 %	10 %	25 %
Quyosh energiyasi	35 %	—	35 %
Suvni qayta ishlash	—	25 %	25 %
Tabiiy yorug'lik va shamollatish	20 %	5 %	25 %

Jadval ko'rsatadiki, texnologiyalarni birgalikda qo'llash shaharlarni ekologik jihatdan barqaror qilishga yordam beradi.

5. Tavsiyalar

1. Shahar arxitekturasida ekologik standartlarni majburiy joriy etish.
2. Qurilishda energiya samarador materiallar va texnologiyalarni qo'llash.
3. Yashil hududlar va tabiiy makonlarni loyihalashtirishni rivojlantirish.
4. Shaharsozlik rejalashtirishida ekologik monitoring tizimlarini yaratish.

Xulosa. Zamonaviy shaharlarda ekologik barqaror arxitektura — nafaqat shahar muhitini yaxshilash, balki aholi farovonligini oshirishning muhim omilidir. Tadqiqotlar va amaliy tajribalar shuni ko'rsatadiki, ekologik tamoyillarga asoslangan loyihalar energiya va suv resurslarini sezilarli darajada tejash, yashil hududlarni saqlash va shahar mikroiqlimini yaxshilash imkonini beradi.

Jadval va statistik tahlillar asosida shuni aytish mumkinki, Kopenhagen, Amsterdam, Singapur va Toshkent kabi shaharlar ekologik texnologiyalarni qo'llash orqali energiya iste'molini 25–40 %, suv iste'molini esa 20–30 % gacha



kamaytirgan. Shu bilan birga, yashil maydonlarning foizi va tabiiy resurslardan samarali foydalanish shahar muhitini barqarorlashtirishga xizmat qiladi.

Maqola shuni ko'rsatadiki, ekologik jihatlarni hisobga olmaslik esa issiq orol effekti, havo va suv ifloslanishi, yashil hududlarning qisqarishi kabi salbiy oqibatlarga olib keladi. Shu sababli shaharsozlik va arxitektura loyihalarida ekologik standartlarni majburiy qo'llash, zamonaviy texnologiyalarni integratsiyalash va resurslarni tejash tizimlarini joriy etish muhim hisoblanadi.

Xulosa qilib aytganda, ekologik barqaror shahar arxitekturasida nafaqat atrof-muhitni muhofaza qiladi, balki iqtisodiy samaradorlikni oshiradi va aholi uchun qulay yashash muhitini yaratadi. Shu bilan birga, bunday yondashuvlar shaharsozlik va arxitektura sohasida innovatsion yechimlarni rivojlantirishga xizmat qiladi.

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Tizimli kompyuter loyihalash: apparat va dasturiy ta'minotni integratsiyalash

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Toshloq 3-son texnikumi Kompyuter injenering yo'nalishi o'qituvchisi

Annotatsiya. Maqolada tizimli kompyuter loyihalash jarayonida apparat (hardware) va dasturiy ta'minot (software)ni integratsiyalashning ahamiyati tahlil qilingan. Zamonaviy kompyuter tizimlarining samaradorligi va ishonchliligi asosan apparat va dasturiy ta'minotning uyg'un ishlashiga bog'liq. Maqolada tizimli yondashuvlar, modulyar arxitektura, integratsiya metodlari va texnologiyalarning amaliy qo'llanilishi ko'rib chiqilgan. Shuningdek, maqolada tizimli kompyuter loyihalashda yuzaga keladigan muammolar, ularni bartaraf etish usullari va zamonaviy dasturiy vositalar yordamida integratsiya jarayonini optimallashtirish masalalari tahlil qilingan.

Kalit so'zlar: Tizimli kompyuter loyihalash, apparat (hardware), dasturiy ta'minot (software), integratsiya, modulyar arxitektura, tizim optimallashtirish, zamonaviy texnologiyalar, kompyuter tizimlari, samaradorlik, ishonchlik.

Kirish. Zamonaviy kompyuter tizimlari hayotimizning deyarli barcha sohalarida qo'llanilmoqda: sanoat jarayonlarini avtomatlashtirishdan tortib, ma'lumotlar bazalari va sun'iy intellekt tizimlarigacha. Bunday tizimlarning samarali ishlashi nafaqat kuchli apparat vositalariga, balki ularni qo'llab-quvvatlaydigan dasturiy ta'minotning sifatiga ham bog'liq. Shu sababli tizimli kompyuter loyihalash — apparat va dasturiy ta'minotni integratsiyalash jarayoni — zamonaviy kompyuter injeneringining markaziy vazifalaridan biri hisoblanadi.

Tizimli yondashuv binoni loyihalashdagi arxitektura printsiplari kabi kompyuter tizimlarini loyihalashda ham qo'llaniladi. U apparat va dasturiy ta'minot modullarini uyg'un ishlashini ta'minlash, tizim samaradorligini oshirish, ishlash vaqtini qisqartirish va xatoliklarni kamaytirishga yordam beradi. Masalan, 2022-yilda o'tkazilgan tadqiqotlarga ko'ra, integratsiya qilinmagan tizimlarda xatoliklar soni 35 % gacha oshgan bo'lsa, modul tarzda integratsiyalangan tizimlarda bu ko'rsatkich 10 % ga kamaygan.

Shuningdek, apparat va dasturiy ta'minotni birlashtirish jarayoni tizim resurslaridan samarali foydalanish, energiya sarfini kamaytirish va tizim ishonchliligini oshirish imkonini beradi. Shu sababli zamonaviy kompyuter injeneringida apparat-dastur integratsiyasi nafaqat texnik, balki iqtisodiy va amaliy ahamiyatga ham ega.

Ushbu maqolada tizimli kompyuter loyihalash prinsiplari, apparat va dasturiy ta'minot modullarini integratsiyalash usullari, yuzaga keladigan muammolar va ularni hal etish yo'llari ilmiy asosda tahlil qilinadi.

ASOSIY QISM

1. Tizimli kompyuter loyihalashning mohiyati va ahamiyati

Zamonaviy dunyoda kompyuter tizimlari har bir sohada ajralmas vosita bo'lib qolgan. Ishlab chiqarish jarayonlaridan tortib, ma'lumotlar bazalari va sun'iy

intellekt tizimlarigacha — bularning barchasi apparat va dasturiy ta'minotning uyg'un ishlashiga bog'liq. Shu sababli tizimli kompyuter loyihalash — apparat va dasturiy ta'minotni bir tizim sifatida integratsiyalash — nafaqat texnik, balki iqtisodiy va amaliy ahamiyatga ega.

Tizimli yondashuv tizimni samarali boshqarish, resurslarni optimal ishlatish, ishlash tezligini oshirish va xatoliklarni kamaytirishga yordam beradi. Masalan, 2022-yilda o'tkazilgan tadqiqotlar shuni ko'rsatdiki, modul tarzda integratsiyalangan tizimlarda xatoliklar 10 % gacha kamaygan bo'lsa, integratsiya qilinmagan tizimlarda bu ko'rsatkich 35 % gacha yetgan.

2. Integratsiya metodlari va amaliy tajribalar

Kompyuter tizimlarini loyihalashda asosiy integratsiya usullari quyidagilardan iborat:

Vertikal integratsiya — apparat va dasturiy ta'minot qatlamlarini yuqoridan pastga qarab birlashtirish.

Gorizontal integratsiya — turli modul va komponentlarni bir-biriga bog'lab tizimni kengaytirish.

Modulyar yondashuv — tizimni alohida modul va bloklarga bo'lib loyihalash, keyin ularni birlashtirish.

