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Biological sciences

WAYS OF APPLYING THE DIFFERENTIATED LEARNING TECHNOLOGY FOR THE DEVELOPMENT OF STUDENTS' COGNITIVE INTERESTS IN BIOLOGY

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Abstract

The integration of differentiated learning technologies into biology education offers a promising approach to enhance students' cognitive interests and engagement. These technologies cater to the diverse learning needs, preferences, and abilities of students, fostering a more personalized and interactive learning environment. Adaptive learning platforms, virtual labs, gamified learning, and immersive tools such as augmented reality (AR) and virtual reality (VR) can be effectively utilized to teach complex biological concepts. By providing customized learning pathways, facilitating collaborative projects, and offering multimedia-rich content, these technologies allow students to explore biology at their own pace, encouraging deeper curiosity and understanding. Furthermore, data collection tools, flipped classrooms, and interactive eBooks enable students to connect theory with practice, reinforcing their learning. This paper explores various ways in which differentiated learning technology can stimulate students' cognitive interests in biology, highlighting its potential to make the subject more engaging and relevant. Through the strategic application of these technologies, educators can enhance student motivation, foster critical thinking, and promote a life-long interest in biological sciences.

Keywords: differentiated learning, personality-oriented learning, multi-level tasks, biology, stages, individual approach.

Introduction

Modern concepts of secondary education proceed from the priority of the goal of education and development of the student's personality on the basis of the formation of educational activities. It is important to create conditions so that each student can fully realize himself, become a genuine subject of learning, willing and able to learn. The training should be "variable to the individual characteristics of schoolchildren". One of the means of implementing an individual approach to children is the differentiation of learning.

Differentiated learning is considered such an educational process, which is characterized by accounting typical individual differences of students. The differentiated approach at the individual level is caused by the following factors.

There is not a single child identical to another or a group [1, p.3]. Children are born with different abilities. Each child has his own individual fusion of abilities, temperament, character, will, motivation. These features develop, change, and are amenable to correction. In didactics, teaching is considered differentiated if individual differences of students are taken into account in its process [2, p.200]. Distinguish concepts "internal" and "external" differentiation. Internal refers to such an organization of the educational process, in which the individual characteristics of students are taken into account in the classroom in their classroom. This concept of differentiation is very similar to the concept of individualization of learning. With external differentiation, students of different levels of learning are specially grouped into study groups. With internal differentiation, personality-oriented learning is achieved mainly due to pedagogical technologies, and with external differentiation, students are grouped into study groups according to some individual characteristics. These signs are determined by the types of differentiation. This is differentiation by abilities [4, p.140], by interests. Differentiation by

general abilities is carried out on the basis of taking into account the general level of learning, the development of students, individual features of the psychological development of memory, thinking, cognitive activity.

Students love what they understand, in what they achieve success, which they know how to do. Any student is pleased to get good grades, even a violator of discipline. It is important that with the help of his comrades, teachers, he achieves the first successes, and that they are noticed and noted, so that he sees that the teacher is happy with his successes, or saddened by his failures. In other words, the education process should be differentiated taking into account the natural inclinations of students' abilities [4, pp.74-77].

Therefore, based on the above, the biology teacher faces several problems:

1. Create learning conditions so that a student with a low level of training feels more comfortable, so that knowledge is available to him, and a student with a high level of training "does not tread" on the spot, but studies the material in more depth.

In a modern school, in conditions of a large amount of educational information, it is almost impossible to teach all students at the same high level. Moreover, it is often unattainable for many students. And this means that most of them have a negative orientation towards the educational process as a whole.

2. Create a multi-level practical and didactic material. Existing biology textbooks are focused on their use within the framework of traditional education. In them, the studied material is built according to one template: general theoretical material and its application in practice in the form of frontal tasks.

Multimedia and Visual Learning Tools

- **Description:** Multimedia tools incorporate video, audio, and graphics to create engaging learning experiences.

- **Application:** Platforms like YouTube (e.g., CrashCourse Biology) or Thinglink (for interactive images) help present biological concepts with visual and auditory elements. Students can explore videos of processes like DNA replication or cellular respiration.

- **Benefit:** By offering rich, multimedia resources, these tools cater to different learning preferences and make biology more engaging, visually stimulating, and cognitively interesting.

So, a differentiated approach to students is a purposeful attitude of the teacher to students, taking into account their typological features, manifested in the differentiation of tasks at various stages of the lesson, when organizing homework and extracurricular work [1, p.3-5]. After all, we have long realized the need for a differentiated approach to learning, so that we can devote more time to lagging students, without losing sight of the strong ones, creating favorable conditions for the development of everyone, in accordance with their abilities and capabilities, features of their mental development, character [4, p.75]. After all, all children are very different: some are bright, talented, others are not. But every child must fulfill himself. And I think this is extremely important.

Effective problem-solving requires an orderly approach. Problem-solving skills do not magically appear in students as a result of instructors simply throwing problems at them.

It will be effective if students use the following heuristic: "How to make a DENT in a problem: Define, Explore, Narrow, Test."

The methodological literature offers an algorithm for performing research work in a certain sequence: 1) the formulation of the topic

2) formulation of the purpose and objectives of the study

3) conducting a theoretical study;

4) experimental verification;

5) analysis and presentation of the results of scientific research;

6) implementation and effectiveness of scientific research results;

7) public presentation of works at scientific and practical conferences.

Types of research activities in the lesson

The structure of research activities is defined as follows: Search activity —> analysis —> evaluation —> forecasting the development of the situation —> actions —> search activity. Based on this, the following types of research can be used when organizing the research activities of middle-level students. Solving creative biological problems. Elements of the theory of inventive problem solving (TRIZ) are used to successfully solve biological problems. TRIZ has a large number of tricks and methods that help create a solution and "extract" the solution from the subconscious. 1. Reception "On the contrary" He recommends that instead of a direct action dictated by the conditions of the problem, try to carry out the reverse action, change the generally accepted solutions to the reverse ones. For example: There are very

tasty chocolate sweets - "bottles with syrup". In their manufacture, they encounter a contradiction: – The sweet jelly-like syrup needs to be hot so that it can be easily poured into a chocolate bottle, but then the chocolate melts. - If the syrup is cold, then the chocolate does not melt, but it is very difficult to pour it. What to do? They do the opposite: the syrup is not heated, but frozen in the form of a bottle, and the chocolate is made liquid and the bottle is dipped into it. 2. Reception "Turn harm into favor." This is a difficult, but at the same time wise technique. He requires to know the system well, to know what is bad in it, to try to turn harm into good. For example: At present, the number of working industrial enterprises and agricultural enterprises has sharply decreased. This is bad. So what's so good about it? Answer: The ecological situation in many regions has become noticeably better. Charles Darwin was sick a lot as a child. This is bad. So what's so good about it? Answer: This tempered his will, and he gave humanity a new scientific concept of life on Earth.

Conclusion

As we can see, the advantages of interactive learning with a differentiated approach are still much greater. Practice shows that interactive techniques contribute to the activation of the process of mastering the necessary knowledge, teach students constructive communication, the ability to find compromises, help form critical thinking, allow the child to know himself more deeply, identify his strengths and weaknesses, advantages and disadvantages[6].

They give a powerful impetus to the development of natural abilities, to develop certain models of behavior in society, for self-knowledge and self-improvement. In my opinion, differentiation is a great way to implement a personality-oriented approach to learning. Remember how in school years we liked to play with friends in the yard or at recess, and how we were saddened by the need to read boring textbooks, memorizing long abstruse phrases invented by adults? Nothing has changed today, and children just want to play and do not like to do incomprehensible and uninteresting things imposed on them by adults. Children don't like motionless and sit silently in uninteresting lessons, memorize a huge mass of information and then try to retell it for no clear reason. The question arises - why do we continue to use the same teaching methods that once caused boredom and irritation among us, why are we not doing anything to change this situation? A serious need for this has long been overdue. The main reason for the lag of our education system is the inability to apply the knowledge gained in the study of disciplines. Under the effectiveness of educational activities of the institution,

The success of a graduate of an educational institution who is ready to be competitive in a dynamically changing situation in the country is understood by the team, each teacher and student. To do this, it is not enough to possess a certain amount of knowledge, skills, skills (standard). It requires knowledge of the main ways of interacting with the world and with oneself, such as research, design, organization, communication and reflection constitutes the competence of the graduate. Therefore, I think, that in order to achieve such a quality of educational services, it is necessary to use a differentiated approach in educational activities and the use of interactive educational technologies, the transition to interactive learning, which takes into account the abilities and level of development of students.