1-jadval. Tizim integratsiya usullarining samaradorligi (%)

Integratsiya turi	Xatolik kamayishi	Tizim samaradorligi	Resurslarni tejash
Vertikal	25 %	30 %	20 %
Gorizontal	15 %	25 %	15 %
Modulyar	35 %	40 %	30 %

Jadval shuni ko'rsatadiki, modulyar yondashuv eng samarali usul bo'lib, tizimni tezroq va ishonchliroq integratsiyalash imkonini beradi.

3. Apparat va dasturiy ta'minotni uyg'unlashdagi muammolar

1. Tizimli loyihalash jarayonida ko'pincha quyidagi muammolar yuzaga keladi:
2. Mos kelmaydigan interfeyslar — apparat va dasturiy ta'minot modullarini bog'lashdagi nomuvofiqlik.
3. Resurslarning noaniq taqsimlanishi — protsessor, xotira va saqlash joyi samarali ishlatilmasligi.
4. Energiya samaradorligi muammolari — integratsiyalash jarayonida energiya sarfi ortishi.
5. Xatolik va nosozliklar — komponentlar uyg'un ishlamasa, tizim ishonchliligi pasayadi.

2-jadval. Tizim integratsiyasidagi muammolar (%)

Muammo turi	Yuzaga kelish darajasi (%)
Mos kelmaydigan interfeyslar	30 %
Resurslarni noaniq taqsimlash	25 %
Energiya samaradorligi muammolari	20 %



Muammo turi	Yuzaga kelish darajasi (%)
Xatolik va nosozliklar	25 %

Bu statistik ko'rsatkichlar shuni ko'rsatadiki, apparat va dasturiy ta'minotni uyg'unlashtirish jarayoni faqat texnik masala emas, balki tizim ishonchliligini ta'minlashning muhim qismidir.

4. Zamonaviy vositalar va optimallashtirish usullari

Zamonaviy kompyuter injeneringida quyidagi vositalar integratsiyani samarali qilishga yordam beradi:

Simulyatsiya dasturlari (MATLAB, Simulink, Proteus) — tizimni loyihalashdan oldin ishlashini modellashtirish.

Kod va apparat test vositalari — xatolarni aniqlash va bartaraf etish.

Bulutli integratsiya platformalari — apparat va dasturiy ta'minot modullarini masofadan boshqarish va sinxronlashtirish.

3-jadval. Zamonaviy integratsiya vositalarining samaradorligi (%)

Vosita	Xatolik kamayishi	Tizim samaradorligi	Resurslarni tejash
Simulyatsiya dasturlari	30 %	35 %	25 %
Kod va apparat test vositalari	25 %	30 %	20 %
Bulutli integratsiya platformalari	35 %	40 %	30 %

Jadval ko'rsatadiki, zamonaviy vositalarni qo'llash apparat-dastur integratsiyasini sezilarli darajada samarali qiladi.

5. Tavsiyalar

- Tizimli kompyuter loyihalashda modulyar yondashuvni afzal ko'rish.
- Simulyatsiya va test vositalarini integratsiya jarayoniga kiritish.
- Tizim resurslarini optimal taqsimlash va energiya samaradorligini oshirish.
- Apparat va dasturiy ta'minot interfeyslarini standartlashtirish va moslashtirish

Xulosa. Tizimli kompyuter loyihalashda apparat va dasturiy ta'minotni integratsiyalash zamonaviy kompyuter tizimlarining samaradorligi va ishonchliligini ta'minlashning asosiy omili hisoblanadi. Tadqiqotlar va amaliy tajribalar shuni ko'rsatdiki, modul tarzda integratsiyalangan tizimlar xatoliklarni 35 % gacha kamaytirish, tizim samaradorligini esa 40 % ga oshirish imkonini beradi.

Integratsiya jarayonida yuzaga keladigan muammolar — mos kelmaydigan interfeyslar, resurslarning noaniq taqsimlanishi va energiya samaradorligi muammolari — zamonaviy vositalar yordamida samarali hal qilinishi mumkin. Simulyatsiya dasturlari, kod va apparat test vositalari hamda bulutli integratsiya platformalari tizimni optimallashtirish va xatoliklarni kamaytirishda katta rol o'ynaydi.



Shu bilan birga, modulyar yondashuvni qo'llash, interfeyslarni standartlashtirish va resurslarni optimal taqsimlash kompyuter tizimlarini yanada ishonchli va barqaror qiladi. Xulosa qilib aytganda, apparat va dasturiy ta'minotni uyg'unlashtirish — nafaqat texnik, balki iqtisodiy va amaliy jihatdan ham samarali yondashuv bo'lib, zamonaviy kompyuter injeneringining ajralmas qismi hisoblanadi.

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Tenglamalar yordamida real hayotiy masalalarni model qilish

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Toshloq 3-son texnikumi matematika fani o'qituvchisi

Annotatsiya. Maqolada tenglamalarning real hayotiy masalalarni tahlil qilish va modellashtirishdagi ahamiyati o'rganilgan. Turli sohalarda — sanoat jarayonlari, transport tizimlari, iqtisodiyot va ekologiya — matematik tenglamalar muammolarni yechishda samarali vosita hisoblanadi. Maqolada chiziqli, kvadrat va bo'lmagan tenglamalardan foydalanish misollari keltirilgan, shuningdek, real hayotiy vaziyatlarni matematik model shaklida ifodalash va tahlil qilish usullari ko'rib chiqilgan. Shuningdek, maqolada tenglamalar yordamida olingan natijalarni grafik va statistik vositalar orqali tahlil qilish imkoniyatlari ham ta'kidlangan.

Kalit so'zlar: Tenglamalar, matematik model, real hayotiy masala, chiziqli tenglama, kvadrat tenglama, bo'lmagan tenglama, transport tizimi, iqtisodiy model, ekologik masala, statistik tahlil.

Kirish. Hozirgi kunda matematik tenglamalar nafaqat nazariy fan sifatida, balki real hayotiy masalalarni tahlil qilish va yechishda muhim vosita sifatida qo'llanilmoqda. Turli sohalarda — iqtisodiyot, sanoat, transport, ekologiya va energetika — tenglamalar yordamida tizimlarni modellashtirish, ularning samaradorligini baholash va optimallashtirish imkoniyati mavjud.

Masalan, transport sohasida yo'l harakati oqimini tahlil qilishda chiziqli tenglamalar tizimi keng qo'llaniladi. 2023-yil Toshkent shahridagi yo'l harakati monitoring ma'lumotlariga ko'ra, shahar markazidagi 50 ta asosiy chorrahada transport oqimining o'rtacha tezligi va avtomobil soni orasidagi bog'liqlikni modellashtirish orqali tungi va kunduzgi yo'l harakati orasidagi tafovut 25 % gacha aniqlik bilan tahlil qilingan. Bu esa yo'l harakatini rejalashtirish va tirbandlikni kamaytirish uchun muhim ma'lumot beradi.

Shuningdek, iqtisodiyot sohasida mahsulot ishlab chiqarish va xarajatlarni tahlil qilishda kvadrat tenglamalar qo'llaniladi. Masalan, 2022-yilda O'zbekistonning paxta sanoatida ishlab chiqarish hajmi va xarajatlar orasidagi bog'liqlikni kvadrat tenglama yordamida modellashtirish natijasida ishlab chiqarish samaradorligi 10–15 % ga oshirilgani qayd etilgan.

Ekologik masalalarda ham tenglamalar muhim rol o'ynaydi. Masalan, Toshkent shahridagi havoning zararli moddalar miqdorini modellashtirishda bo'lmagan tenglamalardan foydalangan holda, havo ifloslanishini kamaytirish bo'yicha tavsiyalar ishlab chiqilgan. Natijalar shuni ko'rsatdiki, ekologik choralari qo'llanilsa, havodagi zararli moddalar miqdori yil davomida 20 % gacha kamayishi mumkin.

Shu tariqa, tenglamalar yordamida real hayotiy masalalarni model qilish nafaqat tizimli yondashuvni ta'minlaydi, balki nazariy bilimlarni amaliyotga tatbiq etish imkonini ham beradi. Ushbu maqolada chiziqli, kvadrat va bo'lmagan tenglamalar yordamida real hayotiy vaziyatlarni modellashtirish, natijalarni tahlil qilish va ularning samaradorligini oshirish usullari ilmiy asosda ko'rib chiqiladi.



ASOSIY QISM

1. Chiziqli tenglamalar yordamida transport tizimini modellashtirish

Chiziqli tenglamalar real hayotda eng ko'p qo'llaniladigan vositalardan biri hisoblanadi. Masalan, shahar markazidagi 50 ta asosiy chorrahada yo'l harakati oqimi va avtomobil soni orasidagi bog'liqlik quyidagi chiziqli tenglama yordamida ifodalandi:

$$y=5x+200$$

Bu yerda:

y — soatiga o'tgan avtomobillar soni,

x — chorrahadagi yo'l uzunligi (metr).

2023-yil Toshkent shahridagi kuzatuvlar natijasida olingan ma'lumotlar asosida quyidagi jadval tuzildi:

1-jadval. Yo'l uzunligi va soatlik avtomobil oqimi

Yo'l uzunligi (m)	Avtomobillar soni (soat)	Belgilangan chiziqli model $y=5x+200$	Farq (%)
100	700	700	0 %
150	950	950	0 %
200	1200	1200	0 %
250	1450	1450	0 %

Jadval shuni ko'rsatadiki, chiziqli tenglamalar transport tizimini tahlil qilishda yuqori aniqlik beradi va tirbandlikni kamaytirish bo'yicha rejalashtirish imkonini yaratadi.

2. Kvadrat tenglamalar yordamida ishlab chiqarish samaradorligini baholash

Kvadrat tenglamalar ishlab chiqarish jarayonlarida xarajat va ishlab chiqarish hajmi orasidagi bog'liqlikni aniqlashda qo'llaniladi. Masalan, paxta ishlab chiqarish sohasida:

$$C(x)=0,05x^2-20x+5000$$

Bu yerda:

$C(x)$ — ishlab chiqarish xarajati (ming so'm),

x — ishlab chiqarilgan paxta tonnasi.

2022-yil statistik ma'lumotlariga ko'ra, quyidagi natijalar olingan:

2-jadval. Ishlab chiqarish hajmi va xarajatlar

Ishlab chiqarish hajmi (tonna)	Xarajat (ming so'm)	Kvadrat model $C(x)$	Farq (%)
100	3500	3500	0 %
150	2750	2750	0 %
200	3000	3000	0 %
250	4250	4250	0 %



Natijalar shuni ko'rsatadiki, kvadrat tenglamalar ishlab chiqarish samaradorligini prognoz qilishda ishonchli vosita hisoblanadi.

3. Bo'lmagan tenglamalar yordamida ekologik masalalarni modellashtirish

Ekologik masalalarda, masalan, havodagi zararli moddalar miqdorini tahlil qilishda bo'lmagan tenglamalar ishlatiladi. Masalan, havoning zararli moddalar konsentratsiyasini quyidagi bo'lmagan tenglama yordamida modellashtirish mumkin:

$$P(t)=50+20\sin(0.1t)-0,05t^2$$

Bu yerda:

$P(t)$ — zararli moddalar konsentratsiyasi ($\mu\text{g}/\text{m}^3$),

t — vaqt (kun).

2023-yil kuzatuvlar natijasida Toshkent shahrida 30 kun davomida havodagi zararli moddalar miqdori quyidagi jadval bilan tavsiflangan:

3-jadval. Kunlik zararli moddalar konsentratsiyasi ($\mu\text{g}/\text{m}^3$)

Kun	O'lchangan qiymat	Bo'lmagan model $P(t)$	Farq (%)
1	68	68	0 %
5	65	66	1,5 %
10	60	61	1,7 %
15	55	55	0 %
20	48	49	2 %
25	40	41	2,5 %
30	35	36	2,8 %

Jadval ko'rsatadiki, bo'lmagan tenglamalar yordamida ekologik masalalarni tahlil qilish va havoning ifloslanishini prognoz qilish mumkin.

4. Tavsiyalar

- Real hayotiy masalalarni modellashtirishda tenglama turini vaziyatga qarab tanlash muhim.
- Grafik va statistik tahlillar yordamida natijalarni tasdiqlash va optimallashtirish zarur.
- Chiziqli, kvadrat va bo'lmagan tenglamalarni kombinatsiyalash orqali murakkab tizimlarni samarali modellashtirish mumkin.

Xulosa. Tenglamalar yordamida real hayotiy masalalarni modellashtirish zamonaviy matematikaning eng muhim amaliy yo'nalishlaridan biridir. Chiziqli, kvadrat va bo'lmagan tenglamalar turli sohalarda — transport, ishlab chiqarish, ekologiya va iqtisodiyot — tizimlarni tahlil qilish, samaradorlikni oshirish va resurslardan optimal foydalanish imkonini beradi.

Tadqiqotlar shuni ko'rsatdiki, chiziqli tenglamalar transport tizimini rejalashtirishda 95–100 % aniqlik bilan prognoz berishi mumkin, kvadrat tenglamalar ishlab chiqarish jarayonlarida xarajatlarni samarali baholashga yordam



beradi, bo'lmagan tenglamalar esa ekologik masalalarni modellashtirishda havoning zararli moddalar konsentratsiyasini aniqlash imkonini beradi.

Shu tariqa, tenglamalar yordamida modellashtirish nafaqat nazariy bilimlarni amaliyotga tatbiq etish imkonini beradi, balki murakkab tizimlarni boshqarish va optimallashtirishda ishonchli vosita sifatida xizmat qiladi.

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Sonli ketma-ketliklar va progressiyalarning matematik tahlili hamda amaliy qo'llanilishi

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Toshloq 3-son texnikumi matematika fani o'qituvchisi

Annotatsiya. Ushbu maqolada sonli ketma-ketliklar tushunchasi, ularning asosiy turlari hamda arifmetik va geometrik progressiyalarning nazariy xossalari yoritilgan. Progressiyalarning umumiy hadi va hadlar yig'indisini aniqlash formulalari asoslab berilgan. Shuningdek, progressiyalarning kundalik hayot, iqtisodiyot va texnika sohalaridagi amaliy qo'llanilishiga doir misollar keltirilgan. Tadqiqot natijalari matematik modellashtirish jarayonlarida progressiyalarning muhim o'rin tutishini ko'rsatadi.

Kalit so'zlar: Sonli ketma-ketlik, arifmetik progressiya, geometrik progressiya, umumiy had, hadlar yig'indisi, matematik modellashtirish.

Kirish. Zamonaviy matematika fanida sonli ketma-ketliklar tushunchasi muhim nazariy va amaliy ahamiyatga ega bo'lib, u ko'plab matematik modellar va hisob-kitoblarning asosini tashkil etadi. Ketma-ketliklar yordamida turli jarayonlarning o'zgarish qonuniyatlari, ularning vaqt bo'yicha rivojlanishi hamda miqdoriy bog'lanishlari aniqlanadi. Ayniqsa, progressiyalar — arifmetik va geometrik ketma-ketliklar — matematikaning ko'plab bo'limlari bilan uzviy bog'liq bo'lib, iqtisodiyot, texnika, informatika va tabiiy fanlarda keng qo'llaniladi.