At the same time, it is important to take into account that the technology of differentiated education and upbringing is effective only if it is integrated with other technologies: with the technology of personality-oriented, problem-based learning.

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Chemical sciences

WAYS OF INCREASING THE CORROSION RESISTANCE OF GALVANIZED SURFACES

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Abstract

Galvanized steel, which involves coating steel with a layer of zinc, is widely used for its excellent corrosion resistance. However, even galvanized surfaces can deteriorate over time, particularly in harsh environmental conditions. This article explores various methods to enhance the corrosion resistance of galvanized steel. Key strategies include post-galvanization treatments such as passivation, chromate coatings, and clear coatings, as well as improvements to the galvanization process itself, including hot-dip galvanizing and double galvanizing. Additionally, protective coatings such as epoxy, polyurethane, and powder coatings can further enhance corrosion resistance. Cathodic protection methods, including sacrificial anodes and impressed current systems, are also examined. Environmental control and regular maintenance practices are crucial in extending the lifespan of galvanized surfaces. This comprehensive approach helps ensure galvanized steel's long-term durability, particularly in applications exposed to extreme environmental conditions.

Keywords: galvanized steel, corrosion resistance, passivation, chromate coatings, hot-dip galvanizing, double galvanizing, epoxy coatings, polyurethane coatings, powder coating

Introduction

Galvanized steel, which involves coating steel with a layer of zinc, is widely used across a range of industries due to its excellent resistance to corrosion. The zinc layer serves as a sacrificial anode that corrodes preferentially, protecting the underlying steel from rust and degradation. However, galvanized surfaces can still experience corrosion over time, especially under harsh environmental conditions. Enhancing the corrosion resistance of galvanized surfaces is crucial to increase their longevity and effectiveness, particularly in applications exposed to extreme conditions. After galvanization, additional treatments can be applied to further enhance the corrosion resistance:

Table 1

Characteristics of processes

Names of processes	Characteristics
Passivation:	Passivation involves treating the galvanized surface with a passivating agent to form a protective oxide layer, which reduces the surface's reactivity. This can be done with phosphoric acid, chromate, or other chemical solutions.
Chromate Coating	A chromate coating is often applied after galvanizing to enhance the durability and corrosion resistance. This creates a thin, protective film that helps prevent corrosion.
Clear Coating:	Applying a clear polymer or paint over the galvanized surface forms an additional barrier, preventing moisture and pollutants from reaching the zinc layer.

Enhancing the galvanizing process itself can yield better corrosion resistance:

Table 2

Characteristics of galvanizing processes

<i>Names of galvanizing processes</i>	<i>Characteristics</i>
<i>Hot-Dip Galvanizing:</i>	<i>Ensure proper hot-dip galvanizing procedures (temperature, time, and quality control) to achieve a thicker and more uniform zinc coating, which provides better protection.</i>
<i>Double Galvanizing</i>	<i>Applying two layers of zinc, either in succession or with an intermediate layer, can provide extra protection against corrosion.</i>
<i>Epoxy Coatings:</i>	<i>Epoxy coatings can be applied over galvanized steel to further prevent corrosion. Epoxy paints create a strong, durable layer that resists scratches and wear, providing an additional layer of protection.</i>
<i>Polyurethane Coatings:</i>	<i>Polyurethane coatings are resistant to environmental elements and provide a tough outer layer that protects galvanized surfaces from corrosion.</i>
<i>Powder Coating</i>	<i>Powder coating can also enhance the corrosion resistance of galvanized surfaces. It provides a tough, long-lasting finish that protects the zinc coating from damage.</i>

Anodizing is typically used for aluminum but can also be applied to galvanized steel. This process creates a thicker oxide layer on the metal, improving its corrosion resistance[1].

Sacrificial Anodes: Attach sacrificial anodes made of more reactive metals, such as magnesium or aluminum, to the galvanized surface. These anodes corrode instead of the galvanized steel, offering cathodic protection and reducing corrosion risk.

Impressed Current Systems: In more demanding applications, impressed current cathodic protection (ICCP) can be used, which provides an external electrical current to prevent corrosion.

Avoiding Contaminants: Exposure to certain environmental elements such as chlorides, sulfur compounds, and acids can accelerate corrosion. Using galvanized steel in less corrosive environments or coating it to protect against these contaminants can help.

Controlling Temperature and Humidity: In certain settings, reducing the exposure to high humidity or extreme temperatures can limit the development of corrosion on galvanized surfaces.

Inspection and Cleaning: Regular inspections and cleaning to remove dirt, debris, or contaminants that could promote corrosion can improve the longevity of galvanized surfaces[2].

Touch-up Galvanization: If the galvanized layer becomes damaged, it is important to apply a touch-up galvanizing solution to prevent exposure of the steel surface to corrosive elements.

Zinc-Aluminum Coatings: Zinc-aluminum coatings (also known as ZALCOAT) offer better corrosion resistance than traditional pure zinc coatings. The aluminum in the alloy enhances the protective qualities, particularly in harsh environments.

By implementing one or more of these strategies, you can significantly enhance the corrosion resistance of galvanized surfaces and extend their useful life.

Enhancing the Corrosion Resistance of Galvanized Surfaces

Galvanized steel, which is coated with a layer of zinc, is widely known for its ability to resist corrosion. Zinc provides a sacrificial layer that corrodes in place of the underlying steel, effectively protecting it from rust and degradation. However, over time and under certain environmental conditions, the galvanized surface can still suffer from corrosion. To enhance its durability and extend its service life, several strategies can be employed to further boost its corrosion resistance. This article will explore various methods to improve the corrosion resistance of galvanized surfaces, ensuring that these materials perform optimally in harsh environments[3].

1. Post-Galvanization Treatments

Once galvanized, the steel's surface can be treated further to enhance its corrosion resistance. These treatments form additional protective layers that serve as barriers against environmental contaminants, moisture, and pollutants.

- **Passivation:** Passivation is a chemical treatment that involves using agents like phosphoric acid to form a protective oxide layer on the surface of galvanized steel. This process reduces the material's reactivity and helps prevent further corrosion. Passivation also improves the appearance of the surface, providing a more uniform and appealing finish.

- **Chromate Coating:** Another common post-treatment for galvanized surfaces is the application of a chromate coating. This method forms a thin, transparent layer that protects the galvanized surface from corrosion, further enhancing its resistance to harsh weather and chemicals.

- **Clear Coating:** Applying a clear polymer or lacquer coating over galvanized steel offers another layer of protection. These coatings act as barriers against moisture, salts, and pollutants, which are common causes of corrosion. This treatment also enhances the aesthetics of the galvanized surface by providing a smooth, clean finish.

The process by which steel is galvanized can also impact its long-term performance in terms of corrosion resistance. By optimizing certain factors in the galvanizing process, manufacturers can produce coatings that offer better protection.

- **Hot-Dip Galvanizing:** Hot-dip galvanizing is the most common method of applying a zinc coating to steel. In this process, the steel is immersed in molten zinc, creating a thick, durable layer. To ensure maximum corrosion resistance, it is important to control the temperature, immersion time, and quality of the zinc used. A thicker, more uniform coating generally provides better protection[4].

- **Double Galvanizing:** For particularly aggressive environments, double galvanizing can be used. This involves applying two layers of zinc, often with an intermediate layer between them. This technique enhances corrosion resistance by providing a redundant protective barrier, ensuring that the steel remains protected even if the outer layer begins to degrade.

Adding extra coatings on top of the galvanized surface can provide even more robust protection. These coatings create an additional physical barrier, preventing the steel from coming into contact with corrosive elements.

- **Epoxy Coatings:** Epoxy coatings are known for their strong adhesive properties and resistance to environmental elements. When applied over galvanized surfaces, these coatings provide an additional layer of protection against abrasion, moisture, and harsh chemicals. Epoxy coatings are widely used in industrial applications where extra durability is required.

- **Polyurethane Coatings:** Similar to epoxy coatings, polyurethane coatings provide a tough outer layer that resists wear and degradation. These coatings are particularly effective in protecting galvanized surfaces from environmental factors like UV radiation and temperature fluctuations.

- **Powder Coating:** Powder coating is another option for improving the corrosion resistance of galvanized steel. This method uses a dry powder that is applied electrostatically to the surface and then cured under heat. The result is a strong, durable finish that resists scratches, chips, and other forms of mechanical wear.

Although typically used for aluminum, anodizing can also be applied to galvanized steel. This process involves creating a thicker oxide layer on the surface, which increases the material's resistance to corrosion. While anodizing is more commonly associated with aluminum, it can be effective on galvanized surfaces in certain applications, especially where extra corrosion protection is needed[5].

Cathodic protection is a method of preventing corrosion by making the galvanized steel the cathode in an electrochemical cell. This method uses an external current or a sacrificial anode to prevent corrosion from occurring on the galvanized surface.

- **Sacrificial Anodes:** A sacrificial anode, typically made from magnesium or aluminum, is attached to the galvanized surface. The anode corrodes instead of the galvanized steel, offering cathodic protection. This technique is commonly used in marine applications or underground structures where the risk of corrosion is high.

- **Impressed Current Systems:** In some high-risk environments, an impressed current cathodic protection (ICCP) system can be used. This system applies an external current to the surface to counteract the corrosive forces. It is often used for large structures like pipelines, storage tanks, and offshore platforms.

Controlling the environmental factors that contribute to corrosion can significantly improve the lifespan of galvanized surfaces.

Avoiding Contaminants: Exposure to certain chemicals, such as chlorides and sulfur compounds, can accelerate corrosion on galvanized surfaces. In environments where these contaminants are common, applying protective coatings or selecting alternative materials can help mitigate the risk of corrosion.

- **Controlling Temperature and Humidity:** Excessive humidity or temperature fluctuations can contribute to the formation of rust on galvanized surfaces. In environments where these factors are difficult to control, regular maintenance and additional protective coatings can help prevent corrosion. Even with advanced corrosion resistance strategies, regular maintenance remains crucial for maintaining the longevity of galvanized surfaces.

Inspection and Cleaning: Routine inspections and cleaning can remove dirt, debris, and contaminants that may encourage corrosion. Cleaning galvanized surfaces with mild soap and water can help ensure that corrosive elements do not accumulate.

Touch-Up Galvanization: If the zinc coating becomes damaged, it is important to apply touch-up galvanizing solutions or zinc-rich paints to repair the coating. This ensures that the steel remains protected and reduces the chances of corrosion.

Zinc-Aluminum Coatings: An alloy of zinc and aluminum, known as ZALCOAT, can provide superior corrosion resistance compared to pure zinc coatings. The addition of aluminum to the zinc layer creates a more stable and durable coating, which is particularly effective in harsh environments where corrosion is a concern.

Conclusion

Galvanized steel is a robust material that offers excellent corrosion resistance, but there are several ways to further enhance its durability. By employing post-galvanization treatments, optimizing the galvanizing process, adding protective coatings, and utilizing advanced techniques like cathodic protection, the corrosion resistance of galvanized surfaces can be significantly improved. Regular maintenance and environmental controls also play a critical role in preserving the longevity of galvanized materials. Through these methods, galvanized steel can continue to serve as a highly effective material in a wide range of applications, from construction to industrial use, ensuring long-lasting performance and protection against corrosion.

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THE ROLE OF CHEMISTRY IN IMPROVING ENVIRONMENTAL LITERACY OF STUDENTS

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Abstract

Chemistry plays a pivotal role in enhancing environmental literacy by providing students with a scientific understanding of the natural world and the impacts of human activities on the environment. Through the study of chemistry, students gain insights into fundamental environmental processes such as the water, carbon, and nitrogen cycles, which are essential for understanding the interdependence of ecosystems. Chemistry also helps explain environmental issues like pollution, climate change, and waste management by elucidating the chemical reactions and substances responsible for these problems. Furthermore, it promotes sustainable practices through the application of green chemistry principles, encouraging the design of eco-friendly products and processes. By exploring the chemistry behind renewable energy, carbon capture, and recycling, students develop critical thinking and problem-solving skills, enabling them to assess environmental challenges and propose viable solutions. Overall, integrating chemistry into environmental education empowers students to make informed decisions, advocate for effective policies, and contribute to global sustainability efforts.

Keywords: environmental literacy, chemistry, sustainability, pollution, climate change, green chemistry, renewable energy, recycling, waste management, critical thinking, chemical processes, environmental education, greenhouse gases

Introduction

The current environmental situation in the world poses an important task for humanity - the preservation of environmental living conditions in the biosphere. In this regard, the issue of environmental literacy and environmental culture of current and future generations is acute. Ecology should acquire special importance as a science that helps to find ways out of the scientific crisis. The situation can be improved through environmental education of the younger generation, which should be conducted by highly qualified, environmentally literate teachers, armed in addition to special knowledge with a number of effective techniques that allow, by comprehensively influencing the personality of students, to develop all components of environmental culture as personality qualities in terms of general human culture.

The situation can be improved through environmental education of the younger generation, which should be conducted by highly qualified, environmentally literate teachers, armed in addition to special knowledge with a number of effective techniques that allow, by comprehensively influencing the personality of students, to develop all components of environmental culture as personality qualities in terms of general human culture. Today, for the further development of civilization, the necessity of forming an ecological culture based on the values of environmental ethics becomes obvious. In order for environmental requirements to become the norm of behavior for every human being, it is necessary from childhood to purposefully cultivate a sense of responsibility for the state of the environment, the natural world, and its ecological beauty. Environmental education aims to implement an integrated process of education and upbringing, to develop educational models that organically combine the cognitive and value sides of consciousness. Modern education should be based on a solid natural science and humanitarian foundation, providing systemic interdisciplinary, integrative knowledge about nature and society, the principles of their interaction[1].

Chemistry plays a vital role in improving environmental literacy among students by providing them with the scientific foundation necessary to understand and address environmental issues. Chemistry helps students understand the fundamental processes that govern environmental systems, such as the water cycle, carbon cycle, and nitrogen cycle. By learning how these cycles work at the molecular level, students can better grasp the interconnectedness of natural systems and the impacts of human activity on the environment. Concepts like chemical reactions, energy transfer, and molecular interactions allow

students to see how pollution (e.g., greenhouse gases, acid rain) or conservation efforts (e.g., renewable energy) can have tangible effects on ecosystems and climate.

Students learn about the chemical composition of pollutants such as plastics, carbon dioxide, sulfur dioxide, and nitrogen oxides, and how these substances contribute to environmental degradation. By understanding the chemistry behind pollutants, students are more likely to appreciate the need for sustainable solutions.

For example, the role of chemistry in developing cleaner energy sources, such as solar cells, hydrogen fuel cells, or biofuels, provides students with insight into how science can combat environmental problems.

Materials and methods

Through chemistry, students learn about the importance of reducing, reusing, and recycling materials. Understanding the chemical properties of materials helps students assess which substances are biodegradable, which can be recycled, and which contribute to waste and pollution. Chemistry also introduces students to concepts like "green chemistry," which focuses on designing products and processes that minimize environmental harm. This encourages students to think critically about the materials and chemicals used in everyday products.

One of the most pressing environmental issues, climate change, is fundamentally based on chemical principles such as the greenhouse effect and the behavior of gases in the atmosphere. By studying the chemical makeup of greenhouse gases like carbon dioxide and methane, students gain a better understanding of how these gases trap heat and contribute to global warming. Students also learn about the chemical reactions involved in ozone depletion, acid rain formation, and the impact of human activities on the planet's climate. Chemistry provides students with the knowledge to understand the breakdown and recycling of materials. For instance, they can learn about how plastics degrade over time, the chemical processes involved in composting, or the principles behind waste-to-energy technologies. This encourages students to apply their knowledge of chemical processes to reduce waste, promote recycling, and think of innovative solutions for managing and reusing resources.

Results and Discussion

Environmental policies often rely on scientific data, and chemistry is essential in understanding this data. Students learn how chemical analysis informs environmental legislation, from measuring air and water quality to setting safe limits for pollutants. By connecting chemistry with environmental law and policy, students can better understand the role of science in shaping decisions that protect natural resources. Chemistry, when integrated with other subjects like biology, physics, and geography, provides students with a holistic view of environmental science. For example, the chemical principles behind photosynthesis, ecological balance, and ecosystem functions offer students a more comprehensive understanding of environmental issues.

By studying the chemical processes that influence the environment, students develop critical thinking and problem-solving skills. They can assess environmental challenges and consider scientific solutions, weighing the benefits and drawbacks of different approaches to issues such as pollution control, renewable energy, and resource conservation.