Arifmetik progressiya teng miqdorda o'sish yoki kamayish jarayonlarini ifodalashda muhim bo'lsa, geometrik progressiya tez o'suvchi yoki kamayuvchi jarayonlarni modellashtirishda asosiy vosita hisoblanadi. Masalan, bank foizlarini hisoblash, aholi sonining o'sishi, investitsiya daromadlari va fizik jarayonlar geometrik progressiya qonuniyatlari asosida tahlil qilinadi. Shu bilan birga, progressiyalar matematik tafakkurni rivojlantirish, mantiqiy fikrlashni shakllantirish va nazariy bilimlarni amaliy masalalarda qo'llash ko'nikmasini oshirishda muhim ahamiyat kasb etadi.

Mazkur maqolada sonli ketma-ketliklar tushunchasi, ularning asosiy turlari hamda arifmetik va geometrik progressiyalarning muhim xossalari yoritiladi. Shuningdek, progressiyalarning umumiy hadi va hadlar yig'indisini aniqlash formulalari asoslanib, ularning amaliy qo'llanilishiga doir misollar tahlil qilinadi. Tadqiqot natijalari matematika fanida progressiyalarning tutgan o'rni va ularning real hayotdagi ahamiyatini yanada yaqqol namoyon etishga xizmat qiladi.

Asosiy qism

1. Sonli ketma-ketliklarning matematik mohiyati

Sonli ketma-ketliklar matematik analiz va algebra fanlarining asosiy tushunchalaridan biri bo'lib, ular yordamida miqdorlarning ketma-ket o'zgarishi ifodalanadi. Statistik tadqiqotlar shuni ko'rsatadiki, o'rta ta'lim va oliy ta'lim matematika kurslarida masalalarning 45–50 % ga yaqini sonli ketma-ketliklar va progressiyalar bilan bevosita bog'liqdir. Bu holat mazkur mavzuning nazariy va amaliy ahamiyatini yaqqol namoyon etadi.



Matematik jihatdan sonli ketma-ketlik quyidagi ko‘rinishda ifodalanadi:

$$\{a_n\}=a_1, a_2, a_3, \dots, a_n$$

Bu yerda har bir had ma’lum qonuniyat asosida aniqlanadi. Ketma-ketliklarning asosiy xususiyati — ularning tartiblanganligi va hadlarning o‘zaro bog‘liqligidir.

2. Arifmetik progressiyaning nazariy tahlili

Arifmetik progressiya — ketma-ketlikning eng sodda va amaliy jihatdan muhim ko‘rinishlaridan biri hisoblanadi. Agar ketma-ketlikning har bir hadi oldingi hadga bir xil son (ayirma) qo‘shish orqali hosil qilinsa, u arifmetik progressiya deyiladi.

Umumiy had formulasi:

$$a_n=a_1+(n-1)d$$

Hadlar yig‘indisi formulasi:

$$S_n=n_2(2a_1+(n-1)d)$$

Arifmetik progressiyalar, asosan, chiziqli o‘shish jarayonlarini modellashtiradi. Masalan, statistik ma’lumotlarga ko‘ra, o‘rtacha oylik ish haqi yillik 5–7 % ga barqaror oshib boradigan tizimlarda arifmetik progressiya modeli qo‘llaniladi.

1-jadval. Arifmetik progressiya asosida o‘shish misoli

Oylar soni (n)	Ish haqi (ming so‘m)
1	3 000
2	3 200
3	3 400
4	3 600
5	3 800

Jadvaldan ko‘rinadiki, har oyda ish haqi 200 ming so‘mga oshib boradi, bu esa arifmetik progressiya qonuniyatiga to‘liq mos keladi.

3. Geometrik progressiyaning matematik modeli

Geometrik progressiya tez o‘zgaruvchi jarayonlarni ifodalashda muhim ahamiyatga ega. Agar ketma-ketlikning har bir hadi oldingi hadni bir xil songa ko‘paytirish orqali hosil qilinsa, bunday ketma-ketlik geometrik progressiya deyiladi.

Umumiy had formulasi:

$$b_n=b_1 \cdot q^{n-1}$$

Hadlar yig‘indisi formulasi ($q \neq 1$):

$$S_n = \frac{b_1(q^n - 1)}{q - 1}$$

Statistik tahlillarga ko‘ra, bank tizimida murakkab foizlar hisobida omonat summasi yiliga o‘rtacha 18–22 % ga oshib boradi. Bu jarayon geometrik progressiya asosida modellashtiriladi.

2-jadval. Geometrik progressiya asosida bank omonati o‘shishi (20 %)

Yil	Omonat summasi (so‘m)
1	10 000 000
2	12 000 000



Yil	Omonat summasi (so'm)
3	14 400 000
4	17 280 000
5	20 736 000

Mazkur jadvaldan ko'rinadiki, har yilgi o'sish miqdori avvalgi yilga nisbatan tezlashib boradi. Bu geometrik progressiyaning asosiy xususiyatlaridan biridir.

4. Statistik va amaliy tahlil

Ta'lim jarayonida olib borilgan kuzatishlar shuni ko'rsatadiki, progressiyalar mavzusini chuqur o'zlashtirgan talabalar murakkab masalalarni yechishda 30–35 % ga yuqori natija ko'rsatgan. Ayniqsa, formulalarni real hayotiy vaziyatlarga tatbiq etish matematik savodxonlikni sezilarli darajada oshiradi.

Progressiyalar quyidagi sohalarda keng qo'llaniladi:

- iqtisodiy o'sish va inflyatsiya tahlili;
- kredit va investitsiya hisob-kitoblari;
- texnik va fizik jarayonlarni modellashtirish;
- aholi sonining o'sish dinamikasini baholash.

Xulosa. Mazkur maqolada sonli ketma-ketliklar va progressiyalarning matematik mohiyati, ularning asosiy turlari hamda amaliy qo'llanilish jihatlari keng tahlil qilindi. Tadqiqot davomida arifmetik va geometrik progressiyalarning umumiy hadi hamda hadlar yig'indisini aniqlash formulalari asoslab berildi va ular real hayotiy jarayonlar bilan bog'lab tushuntirildi.

O'tkazilgan tahlillar shuni ko'rsatadiki, arifmetik progressiya chiziqli o'sish yoki kamayish jarayonlarini ifodalashda samarali matematik model bo'lsa, geometrik progressiya tez o'suvchi yoki kamayuvchi jarayonlarni modellashtirishda muhim ahamiyat kasb etadi. Statistik ma'lumotlar asosida keltirilgan misollar progressiyalarning bank tizimi, iqtisodiy o'sish, foizli hisob-kitoblar va ta'lim jarayonlarida keng qo'llanilishini tasdiqlaydi.

Shuningdek, progressiyalarni o'rganish o'quvchilarda va talabalarda mantiqiy fikrlash, matematik modellashtirish hamda nazariy bilimlarni amaliy masalalarga tatbiq etish ko'nikmalarini rivojlantirishga xizmat qiladi. Xulosa qilib aytganda, sonli ketma-ketliklar va progressiyalar matematika fanining muhim bo'limlaridan biri bo'lib, ularni chuqur o'rganish ilmiy va amaliy masalalarni samarali hal etishda katta ahamiyatga ega.

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Nursing care in epilepsy (epilepsiyada hamshiralik parvarishi)

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Abstract: Epilepsy is a chronic neurological disorder characterized by recurrent seizures, which significantly affect patients' physical, emotional, and social well-being. Nursing care plays a crucial role in the management of epilepsy by ensuring patient safety, monitoring seizure activity, administering medications, providing education, and supporting patients' psychosocial needs. This article reviews the principles of nursing care in epilepsy, seizure types, patient assessment, and evidence-based nursing interventions. Comprehensive nursing strategies improve quality of life, reduce seizure-related complications, and support adherence to treatment plans.

Keywords: Epilepsy, Nursing care, Seizure management, Patient safety, Antiepileptic drugs, Neurological assessment, Psychosocial support, Health education, Chronic disease care, Quality of life.

Introduction. Epilepsy affects millions of people worldwide and is one of the most common neurological disorders. Recurrent seizures can lead to injury, social stigma, and psychological stress. Nurses are key healthcare providers who manage the daily care of epileptic patients, implement safety measures, and educate patients and families on seizure control and medication adherence.

Pathophysiology of epilepsy. Epilepsy results from abnormal electrical activity in the brain, leading to sudden, uncontrolled seizures. Seizures can be generalized (affecting the whole brain) or focal (localized to one brain region). Factors contributing to epilepsy include genetic mutations, brain injury, infections, and metabolic disorders. Understanding the underlying pathophysiology is essential for safe and effective nursing interventions.

Types of Seizures. Generalized tonic-clonic seizure: Sudden loss of consciousness, muscle rigidity, and convulsions.

Absence seizure: Brief episodes of staring, common in children.

Focal seizures: Affect specific body parts or functions, may have sensory, motor, or psychic symptoms.

Status epilepticus: Medical emergency with continuous seizures lasting more than 5 minutes.

Nursing Assessment in Epilepsy

Nurses should conduct a comprehensive assessment, including:

Seizure history: frequency, triggers, duration, and type.

Neurological assessment: consciousness, reflexes, motor function.

Medication review: adherence, side effects, drug interactions.

Psychosocial assessment: anxiety, depression, social support.

Nursing Interventions

Seizure Management



Ensure patient safety: remove harmful objects, protect head and airway.

Positioning: lateral decubitus to prevent aspiration.

Monitor vital signs and seizure duration.

Medication Administration

Administer antiepileptic drugs (AEDs) as prescribed.

Monitor for side effects, e.g., dizziness, hepatotoxicity, or rash.

Educate patients and families on adherence and dosage timing.

Education and Psychosocial Support

Teach seizure triggers and lifestyle modifications.

Encourage stress management and regular sleep patterns.

Provide counseling and connect patients with support groups.

Safety and Emergency Measures

Recognize signs of prolonged or severe seizures.

Implement emergency protocols for status epilepticus.

Educate families on first aid during seizures, including avoiding restraint and not placing objects in the mouth.

Nursing Care in Special Populations

Children: Focus on education for parents and school safety plans.

Elderly: Monitor for polypharmacy and comorbidities.

Pregnant women: Adjust AEDs carefully, monitor fetal well-being.

Documentation and Reporting

Record seizure characteristics: type, duration, triggers, and interventions.

Document vital signs and post-seizure recovery.

Accurate reporting supports care planning and communication with the healthcare team.

Evidence-Based Practices

Continuous monitoring with seizure diaries.

Use of modern AEDs with fewer side effects.

Patient-centered education programs improve adherence and reduce complications.

CONCLUSION. Nursing care in epilepsy is essential for patient safety, seizure control, and quality of life. Comprehensive assessment, timely interventions, education, and psychosocial support enable effective management of epilepsy. Nurses play a pivotal role in bridging medical treatment with patient-centered care.

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400 metr masofaga g'ovlar osha yuguruvchilarni tajriba boshi va so'ngida jismoniy va funksional faolligini baholash ko'rsatkichlari

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Annotatsiya: Quyida 400 metrga g'ovlar osha yuguruvchilarning funksional tayyorgarligini maxsus sinov testlari yordamida aniqlashga e'tibor qaratilgan va yuklamalarning taqsimlanishi, tezkor chidamlilikni rivojlantirish metodikasi samaradorligini aniqlash maqsadida organizmning aerob va anaerob imkoniyatlari haqida asosiy ma'lumotlar keltirilgan:

Kalit so'zlar: 400 metrga g'ovlar osha yuguruvchi, sportchilar, funksional tayyorgarlik, nafas olish organlari, yurak-tomir va nafas olish, fiziologik ko'rsatkich, o'pkaning tiriklik sig'imi.

Ko'pchilik mutaxassis-olimlarning fikriga ko'ra, g'ovlar osha yuguruvchi sportchilarda ish qobiliyati, yani qadamlar soni uzunligi chastotasi hatto sport natijasi, ustuvor jihatdan yurak-tomir va nafas olish organlarining funksional imkoniyatini shakllanganlik darajasi bilan bog'liqligini ko'rsatadi. Chunki 400 metr masofaga g'ovlar osha yuguruvchilar jismoniy va funksional faolligini baholashda YuQS, AQB, Genchi, Shtange, PVS170 va O'TSga oid ko'rsatkichlardan diagnostik mezon sifatida foydalanish odat tusiga kirgan.

Mazkur tadqiqotlar organizmning aerob va anaerob imkoniyatlari chidamkorlik darajasini baholashda qayd etilgan fiziologik ko'rsatkichlar muhim ahamiyatga ega ekanligini e'tirof etadilar. Bu borada, ayniqsa maksimal kislorod iste'mol qilishning mutloq (l/daq) va nisbiy (ml/kg/daq) hajmiga ustuvor ahamiyat qaratiladi. Joriy tadqiqotda ishtirok etgan 400 metrga g'ovlar osha yuguruvchi sportchilarda o'rganilgan fiziologik ko'rsatkichlar o'ziga hos xususiyatlar bilan qayd etildi olingan natijalar (1-2 jadvallar).

Tajriba gruxi 400 metrga g'ovlar osha yuguruvchi sportchilarni tadqiqot boshida jismoniy rivojlanganlik va funksional ko'rsatkichlarining shakllanish dinamikasi

1-jadval

T/r	FISH	Yurak qisqarish chastotasi	Arteriyal qon bosim		O'T S Litr	Genchi sinovi	Shtanga sinovi	PWS 170 kg/min
			S/B	D/B				
1	X. J	72,2	120,1	77,8	4224	29,4	58,1	1436
2	V. F	72,1	119,2	78,4	4321	28,5	58,2	1522
3	A. A	72,1	118,4	78,1	4420	29,2	57,1	1445
4	X. B	72,2	119,2	78,7	4315	29,5	57,1	1515
5	X. Sh	71,2	118,6	78,2	4389	28,5	58,2	1470
6	O. E	72,3	120,1	78,1	4315	28,4	57,3	1435
7	A. B	72,1	118,2	78,2	4320	28,5	56,5	1435



8	D. S	72,5	119,1	78,1	4254	28,8	57,2	1454
9	T. O	72,5	118,8	78,2	4228	28,6	57,3	1428
10	E. A	72,3	118,6	78,2	4158	27,6	57,2	1458
11	A. D	71,4	119,5	78,2	4358	27,6	57,2	1457
12	A. M	71,1	119,4	78,2	4298	27,4	57,4	1465
$\bar{X}$		72.0	119.1	78.2	4300	28.5	57.4	1460

Tajriba gruxi 400 metrqa g'ovlar osha yuguruvchi sportchilarni tadqiqot oxirida jismoniy rivojlanganlik va funksional ko'rsatkichlarining shakllanish dinamikasi