In an era of escalating environmental challenges such as climate change, pollution, and resource depletion, environmental literacy has become an essential part of education. Environmental literacy refers to the knowledge, skills, and attitudes needed to understand and address environmental issues. One of the most effective ways to enhance environmental literacy is through the study of chemistry, a field that provides the scientific foundation for understanding the natural world and the impact of human activity on the environment. Chemistry plays a crucial role in equipping students with the tools needed to tackle these issues and make informed decisions about sustainability.

Chemistry helps students gain a deep understanding of the fundamental processes that govern environmental systems. Concepts like the water cycle, carbon cycle, and nitrogen cycle are central to understanding how ecosystems work. By learning about the chemical interactions that occur within these cycles, students develop a better appreciation for how natural systems function and how they are affected by human actions. For example, students can explore the role of chemical reactions in the breakdown of pollutants, the formation of acid rain, or the absorption of carbon dioxide by oceans. Understanding these processes is crucial for recognizing the broader environmental impacts of everyday activities and industrial practices. This knowledge fosters a sense of responsibility and encourages environmentally conscious behavior.

Chemistry provides a key framework for understanding pollution and its solutions. Many environmental issues, such as air and water pollution, are the result of chemical reactions or the release of

harmful substances. By studying the chemical composition of pollutants such as carbon dioxide, nitrogen oxides, and sulfur dioxide, students can better understand how these substances affect air quality, human health, and the environment. In addition to understanding pollution, chemistry also offers insights into potential solutions. For instance, the development of cleaner energy sources, such as solar energy, biofuels, and hydrogen fuel cells, is rooted in chemical research. By learning about these innovations, students gain a sense of hope and empowerment, knowing that science and technology can play a pivotal role in reducing the environmental impact of human activities.

Sustainability is at the heart of environmental literacy, and chemistry is integral to understanding how to reduce environmental impact. By learning about the properties of materials, students can make informed choices about which products are eco-friendly, biodegradable, or recyclable. For instance, chemistry explains why certain plastics take centuries to decompose while other materials, such as biodegradable polymers, break down more quickly without causing long-term harm to ecosystems.

Chemistry also introduces students to the concept of "green chemistry," a field focused on designing chemicals and processes that minimize environmental damage. Green chemistry principles encourage students to think about how products are made and how they can be produced in a way that reduces waste, conserves resources, and avoids harmful chemicals. This fosters a mindset of sustainability, encouraging students to apply these principles in their daily lives.

One of the most pressing environmental issues of our time, climate change, is deeply rooted in chemistry. The greenhouse effect, for example, involves chemical reactions between gases like carbon dioxide and methane, which trap heat in the Earth's atmosphere. By studying the chemical composition of greenhouse gases and their role in global warming, students can better understand the mechanisms driving climate change and its potential consequences.

In addition to understanding the causes of climate change, chemistry also provides insights into possible solutions. Through the study of renewable energy sources, such as wind, solar, and geothermal power, students learn about sustainable alternatives to fossil fuels. Chemistry is also fundamental in the development of carbon capture technologies, which aim to reduce the concentration of greenhouse gases in the atmosphere. Understanding these solutions gives students the knowledge and motivation to advocate for policies and practices that can mitigate climate change.

Waste management is another area where chemistry plays a key role in promoting environmental literacy. Students learn how different materials decompose or recycle, and how chemical reactions influence the breakdown and reuse of resources. For instance, they can study the chemical processes involved in composting, which turns organic waste into nutrient-rich soil, or the recycling of aluminum, a process that requires less energy than producing new aluminum from raw materials. By understanding the chemistry of waste, students can make more informed decisions about reducing, reusing, and recycling materials. They can also appreciate the importance of waste-to-energy technologies, which use chemical processes to convert waste into electricity, further reducing the environmental burden of landfills. Environmental policy is often informed by scientific data, and chemistry plays an essential role in generating this data. Students can learn how chemical analysis is used to monitor air and water quality, measure pollutant levels, and assess the effectiveness of environmental regulations. For example, understanding how chemical markers are used to detect toxic substances in water allows students to appreciate the importance of environmental regulations in safeguarding public health.

By connecting chemistry with environmental law and policy, students see how science can guide decisions that protect the environment. This understanding encourages students to engage with current environmental issues and advocate for policies that promote sustainability and environmental protection. One of the most valuable outcomes of studying chemistry is the development of critical thinking and problem-solving skills. Chemistry encourages students to analyze complex systems, consider multiple factors, and evaluate potential solutions. These skills are essential when addressing environmental challenges, which often involve complex interactions between science, society, and policy. For example, students can analyze the trade-offs between different energy sources—such as the environmental impact of extracting fossil fuels versus the challenges of scaling up renewable energy technologies. By applying chemical knowledge to these issues, students develop the skills needed to assess the feasibility and sustainability of various environmental solutions.

Conclusion

Incorporating chemistry into environmental education is essential for improving environmental literacy. By understanding the chemical processes that shape the world around them, students are empowered to make informed decisions about environmental issues and contribute to solving global challenges. Chemistry not only deepens students' understanding of environmental processes but also fosters

sustainable thinking, problem-solving skills, and a commitment to protecting the planet. As environmental challenges continue to grow, chemistry will remain a crucial tool in shaping the environmentally literate citizens of tomorrow.

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Economic sciences

SECURITIES MARKET AS A SOURCE OF ATTRACTION OF INVESTMENTS

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Abstract

In the work we have presented, the role of the investment process in ensuring economic development has been studied. In addition, research has been conducted on the use of the opportunities of the securities market in attracting investments, and appropriate recommendations have been made based on a number of generalizations.

Keywords: securities, securities market, investment, investment process, liquidity, stock market.

The basis of the investment process is investments in the real sector of the economy, that is, in the fixed and working capital of enterprises of various forms of ownership. The investment market is the area where investment goods are bought and sold at equilibrium prices. In this case, investments are made in the form of investment goods, which are embodied in the following form:

- movable and immovable property;
- cash, special-purpose bank deposits,
- securities and other financial assets;
- property rights, licenses, patents,
- the right to use land and other resources.

Investment activity in Azerbaijan is regulated by the Law of the Republic of Azerbaijan "On Investment Activity". According to Article 10 of the aforementioned law, investors in Azerbaijan have the following rights: "to freely determine the form of investment activity, the volume of investment, the field and form of entrepreneurial activity; to freely determine the sources of financing of investment activity that are not prohibited by law; to suspend or terminate investment activity at any time, taking into account the requirements of this Law and the terms of the contract on the implementation of investment activity" [1].

The processes taking place in the world show that at present one of the main engines of the economy remains the mechanism of capital redistribution, which is the main component of investments, which is largely provided by the securities market. It is the securities market that allows redistributing temporarily free funds of legal entities and individuals between various sectors of the economy on a commercial basis, uniting issuers and those seeking to profitably invest their funds. Thus, financial cooperation between companies and investors ensures the normal development of the modern economy. One of the most important indicators of the stable activity of issuers is the investment attractiveness of their shares. It is obvious that the issuer, issuing shares of the company, seeks to attract as many funds as possible to increase the company's capital, and the investor when concluding transactions with shares, seeks to obtain maximum profit.

Investors who want to make successful investments participate in stock exchanges where they can buy shares of various companies, regularly study statistical data obtained from the results of securities trading and the financial statements of issuers, analyze possible dividends that can be obtained on stocks, and do much more to correctly analyze the investment attractiveness of stocks. Such analyses are carried out using various mathematical formulas and models developed over the years by specialists in the field of the securities market.

At first glance, it may seem that to assess the investment attractiveness, it is enough to be sure of the profitability and liquidity of securities, in some cases it is worth paying attention to the turnover and risk of financial instruments, but in reality, this is not always justified. Thus, several methods are used to assess the investment qualities of securities, which may include both fundamental analysis and technical analysis [44, p. 351].

The ability to analyze correctly is very important for modern stock market participants in making effective decisions. This is due to the role played by the securities market in the world economy, which is an important element of the economic mechanism of countries, as well as the need to have an understanding of the methods of valuing the shares of individual companies and the factors affecting the attractiveness and value of financial instruments.

It should be noted that the securities market plays an important role in shaping the investment attractiveness of various financial instruments. From this point of view, the assessment of the impact of the securities market on investment attractiveness can be carried out in the following stages [6].

Liquidity: The securities market provides liquidity, allowing investors to easily buy and sell financial assets. High liquidity increases investment attractiveness because it allows investors to quickly enter or exit positions without a significant impact on the price. This liquidity is especially important for institutional investors and traders who need efficient markets to effectively implement their strategies.

Price discovery: Securities markets facilitate the process of price discovery by reflecting the collective wisdom of market participants. Transparent prices of securities allow investors to assess the fair value of an investment and make informed decisions. Efficient price discovery increases investment attractiveness because it reduces information asymmetry and increases confidence in the market.

Diversification opportunities: The securities market offers a wide range of investment options across various asset classes, such as stocks, bonds, derivatives, and exchange-traded funds (ETFs). This diversity allows investors to create diversified portfolios tailored to their risk preferences and investment objectives. Diversification is an important aspect of investment attractiveness because it helps reduce portfolio risk by spreading it across a variety of assets.

Investor protection: Strong regulatory frameworks and investor protection mechanisms are vital for investment attractiveness. Securities market regulators enforce laws and regulations that govern market conduct, financial reporting, and requirements. Transparent and well-regulated markets increase investor confidence, attract capital, and strengthen long-term investment commitments.

Market efficiency: Efficient securities markets are characterized by fair pricing, low transaction costs, and minimal losses. Efficient markets ensure that relevant information is reflected in securities prices promptly, reducing the potential for mispriced assets. Investors are more likely to find attractive investment opportunities in markets where prices accurately reflect fundamental values.

Risk management: Securities markets offer risk management tools such as options, futures, and derivatives that allow investors to hedge their positions and manage their risk exposure. These tools increase investment attractiveness by providing mechanisms to mitigate downside risk and protect portfolios during market volatility.

Technological Advances: Advances in technology have transformed securities markets, leading to increased accessibility, transparency, and speed of trading. Electronic trading platforms, algorithmic trading, and high-frequency trading are increasing market efficiency and liquidity, making investment more attractive to both individual and institutional investors.

It is important to note that the impact of the securities market on investment attractiveness may vary across regions and markets. Factors such as market size, regulatory environment, political stability and macroeconomic conditions also affect the overall attractiveness of investment opportunities.

Investors should consider these factors, along with the characteristics of the securities market, when assessing investment attractiveness.

Thus, several economic indicators can be used to determine the relationship between the stock market and the volume of investment returns. These indicators provide insights into the overall health and performance of the stock market, and its impact on investment returns. Some of the indicators that are commonly used in this context are mainly as follows:

Stock Market Indices: These indices track the price movements of selected stocks and provide a snapshot of market trends. A rising stock market index indicates positive investor sentiment and potential gains in investment returns.

Total Market Capitalization: Market capitalization reflects the total value of a stock market or a specific segment of it. An increasing market capitalization indicates increased investor interest and potential investment returns. A higher market capitalization indicates the availability of more investment opportunities, which can lead to increased investment returns.

Trading Volume: Trading volume measures the total number of shares or contracts traded in a given period. Higher trading volume indicates increased market activity and liquidity. Increased trading volumes often accompany periods of increased investor participation and may indicate potential opportunities for investment returns.

Bond yields: Bond yields, such as government bond yields or corporate bond yields, reflect the return offered by fixed-income securities. Changes in bond yields can affect investment returns from fixed-income investments. Higher bond yields can attract investors seeking better returns, potentially increasing investment returns from owning bonds.

Dividend Yield: Dividend yield is the ratio of annual dividends paid by a company to its share price. Dividend-paying stocks can provide a regular stream of income for investors. Higher dividend yields can make stocks more attractive to income-seeking investors and can have a positive impact on investment returns.

Interest rates: Changes in interest rates have a significant impact on investment returns. Lower interest rates can make fixed-income investments less attractive and potentially drive investors to seek higher returns in the securities market. Conversely, higher interest rates can increase borrowing costs for companies, affecting their profitability and potential dividend payments.

Economic growth indicators: Economic growth indicators such as GDP growth rates, employment data, and consumer spending provide a general idea of the overall health of the economy. Strong economic growth can have a positive impact on corporate profits and, consequently, investment returns from shareholders.

Investor sentiment surveys: Surveys and indices that measure investor sentiment can be an indicator of the expectations and confidence of market participants. Positive investor sentiment can lead to increased investment activity, potentially contributing to higher investment returns.

Overall, to fully understand the relationship between the securities market and investment returns, these indicators must be analyzed in conjunction with each other and a broader economic context. In addition, specific investment strategies and asset classes may have unique indicators that relate to their performance and return generation. In this regard, let's look at the current state of some of these indicators in Azerbaijan.

As mentioned above, the growth rate of GDP in the country, which is one of the indicators of economic development, is also one of the indicators that provide the relationship between the securities market and investment attractiveness. The table below reflects the changes in the volume and structure of the Gross Domestic Product in the Republic of Azerbaijan.

Table 1.

Changes in the volume and structure of GDP in the Republic of Azerbaijan in 2015-2023 (million manats, share in%) [7]

	2015	2018	2019	2020	2022	2023	Growth in 2023 compared to 2015
ÜDM mln manatla	54380,0	80092,0	81896,5	72578,1	133972,7	123005,5	2.3 times
Including oil and gas sector in million manats	15382,2	32231,7	30051,9	20417,5	62490,5	43472,5	2,8 times
Specific gravity, %	28,3	40,2	36,7	28,1	46,6	35,3	–
non-oil and gas sector, million manats	34138,8	41662,0	44481,8	45312,2	61509,1	68341,3	2,0 times
Specific gravity, %	62,8	52,0	54,3	62,4	46,0	55,6	–
Net taxes on products and imports, million manats	4859,0	6198,2	7362,5	6848,4	99731,1	11191,7	7,3 times
Specific gravity, %	8,9	7,8	9,0	9,5	7,4	9,1	–
Volume per capita, thousand manats	5706,6	8156,5	8268,8	7257,8	13270,9	12114,5	4,9 times

During the period in the table, GDP growth of 2.3 times was observed in all major sectors of the economy. Thus, the oil and gas sector increased by 2.8 times, the non-oil sector by 2.0 times, and net taxes on products and imports by 2.3 times [7].

We can conclude that the growth dynamics of Gross Domestic Product (GDP) can affect the development of the securities market in several ways:

First, this growth creates investor confidence. Since rising GDP indicates proportional growth across all sectors of the economy, this can lead to increased investor confidence. When investors perceive the economy as robust and growing, they are likely to show greater willingness to invest in the securities market. This heightened confidence can boost demand for stocks, bonds, and other financial instruments, potentially causing their prices to rise.

Corporate earnings: GDP growth often corresponds with rising corporate earnings. As the economy expands, companies tend to generate higher revenues and profits. These positive financial indicators can attract investors and boost stock prices, especially for companies in sectors experiencing significant growth.

Investment opportunities: Rising GDP can create new investment opportunities in various sectors. For example, as certain industries that are currently considered relevant, such as technology, renewable energy, or healthcare, expand, investors can try to take advantage of these trends by investing in related securities. The securities market can facilitate the allocation of capital to these promising sectors, thereby facilitating economic growth.

Capital formation: GDP growth can also lead to increased savings and capital formation in the economy. As individuals and businesses accumulate more capital, they may choose to invest those funds in securities. This capital flow can create the basis for the expansion of the securities market, which in turn provides a sound basis for offering a wider range of investment options to market participants.

Government policy: Governments often implement policies to stimulate economic growth, such as lowering interest rates or implementing fiscal stimulus measures. These policies can indirectly affect the stock market by affecting borrowing costs, investor sentiment, and the overall economic environment. Changes in government policy aimed at stimulating GDP growth can affect stock market performance.

At the same time, it is important to note that the relationship between GDP growth and the stock market is complex. Other factors such as interest rates, inflation, geopolitical events, and market conditions also play an important role. While increasing GDP can have a positive impact on the stock market, it is important to consider many factors and conduct a detailed analysis to understand the specific dynamics in any given situation.

In economic growth theories, the main factor determining the intensity of the economic process has been and remains investment. Modernization and reconstruction of the economy are impossible without a mechanism for attracting investment resources. One of the sources of attracting investment resources to the Azerbaijani economy can be an efficient securities market.

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THE ROLE OF INNOVATION IN INCREASING THE COMPETITIVENESS OF BUSINESS ACTIVITIES**Sakina Fakhraddin Shirinova**Master's student,
Azerbaijan State Agricultural University**РОЛЬ ИННОВАЦИОННОГО ФАКТОРА В ПОВЫШЕНИИ КОНКУРЕНТОСПОСОБНОСТИ
ХОЗЯЙСТВЕННОЙ ДЕЯТЕЛЬНОСТИ****Сакіна Фахрaddin Ширінова**Студентка магістратури,
Азербайджанський державний сільськогосподарський університет**Abstract**

In the research work, the role of innovation potential in ensuring the competitive advantage of business activities was investigated within a limited framework. As is known, the concept of innovation and business is characterized as the main economic concepts that complement each other in the modern world. In the modern world, the innovation potential of countries is evaluated as the main criteria that determine their economic performance and the level of socio-economic standards of the population. In our research, it was concluded that strengthening innovation trends is essential to increase the competitiveness of countries in the globalization process.