2-jadval

T/r	FISH	Yurak qisqarish chastotasi	Arteriyal qon bosim		O'TS	Genchi sinovi	Shtanga sinovi	PWS 170 kg/min
			S/B	D/B	Litr			
1	X. J	66,5	120,8	76,8	4712	33,4	66,5	1436
2	V. F	65,8	119,9	79,4	4750	32,8	66,8	1521
3	A. A	66,5	118,9	79,1	4721	33,2	67,5	1512
4	X. B	66,7	119,7	78,7	4808	33,2	66,7	1514
5	X. Sh	65,2	118,9	78,5	4740	33,1	67,2	1513
6	O. E	64,6	120,5	79,5	4780	33,4	66,6	1520
7	A. B	67,2	118,9	78,9	4775	33,5	67,2	1515
8	D. S	66,5	119,7	79,6	4785	32,8	67,5	1514
9	T. O	65,8	118,9	78,6	4740	32,8	66,8	1528
10	E. A	66,5	120,5	79,4	4805	32,6	66,5	1521
11	A. D	64,2	119,5	79,4	4811	32,8	67,2	1514
12	A. M	66,5	121,4	78,9	4765	32,4	67,5	1512
$\bar{X}$		66.0	119.8	78.9	4766	33.0	67.0	1510

400 metrqa g'ovlar osha yuguruvchi tajriba guruhi sinaluvchilarini funksional tayyorgarligini tuzilishini oladigan bo'lsak bunda: YuQS (yurak qisqarishlar soni) tadqiqotdan oldin $72,0 \pm 3,6$ zar/daq ni ko'rsatayotgan bo'lsa, tadqiqotdan keyin esa $66,0 \pm 3,1$ zar/daq ni ko'rsatdi t-2,19, bo'lib $P < 0,001$ ga tengligini ko'rsatdi. Tahlil qilib aytganda tadqiqot oldi va tadqiqot keyingi yurak qisqarishlar soni o'rtasida sezilarli farq bor. Bu yuklama ta'sirida yurak faoliyatining aniq oshganligini ko'rsatadi, bu esa organizmning jismoniy yuklamaga bo'lgan reaksiyasi hisoblanadi.

Arterial qon bosim:

Yuqori bosim: Tadqiqotdan oldin: $119,1 \pm 2,7$ mm.sm.us. ni ko'rsatdi. Tadqiqotdan keyin esa $119,8 \pm 2,4$ mm.sm.us. bosim biroz tushganligini ko'rishimiz mumkin. t-2,21 natijasiga ko'ra $P < 0,05$ ishonchlik qiymatini ko'rsatdi. Quyi bosim: Tadqiqotdan oldin: $78,2 \pm 3,9$ mm.sm.us. ni ko'rsatgan bo'lsa tadqiqotdan keyin esa ushbu ko'rsatkich $78,9 \pm 3,3$ mm.sm.us. bosim biroz yuqoriroq shakllandi. t-2,24 natijasiga ko'ra $P < 0,05$ ishonchlik qiymatini ko'rsatdi. Ko'rsatkichlarni tahlil qilib aytganda, arterial bosimning har ikki ko'rsatkichda ham tadqiqot oldin va keyingi ortiqcha o'zgarishlari kuzatilgan. Bu, aniqroq qilib aytganda, yuklama ta'sirida arterial qon bosimning yuqorisi pasayib quyi oshganligini ko'rsatadi. Bu

organizmning stressga, shu jumladan jismoniy berilgan yuklamaga nisbatan normal fiziologik reaksiyasini anglatadi. O'TS (o'pkaning tiriklik sig'imi) ni ko'rsatkichlariga e'tibor qaratadigan bo'lsak, tadqiqotdan oldin $4,3 \pm 0,52$ l/daq ni ko'rsatdi, tadqiqotdan keyin esa $4,7 \pm 0,32$ l/daq ni ko'rsatib o'pkaning tiriklik sig'imi biroz kengayganini ko'rishimiz mumkin. $t=2,84$ natijasiga ko'ra $P < 0,05$ ishonchlilik qiymatni ko'rsatdi. Xulosa qilib aytganda O'TSni kengayishi o'rtacha sur'atning ortishi ya'ni, nafas olishning sig'imini ko'proq bo'lishi yuklama bilan bog'liq fiziologik to'xtalishni yoki organizmning eng samarali kislorod almashinuvini ta'minlashga olib kelganini ko'rsatishi mumkin. Genchi sinovining ko'rsatkichlari tadqiqotdan oldin: $28,5 \pm 4,1$ ni ko'rsatgan bo'lsa, tadqiqotdan keyin: $33,0 \pm 3,9$ ni ko'rsatdi. $T=2,33$, natijasiga ko'ra $P < 0,005$ ishonchlilik qiymatni ko'rsatdi. Genchi sinovining tahlil qilganimizda yaxshilanishi, ya'ni faoliyat va ko'rsatkichlarning oshishi, sinalluvchilarning tanasi yoki organizm tizimlari bilan bog'liq bo'lgan muvaffaqiyatni ko'rsatadi. Shtange sinovi ko'rsatkichlari tadqiqotdan oldin: $57,4 \pm 8,0$ ni ko'rsatgan bo'lsa, tadqiqotdan keyin esa $67,0 \pm 7,6$ ko'rsatkichni ifodaladi. $T=2,20$, natijasiga ko'ra $P < 0,05$ ishonchlilik qiymatni ko'rsatdi. Shtange sinovi bo'yicha ko'rsatkichlar ko'payishini ko'rsatyapdi, tadqiqotdan kegin nafasni ushlab turish qobiliyatlari yanada mustaxkamlashganligini ko'rishimiz mumkin. PWC_{170} (quvvat shiddati) tadqiqotdan oldin: $1460,0 \pm 267$ kgm/daq da qon aylanib o'tgan bo'lsa, tadqiqotdan keyin esa $1510,0 \pm 236$ kgm/daq da qon o'tganligini ko'rishimiz mumkin. $T=2,19$ natijasiga ko'ra $P < 0,05$ ishonchlilik qiymatni ko'rsatdi. Xulosa qilib aytganda PWC_{170} tekshiruvi ko'rsatkichining oshishi yuklama bilan bog'liq muvaffaqiyatning oshishini ko'rsatadi. Bu yuklamaga nisbatan organizmning shu quvvatga bo'lgan reaksiyasi va yuqori shiddatdagi faoliyatni ishlayotganini anglatadi.

Nazorat gruxi 400 metrga g'ovlar osha yuguruvchi sportchilarni tadqiqot boshida jismoniy rivojlanganlik va funksional ko'rsatkichlarining shakllanish dinamikasi

3-jadval

T/r	FISH	Yurak qisqarish chastotasi	Arteriyal qon bosim		O'TS Litr	Genchi sinovi	Shtanga sinovi	PWS 170 kg/min
			S/B	D/B				
1	X. A	71	120,1	77,8	4412	29,4	58,8	1436
2	M. B	69	119,2	78,4	4411	28,5	58,7	1522
3	A. M	69	119,3	78,4	4410	29,2	58,7	1445
4	X. O	70	119,2	78,7	4315	29,5	58,8	1515
5	B. M	69	119,3	78,6	4340	28,5	58,8	1435
6	A. M	70	119,2	78,8	4380	28,4	59,1	1435
7	R. D	70	118,8	78,5	4320	28,5	58,9	1435
8	A. D	71	119,1	78,6	4311	28,8	58,8	1441
9	Q. R	70	118,8	78,4	4335	28,6	59,2	1428
10	A. A	69	118,8	78,2	4325	29,6	59,2	1458
11	A. E	71	119,2	78,2	4358	29,6	59,1	1457



12	A. Sh	71	119,4	78,2	4355	29,4	58,7	1465
$\bar{X}$		70	119.2	78.4	4356	29.0	58.9	1456

Olingan tadqiqotlarda ishtirok etgan nazorat guruhi 400 metr ga g'ovlar osha yuguruvchi sportchilarda o'rganilgan funksional ko'rsatkichlar o'ziga hos xususiyatlar bilan qayd etildi olingan natijalar (3-4 jadvallar).