Аннотация

В исследовательской работе роль инновационного потенциала в обеспечении конкурентного преимущества предпринимательской деятельности исследована в ограниченных рамках. Как известно, понятие инноваций и бизнеса характеризуется как основные экономические понятия, дополняющие друг друга в современном мире. В современном мире инновационный потенциал стран оценивается как основной критерий, определяющий их экономические показатели и уровень социально-экономического уровня населения. В нашем исследовании сделан вывод о том, что в процессе глобализации необходимо усиление инновационных тенденций для повышения конкурентоспособности стран.

Keywords: *business, innovation, competition, market economy, globalization, economic growth*

Ключевые слова: *бизнес, инновации, конкуренция, рыночная экономика, глобализация, экономический рост*

Introduction

The intensive character of the globalization process has led to significant changes in the structure of world trade and financial flows as a result of the influence of the increasing liberalization tendencies of countries. Undoubtedly, the occurrence of these trends has played a special role in the intensification of technological processes in the world economic system, as well as in the formation of modern management systems. This process has affected not only business organizations, but also all subjects of the market economy as a whole. Naturally, during this period of social, cultural and economic transformation, the traditional concept of entrepreneurship has also changed. In the past, the prototype of a courageous, risk-loving entrepreneur has now been replaced by a business entity based on knowledge and innovative thinking. In a globalized world where competition is experienced and competition is gaining importance, this concept is also characterized as an innovation business. Modern entrepreneurship is considered a source of economic growth and development, innovation and creativity [4]. At the same time, innovative entrepreneurs, who contribute to the identification of market opportunities, the efficient use of resources and the creation of new jobs that adopt new technologies, play an active role in increasing socio-economic well-being. When characterizing a successful entrepreneur in the modern era, it is considered important that he has the following characteristics:

- analytical thinking ability;*
- strong thinking and judgment skills*

- being decisive and determined;
- correctly analyzing all the features of the business;
- having a high imagination;
- the ability to solve problems;
- thinking in a multifaceted way;
- having the power to accept innovations, persuading;
- making quick decisions in conditions of uncertainty.

In addition to these characteristics, modern entrepreneurs play an active role in the business environment as individuals who do not give up despite failure, are tolerant of uncertainty, pay attention to details and are inclined to perfection.

In accordance with the main characteristics of the innovation process and the general economic situation, the participant of market relations should focus on achieving the targeted result. Ensuring its innovative development requires the formation of stimulating mechanisms. This is an important condition in terms of ensuring the continuity of innovation trends in the conditions of conjuncture changes in the market[2]. The irreplaceable role of the state in this aspect is undeniable. The state's innovation policy, in addition to the purposefulness determined by the socio-economic strategy of society, should ensure the coordination of the interests of all participants involved in the innovation process with the tasks of increasing the competitiveness of the national economy in the world market [3]. The experience of economically developed countries shows that at the modern stage of the globalization process, the intensity of competition occurs with the sustainable growth of the economy and the effective integration of new technologies into production areas.

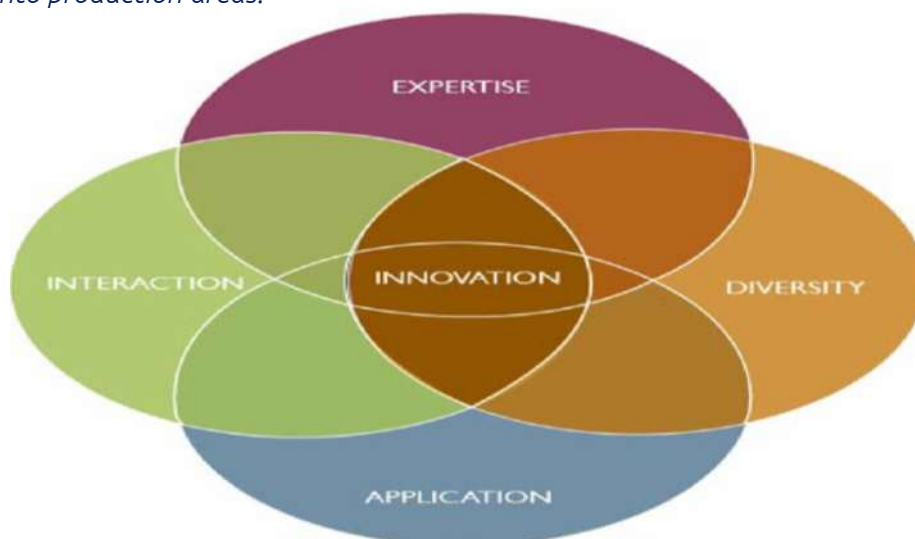


Figure 1. The path to innovation

The development of new technologies is considered one of the important issues for achieving the strategic goals of business entities [1]. When the strategic goals of enterprises are synthesized with innovation trends, they lead to the development and launch of new products on the market, and the adoption of new technologies in production. Thus, currently, innovations determine the prospective development directions of business and play an important role in increasing the market opportunities of the enterprise. Innovations, as a factor of economic growth and progress, should not be a functional task of business entities in competitive conditions, but their main strategic goal.

In order to increase the innovation potential of the Azerbaijani economy, in addition to the formation of mechanisms for the efficient use of existing resources, a large-scale multidisciplinary concept should be developed based on knowledge about the general patterns and trends of leading developing countries. At the modern stage of development of the world economy, the efficient use of human capital is considered one of the most urgent issues in the post-industrial era. The wider penetration of innovation processes into all spheres of society is associated with scientific and technological advances leading to large-scale socio-economic and historical changes. Against the background of these processes, the main influencing factors of economic growth are also diversifying. Among them, along with natural resources and capital, which have the ability to influence the level of development of the economic system, scientific knowledge, which can be transformed into an integral resource, is becoming more important.

All of this brings to the forefront the innovation process that ensures the transformation of know-how and new knowledge into competitive products at the level of experience.

Conclusion:

Innovation is a systematic tool that determines who will be ahead in the competition.

A company that can develop innovative products has the ability to be a price setter. The necessary conditions for ensuring innovation-based growth in our republic and the world include the following:

- Education policy, which is one of the most important elements of innovation policies, must be effective in increasing the skilled workforce and be adapted to global challenges.

- Educational activities should be developed in a way that emphasizes creative thinking.

With continuing education activities, people of all ages and education levels should learn their fields of expertise today and be updated in accordance with current conditions.

- Continuing education should be supported by internal and external factors.

In terms of human capital, the ability of personnel to adapt to sectors should be increased.

- A flexible employment mechanism should be developed.

- Activation of preschool, secondary and higher education programs and establishment of a progressive education system are necessary.

- Talented and capable individuals identified during preschool education should have the opportunity to improve their education in the coming years.

Innovation and entrepreneurship are considered to be the most effective elements in achieving competitive advantage for countries, firms and businesses in recent years. Today, it is impossible to isolate the concepts of entrepreneurship and innovation from each other. The main goal of innovation, which has become one of the main criteria for competition in a market economy, is to increase labor productivity and ensure the growth of the entrepreneur's profit. That is, innovation is not only a means of economic growth, but also of great importance in terms of ensuring the sustainability of economic development and a uniform level of socio-economic standards. By effectively using the results of scientific and technical achievements in competitive conditions, the potential opportunities of the economy are increased. The formation of innovations requires specific knowledge. In the current conditions, the scale of intellectual potential in society is wider than predicted. Simply put, to effectively use this potential, it is necessary to correctly determine its direction of movement. One of the important directions in this aspect is the level of modern education. We believe that in order to achieve high socio-economic development in society, the implementation of scientific research, application, testing, etc. processes should be intensive. Taking into account the specific features of the above-mentioned points, the national innovation system formed in our country can become the main factor of economic diversification in the future by increasing the competitiveness of our country.

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THE PLACE OF THE CONSTRUCTION INDUSTRY IN THE ECONOMY OF THE ANDIJAN REGION**Kakhkhorov Shokhrubek Shavkatjon ugli***Andijan Institute of Economics and Construction, Assistant of the Department of "Economics of Industries", Independent Researcher***МЕСТО СТРОИТЕЛЬНОЙ ПРОМЫШЛЕННОСТИ В ЭКОНОМИКЕ АНДИЖАНСКОЙ ОБЛАСТИ****Каххоров Шохрухбек Шавкатжон угли***Андижанский институт экономики и строительства, ассистент кафедры «Экономика отраслей», независимый исследователь***Abstract**

The article provides information on the organization of 150 small industrial zones in the Andijan region "within the framework of measures implemented by the state to support the development of new competitive industries and small enterprises." In 2019-2024, within the framework of the regional program aimed at increasing the efficiency of using the industrial potential of the Andijan region, projects implemented in the construction industry and general indicators of their effectiveness were studied.

Аннотация

В статье приведены сведения об организации 150 малых промышленных зон в Андижанской области «в рамках реализуемых государством мер по поддержке развития новых конкурентоспособных производств и малых предприятий». В 2019-2024 годах в рамках региональной программы, направленной на повышение эффективности использования промышленного потенциала Андижанской области, изучены проекты, реализуемые в строительной отрасли, и общие показатели их эффективности.

Keywords. construction industry, added value, linear correlation analysis.

Ключевые слова. строительная отрасль, добавленной стоимости, линейно-корреляционный анализ.

В условиях нового Узбекистана во всех регионах республики, включая Андижанскую область, «в рамках постоянно реализуемых государством мер по поддержке развития новых конкурентоспособных производств и малых предприятий создано 150 малых промышленных зон» [1]. Развивая деятельность малых промышленных предприятий, «реализуются комплексные меры по укреплению промышленного потенциала нашей страны и всестороннему развитию регионов, организации новых производств в городах и районах. Благодаря реализации реформ в этом направлении в республике достигнуто бурное развитие таких отраслей, как производство электротехники, текстиля, кожевенной, пищевой, фармацевтической, ювелирной, строительных материалов, мебели, товаров для дома и других товаров народного потребления. регионы. Тем не менее, установлено, что имеющийся в регионах промышленный потенциал, особенно возможности освоения сырьевой базы полезных ископаемых при развитии строительной отрасли, не используются в полной мере» [2]. На основе создания малых промышленных зон в стране приоритет также отдается специализации регионов в различных отраслях промышленного производства, в том числе в период после 2021 года всего 24 района и города республики, в частности, Булокбашинский район Андижанской области будет специализироваться на производстве строительных материалов [7].

По количеству реализованных в строительной сфере проектов в рамках областной программы, направленной на развитие использования промышленного потенциала Андижанской области в 2019-2024 годах, по сравнению с другими регионами области лидируют Булокбашинский, Ходжаабатский и Мархаматский районы. В результате расчетов установлено, что стоимость строительных проектов, реализуемых в других регионах области, в этих регионах выше. (См. Таблицу 1).

Таблица 1

В 2019-2024 годах проекты, реализуемые в строительной отрасли в рамках областной программы, направлены на повышение эффективности использования промышленного потенциала Андижанской области и общих показателей их эффективности [3]

Название местности	Общее количество промышленных проектов, в единицах	Тогда количество строительных проектов вместе		Средняя стоимость каждого проекта, реализованного в строительной отрасли
		Вместе	В процентах	
город Андижан	87	7	8,0	4118,6
город Ханабад	24	3	12,5	3967,2
Андижанский район	44	7	15,9	6403,7
Асакинский район	34	3	8,8	12333,3
Рыбацкий район	34	7	20,6	3613,6
Бозский район	9	2	22,2	11970,0
Булагбошинский рай.	34	18	52,9	26407,2
Джалакудукский рай.	24	9	37,5	3557,9
Избосганский район	18	3	16,7	900,0
Коргонтепинский ра.	29	7	24,1	46469,3
Мерхаматский район	22	12	54,5	24807,1
Олтинкольский ра.	41	8	19,5	7605,5
Пахтабадский рай.	18	8	44,4	6162,5
Улугнорский район	28	3	10,7	2180,0
Ходжабадский рай.	34	18	52,9	24599,5
Шахриханский район	69	6	8,7	2138,3

Также одной из уникальных особенностей строительной отрасли Андижанской области является высокая доля малого бизнеса и частного предпринимательства в этой сфере. Согласно анализу, доля малого бизнеса и частного предпринимательства в строительной отрасли региона в среднем в 2010-2023 годах составила 93,9 процента, с динамичной тенденцией развития [6]. За анализируемый период минимальный и максимальный уровни доли малого бизнеса и частного предпринимательства в строительном секторе региона варьировались в пределах 90,0-96,9 процента (см. рисунок 1).



Рисунок 1. Доля малого бизнеса и частного предпринимательства в строительной отрасли Андижанской области, в процентах от общего объема [4]

Тот факт, что доля малого бизнеса и частных предприятий в строительном секторе региона существенно выше, свидетельствует о том, что рыночная конкуренция в этой сфере возрастает. Определен рост количества малых строительных предприятий в регионе, в том числе и тот факт, что среднегодовой темп роста объема строительных работ в регионе за исследуемый период составил 112,3% (см. рисунок 2). Данная ситуация свидетельствует о том, что объем рыночного оборота товаров и услуг, производимых предприятиями строительной отрасли региона, существенно увеличился [8]. То есть это означает, что на рынке

строительных товаров и услуг региона достигается взаимный баланс между спросом и предложением за счет поддержки деятельности малых предприятий по формированию здоровой конкурентной среды среди предприятий [5].

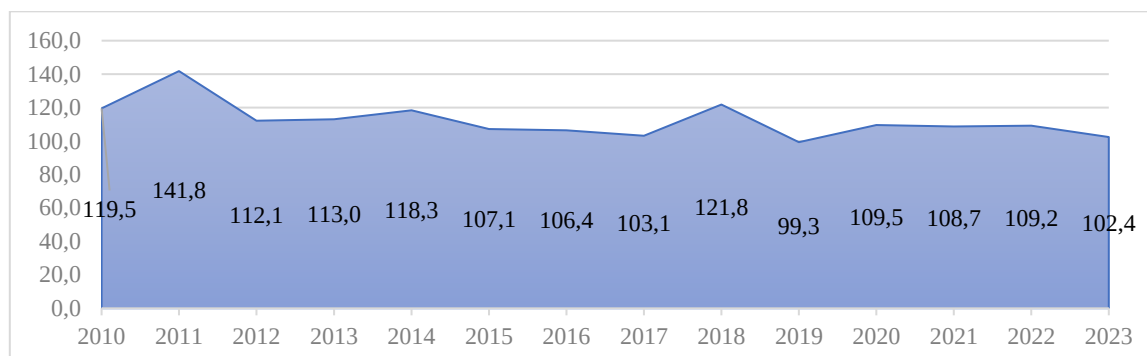


Рисунок 2. Темп роста строительных работ в Андижанской области, в процентах, к прошлому году [4]

Для оценки положения строительной отрасли в экономике Андижанской области за анализируемый период мы сочли необходимым провести линейный регрессионно-корреляционный анализ между добавленной стоимостью, созданной в отраслях промышленности региона, и объемом выполненных строительных работ, в регионе. В этом случае можно оценить влияние объема строительных работ, выполненных в регионе, на объем валовой добавленной стоимости, созданной в отраслях региона. На основе линейного регрессионно-корреляционного анализа, проведенного на основе данной гипотезы, достигнута оценка места строительной отрасли в промышленности региона [9].

Модель линейной регрессии, описывающая положение строительной отрасли в сетях Андижанской области, сформированная на основе приведенных выше расчетов, позволяет сделать следующие выводы:

Во-первых, увеличение объемов строительных работ, осуществляемых в Андижанской области, на один орт-коэффициент обеспечило дополнительный прирост объема созданной добавленной стоимости во всех отраслях экономики региона на векторный коэффициент 8,9491. По итогам объем строительных работ в регионе положительно влияет на потребление товаров и услуг, производимых в строительной отрасли региона, и свидетельствует о том, что потребление продукции с высокой добавленной стоимостью увеличивается. Это означает, что конкурентоспособность строительной отрасли региона возрастает;

во-вторых, установлено, что объем добавленной стоимости, созданной в промышленности региона, имел тенденцию к увеличению значения векторного коэффициента 2126,0 без учета влияния тенденций развития объема выполняемых строительных работ. в области по увеличению объема добавленной стоимости, создаваемой в отраслях промышленности Андижанской области.