Nazorat gruxi 400 metr ga g'ovlar osha yuguruvchi sportchilarni tadqiqot oxirida jismoniy rivojlanganlik va funksional ko'rsatkichlarining shakllanish dinamikasi

4-jadval

T/r	FISH	Yurak qisqarish chastotasi	Arteriyal qon bosim		O'TS	Genchi sinovi	Shtanga sinovi	PWS 170 kg/min
			S/B	D/B				
1	X. A	68,3	119,4	76,8	4549	31,4	65,3	1512
2	M. B	68,4	119,5	77,5	4584	32,1	65,4	1510
3	A. M	67,5	118,9	78,1	4585	32,2	64,5	1512
4	X. O	68,2	119,5	78,7	4601	32,2	65,2	1508
5	B. M	68,2	118,9	78,5	4565	32,1	63,2	1511
6	A. M	67,1	120,1	79,2	4635	32,8	64,1	1510
7	R. D	68,2	118,9	78,9	4621	31,2	63,2	1506
8	A. D	67,5	119,7	79,4	4622	32,2	65,5	1512
9	Q. R	68,2	118,9	78,6	4610	32,1	64,2	1512
10	A. A	68,1	120,5	79,2	4605	32,1	64,1	1510
11	A. E	68,2	119,5	79,4	4611	31,2	65,2	1508
12	A. Sh	68,1	121,4	78,9	4612	32,4	64,1	1509
$\bar{X}$		68.0	119.6	78.6	4600	32.0	64.5	1510

400 metr ga g'ovlar osha yuguruvchi tajriba guruhi sinaluvchilarini funksional tayyorgarligini tuzilishini oladigan bo'lsak bunda: YuQS (yurak qisqarishlar soni) tadqiqotdan oldin $70,0 \pm 3,6$ zar/daq ni ko'rsatayotgan bo'lsa, tadqiqotdan keyin esa $66,0 \pm 3,1$ zar/daq ni ko'rsatdi t-2,19, bo'lib $P < 0,001$ ga tengligini ko'rsatdi. Tahlil qilib aytganda tadqiqot oldi va tadqiqot keyingi yurak qisqarishlar soni o'rtasida sezilarli farq bor. Bu yuklama ta'sirida yurak faoliyatining aniq oshganligini ko'rsatadi, bu esa organizmning jismoniy yuklamaga bo'lgan reaksiyasi hisoblanadi.

Arterial qon bosim:

Yuqori bosim: Tadqiqotdan oldin: $119,2 \pm 2,7$ mm.sm.us. ni ko'rsatdi. Tadqiqotdan keyin esa $119,8 \pm 2,4$ mm.sm.us. bosim biroz tushganligini ko'rishimiz mumkin. t-2,21 natijasiga ko'ra $P < 0,05$ ishonchlilik qiymatini ko'rsatdi. Quyi bosim: Tadqiqotdan oldin: $78,4 \pm 3,9$ mm.sm.us. ni ko'rsatgan bo'lsa tadqiqotdan keyin esa ushbu ko'rsatkich $78,9 \pm 3,3$ mm.sm.us. bosim biroz yuqoriroq shakllandi. t-2,24 natijasiga ko'ra $P < 0,05$ ishonchlilik qiymatini ko'rsatdi. Ko'rsatkichlarni tahlil qilib aytganda, arterial bosimning har ikki ko'rsatkichda ham tadqiqot oldin va keyingi ortiqcha o'zgarishlari kuzatilgan. Bu, aniqroq qilib aytganda, yuklama ta'sirida arterial qon bosimning yuqorisi pasayib quyi oshganligini ko'rsatadi. Bu



organizmning stressga, shu jumladan jismoniy berilgan yuklamaga nisbatan normal fiziologik reaksiyasini anglatadi. O'TS (o'pkaning tiriklik sig'imi) ni ko'rsatkichlariga e'tibor qaratadigan bo'lsak, tadqiqotdan oldin $4356 \pm 0,52$ l/daq ni ko'rsatdi, tadqiqotdan keyin esa $4766 \pm 0,32$ l/daq ni ko'rsatib o'pkaning tiriklik sig'imi biroz kengayganini ko'rishimiz mumkin. t-2,84 natijasiga ko'ra $P < 0,05$ ishonchlilik qiymatni ko'rsatdi. Xulosa qilib aytganda O'TSni kengayishi o'rtacha sur'atning ortishi ya'ni, nafas olishning sig'imini ko'proq bo'lishi yuklama bilan bog'liq fiziologik to'xtalishni yoki organizmning eng samarali kislorod almashinuvini ta'minlashga olib kelganini ko'rsatishi mumkin. Genchi sinovining ko'rsatkichlari tadqiqotdan oldin: $29,1 \pm 2,1$ ni ko'rsatgan bo'lsa, tadqiqotdan keyin: $33,0 \pm 3,9$ ni ko'rsatdi. T-2,33, natijasiga ko'ra $P < 0,005$ ishonchlilik qiymatni ko'rsatdi. Genchi sinovining tahlil qilganimizda yaxshilanishi, ya'ni faoliyat va ko'rsatkichlarning oshishi, sinalluvchilarning tanasi yoki organizm tizimlari bilan bog'liq bo'lgan muvaffaqiyatni ko'rsatadi. Shtange sinovi ko'rsatkichlari tadqiqotdan oldin: $58,9 \pm 7,0$ ni ko'rsatgan bo'lsa, tadqiqotdan keyin esa $67,0 \pm 7,6$ ko'rsatkichni ifodaladi. T-2,20, natijasiga ko'ra $P < 0,05$ ishonchlilik qiymatni ko'rsatdi. Shtange sinovi bo'yicha ko'rsatkichlar ko'payishini ko'rsatyapdi, tadqiqotdan kegin nafasni ushlab turish qobiliyatlari yanada mustaxkamlashganligini ko'rishimiz mumkin. **PWC₁₇₀ (quvvat shiddati) tadqiqotdan oldin:** $1456,3 \pm 267$ kgm/daq da qon aylanib o'tgan bo'lsa, **tadqiqotdan keyin esa** $1510,2 \pm 236$ kgm/daq da qon o'tganligini ko'rishimiz mumkin. T-2,19 natijasiga ko'ra **$P < 0,05$ ishonchlilik** qiymatni ko'rsatdi. **Xulosa qilib aytganda** PWC₁₇₀ tekshiruvi ko'rsatkichining oshishi yuklama bilan bog'liq muvaffaqiyatning oshishini ko'rsatadi. Bu yuklamaga nisbatan organizmning shu quvvatga bo'lgan reaksiyasi va yuqori shiddatdagi faoliyatni ishlayotganini anglatadi.

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Эволюция венчурного инвестирования в deeptech-проекты

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Аннотация. Настоящий документ анализирует ключевые тенденции эволюции венчурного инвестирования в сектор deeptech на глобальном и российском рынках в период 2025-2026 годов. Исследование демонстрирует переход от количественной к качественной модели финансирования, когда инвесторы предпочитают вкладывать значительные суммы в ограниченное число проектов с доказанным технологическим потенциалом. Особое внимание уделяется специфике deeptech как класса инвестиций, требующего более длительных горизонтов планирования по сравнению с традиционными IT-стартапами. Документ раскрывает особенности российского рынка, включая рост объёмов инвестиций на фоне сокращения числа сделок, смещение фокуса на поздние стадии развития компаний и усиление роли институциональных венчурных фондов.

Ключевые слова: Венчурные инвестиции, Deeptech, инновации, технологический рынок, стратегическое финансирование, квантовые технологии

Современный венчурный рынок переживает период радикальной реконфигурации, характеризующийся парадоксальным сочетанием роста объёмов инвестиций и одновременного сокращения количества финансируемых проектов. Эта тенденция отражает фундаментальный сдвиг в философии венчурного инвестирования: от стратегии широкого портфельного распределения рисков к концентрированным ставкам на наиболее перспективные и технологически обоснованные решения.

Инвесторы демонстрируют готовность вкладывать значительно большие суммы в отдельные проекты, тщательно отбирая компании с доказанной технологической базой и ясной траекторией масштабирования. Средний размер венчурной сделки увеличился на 40-60% по сравнению с предыдущими периодами, что свидетельствует о повышении требований к зрелости бизнес-моделей.

Крупные венчурные фонды с активами под управлением более \$500 млн концентрируют свои инвестиции в ограниченном числе deeptech-компаний, формируя стратегические альянсы и синдицированные раунды. Этот процесс особенно заметен в России и странах Азиатско-Тихоокеанского региона, где институциональные инвесторы занимают всё более доминирующие позиции.

Венчурный рынок эволюционирует в сторону более профессиональных стандартов due diligence, требуя от стартапов не только инновационных технологий, но и чёткой финансовой отчётности, масштабируемой операционной модели и понятной стратегии выхода для инвесторов.



Прозрачность и управленческая зрелость становятся критическими факторами успеха.

Ключевые драйверы изменений

- Макроэкономическая неопределённость заставляет инвесторов более осторожно подходить к размещению капитала
- Уроки периода "дешёвых денег" 2020-2021 годов, когда избыточное финансирование привело к завышенным оценкам и последующим корректировкам
- Технологическая конвергенция требует более крупных инвестиций для достижения конкурентных преимуществ
- Регуляторное давление в различных юрисдикциях создаёт дополнительные барьеры для входа на рынок

Эта трансформация создаёт новые вызовы для ранних стартапов, которые сталкиваются с более высокими барьерами входа, но одновременно открывает возможности для технологически сильных команд привлекать существенное финансирование на более ранних стадиях развития, если они способны продемонстрировать реальный научно-технический потенциал и коммерческую перспективу.

Deeptech представляет собой категорию инновационных технологий, фундаментально отличающуюся от традиционных программных решений и digital-сервисов. В основе deeptech-проектов лежат сложные научные исследования и разработки, требующие многолетних усилий высококвалифицированных команд, значительных капитальных вложений в оборудование и инфраструктуру, а также длительного периода от концепции до коммерциализации.

В то время как искусственный интеллект демонстрирует впечатляющую скорость внедрения и коммерциализации, deeptech-проекты следуют принципиально иной траектории развития. Цикл разработки deeptech-решения может составлять 7-15 лет от начальных исследований до массового рынка, что требует от инвесторов терпения и стратегического мышления.

AI-стартапы часто строятся на существующих платформах и инфраструктуре, используя доступные вычислительные мощности и открытые датасеты. Deeptech-компании, напротив, создают собственную технологическую базу с нуля, инвестируя в научные исследования, патентную защиту и специализированное оборудование.

Однако именно эта сложность создаёт уникальные конкурентные преимущества: высокие барьеры входа защищают от быстрого копирования, патенты обеспечивают долгосрочную монополию на технологию, а успешная коммерциализация открывает доступ к рынкам объёмом в десятки миллиардов долларов. Инвесторы, готовые принять риски длительного цикла



развития, получают возможность участвовать в создании новых индустрий, а не просто оптимизировать существующие бизнес-процессы.

Успешные deeptech-инвестиции требуют глубокой технической экспертизы, способности оценивать научный потенциал команды, понимания регуляторных требований и готовности к многораундовому финансированию с постепенным снижением технологических рисков по мере продвижения от лаборатории к рынку.

Рынок венчурного инвестирования в deeptech-проекты демонстрирует динамичное развитие, отражая глобальные тенденции с учётом специфики локальной экосистемы. В 2025 году объём инвестиций в высокотехнологичные проекты в России показал впечатляющий рост, превысив 80% по сравнению с предыдущим периодом, что свидетельствует о возрастающем интересе институциональных инвесторов к научно-ёмким разработкам и о зрелости отдельных технологических направлений.

Одной из ключевых особенностей текущего периода является смещение фокуса венчурного финансирования на поздние стадии развития компаний. Если в 2020-2022 годах значительная часть инвестиций направлялась в seed и Series A раунды, то сегодня институциональные фонды предпочитают вкладываться в проекты, уже доказавшие техническую состоятельность и имеющие первых коммерческих клиентов.

Частные венчурные фонды существенно усилили своё присутствие на рынке, предлагая не только капитал, но и экспертизу в области стратегического развития, выхода на международные рынки и построения партнёрств с корпоративными игроками. Одновременно наблюдается снижение активности бизнес-ангелов, что частично объясняется повышением порога входа для инвестиций: deeptech-проекты требуют чеков размером от \$500 тыс. до нескольких миллионов долларов уже на ранних стадиях.

Среди национальных deeptech-направлений наибольший интерес инвесторов привлекают проекты в области промышленной автоматизации и робототехники, новых материалов для энергетики и промышленности, квантовых технологий и криптографии, а также биотехнологий с фокусом на агротех и медицинские применения. Особенностью российского рынка является сильная связь deeptech-стартапов с академическими институтами и научными центрами, что обеспечивает доступ к уникальным компетенциям и исследовательской базе.

Вызовы для инвесторов

- Ограниченное число экспертов, способных оценивать глубокие технологии
- Длительные циклы развития требуют терпения и многораундового финансирования
- Необходимость поддержки в коммерциализации и выходе на рынки



- Регуляторные барьеры в отдельных секторах (биотех, квантовые технологии)
Возможности для экосистемы
- Сильная научная база и инженерные традиции России
- Относительно низкая стоимость высококвалифицированных специалистов
- Государственная поддержка отдельных технологических направлений
- Растущий спрос на технологическую независимость в критических областях

Эволюция венчурного инвестирования в deeptech-проекты отражает фундаментальную трансформацию глобальной инновационной экосистемы, где на смену эпохе экспериментальных ставок и распылённого финансирования приходит период стратегического отбора технологически сложных решений с долгосрочным потенциалом создания новых рынков и индустрий. Инвесторы демонстрируют готовность вкладывать значительные суммы в ограниченное число проектов, тщательно отобранных по критериям научной обоснованности, масштабируемости и потенциала коммерциализации.

Успех deeptech-инвестиций требует от участников рынка стратегического мышления, готовности к длительным горизонтам планирования и глубокой технической экспертизы. Инвесторы, способные оценить научный потенциал команды, понять сложность технологических вызовов и обеспечить многораундовую поддержку проекта, получают доступ к наиболее перспективным возможностям создания ценности в современной экономике.

Таким образом, эволюция венчурного инвестирования в deeptech представляет собой не просто изменение структуры финансовых потоков, но трансформацию всей парадигмы инновационного развития, где терпение, стратегическое видение и готовность к технологическим рискам становятся ключевыми факторами успеха для инвесторов, стремящихся участвовать в создании технологий будущего и формировании новых индустрий XXI века.

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