в-третьих, он показал, что существует резкая разница между векторным коэффициентом дополнительного роста добавленной стоимости, создаваемой в отраслях региона за счет влияния товаров и услуг, производимых строительными предприятиями, и ситуациями, в которых его влияние не учитывалось. Это означает, что появляются дополнительные возможности использования потенциала развития строительной сферы в экономике региона.

В целом расчеты, проведенные с целью оценки места строительной отрасли в экономике Андижанской области на основе экономико-математических методов, показали, что имеются дополнительные возможности использования потенциала развития строительной отрасли региона. При этом дальнейшее повышение конкурентоспособности строительной отрасли региона удастся за счет развития производства высокотехнологичной продукции строительными предприятиями.

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THEORETICAL BASIS OF DOCUMENTS TO ENSURING COMPETITIVENESS OF THE FOOD INDUSTRY OF THE NEW UZBEKISTAN**Bakhritdinov Sherzodbek Bakhadirovich***Independent researcher of the Department of Economics of Andijan State University*

УДК -338-571.12

ТЕОРЕТИЧЕСКИЕ ОСНОВЫ ДОКУМЕНТОВ ОБЕСПЕЧЕНИЯ КОНКУРЕНТОСПОСОБНОСТИ ПИЩЕВОЙ ПРОМЫШЛЕННОСТИ НОВОГО УЗБЕКИСТАНА**Бахритдинов Шерзодбек Бахадирович***Независимый научный сотрудник кафедры экономики Андижанского государственного университета***Abstract**

The article analyzes the legal and institutional foundations for the development of the food industry in the new Uzbekistan and ensuring its competitiveness. In particular, the regulatory framework for the food industry of the republic, laws, decrees, resolutions and orders on the establishment of enterprises were also analyzed.

Аннотация

В статье анализируются правовые и институциональные основы развития пищевой промышленности в новом Узбекистане и обеспечения ее конкурентоспособности. В частности, были проанализированы также нормативно-правовые основы пищевой промышленности республики, законы, указы, постановления и распоряжения о создании предприятий.

Keywords: strategic goal, food products, New Uzbekistan, potential, consumer goods, export, investment, domestic industry, domestic market, global competitiveness.

Ключевые слова: стратегическая цель, продукты питания, Новый Узбекистан, потенциал, потребительские товары, экспорт, инвестиции, отечественная промышленность, внутренний рынок, глобальная конкурентоспособность.

В условиях Нового Узбекистана также были реализованы реформы по стратегическому направлению достижения зерновой свободы в развитии пищевой промышленности, обеспечения конкурентоспособности предприятий, работающих в сфере. В рамках реформ в этом направлении установлено, что объем муки, экспортируемой зерноперерабатывающими предприятиями, не превышает 75% объема импортируемого ими зерна. В частности, предприятия были освобождены от таможенных пошлин при ввозе следующих семи видов зерновой продукции: [3]

- пшеница семенная (кроме пшеницы твердых);
- ячмень необработанный;
- твердая пшеница;
- пшеница твердая пищевая или несъедобная;
- кукуруза (кроме сладкой кукурузы);
- пшеница пищевая или несъедобная (кроме пшеницы твердых сортов);
- необработанное просо.

В целях дальнейшего развития пищевой промышленности республики, повышения инвестиционной привлекательности отрасли и обеспечения конкурентоспособности выпускаемой ею продукции за счет внедрения современных технологий на пищевых предприятиях реализуются крупные инвестиционные проекты по следующим направлениям:

- переработка и экспорт основных видов сельскохозяйственной продукции;
- создание крупных агрологистических комплексов за счет иностранных кредитных линий;

-реализация инвестиционных проектов по созданию современных агрологистических центров [14];

-реализация инвестиционных проектов по переработке сельскохозяйственной продукции;

-создание интенсивных садов взамен малоэффективных садов в районах, специализирующихся на плодоовощеводстве;

-введение перечня приемлемых международных стандартов в области пищевой промышленности [15];

-глубокая переработка сельскохозяйственной продукции и увеличение производства продуктов питания [1].

Для финансирования вышеуказанных направлений были использованы инвестиции, выделенные следующими международными финансовыми организациями:

-кредитные средства Всемирного банка в размере 200,0 млн долларов США для модернизации сельского хозяйства и повышения конкурентоспособности и 200,0 млн долларов США для развития предпринимательства в сельском хозяйстве [16];

-фонды совместной инвестиционной компании Республики Узбекистан и Объединенных Арабских Эмиратов;

-кредитные средства Французского агентства развития в размере 170,0 млн. долларов США на развитие животноводства;

-кредитные средства в размере 200,0 млн. долларов США от Японского агентства международного сотрудничества для развития производства плодоовощной продукции;

-кредитные средства Азиатского банка развития в размере 347,0 млн долларов США на создание крупных современных агрологистических комплексов и 150,0 млн долларов США на развитие животноводства;

-кредитные средства Международного фонда сельскохозяйственного развития в размере 46,6 млн долларов США для диверсификации и модернизации сельского хозяйства [1].

В период после кризиса «Covid-19» развитие пищевой промышленности в стране, в том числе повышение конкурентоспособности предприятий, работающих в отрасли, осуществлялось по следующим направлениям:

-создание условий для взаимовыгодных отношений между предприятиями, выращивающими (производящими) плодоовощную продукцию, мясо, молоко и другую сельскохозяйственную пищевую продукцию, и предприятиями, осуществляющими переработку, заготовку и реализацию этой продукции [17];

-повысить конкурентоспособность местных продуктов питания и их диверсификацию, разработать стратегии и модели развития пищевой промышленности на основе эффективного использования имеющихся природных и экономических ресурсов регионов;

-финансовые и нефинансовые меры поддержки субъектов хозяйствования, перерабатывающих плодоовощную продукцию, мясо, молоко и другую сельскохозяйственную пищевую продукцию - создание новых инструментов и информационных систем, реализация проектов по высокоэффективным направлениям;

-создание современных торгово-логистических центров, продвижение местных продуктов питания на мировые рынки, повышение их конкурентоспособности, расширение экспортного потенциала и принятие мер по сокращению объемов импорта [2].

При этом усовершенствована практика государственного управления в пищевой промышленности страны, а государственные доли в уставных фондах 36 предприятий пищевой промышленности, входящих в состав АО «Узбексозиквокатхолдинг», переданы Агентству по управлению госактивами на безвозмездной основе. начисляется по их балансовой стоимости [4].

В целях формирования адресной системы государственной поддержки деятельности предприятий пищевой промышленности при Министерстве сельского хозяйства Республики Узбекистан создана деятельность Фонда развития сельского хозяйства и продовольствия.

-покрытие 50% расходов, связанных с подготовкой технико-экономического обоснования перспективных проектов производства пищевой продукции, но не более 100 миллионов сумов по каждому проекту;

-покрыть 50% затрат, связанных с созданием инфраструктуры вновь создаваемых перспективных проектов по производству пищевой продукции, но не более 100 миллионов сумов по каждому проекту [18];

-возмещение 50% затрат, связанных с привлечением иностранных специалистов в сфере производства и глубокой переработки продуктов питания, но не более 50 млн сум по каждому проекту [5].

При этом были улучшены санитарно-гигиенические требования, связанные с деятельностью предприятий пищевой промышленности, работающих по следующим направлениям:

- переработка мяса и мясопродуктов [7];
- обработка рыбы [8];
- производство молока и молочных продуктов [9];
- производство, хранение, транспортировка и реализация соли [10];
- производство и переработка плодоовощной продукции [11];
- переработка бутилированных питьевых и природных минеральных вод [12];
- производство продуктов питания для детей [13].

В частности, обеспечить глобальную конкурентоспособность пищевых предприятий страны, предусмотреть субсидирование расходов, связанных с приобретением оборудования и оборудования, необходимых для лаборатории, внедрить международную систему менеджмента качества в их деятельность, покрыть часть Разработан порядок выдачи затрат на привлечение иностранных специалистов отечественными предприятиями пищевой промышленности [6].

В целом в условиях Нового Узбекистана развитие пищевой промышленности, в том числе реформы, направленные на обеспечение конкурентоспособности местных предприятий, осуществляются во взаимопропорции с аграрным сектором, который рассматривается как его сырьевая база. При этом в целях обеспечения глобальной конкурентоспособности отечественных предприятий пищевой промышленности, наряду с разработкой требований, соответствующих международным стандартам, приоритет отдается модернизации производства продукции на современном оборудовании и привлечению ведущих зарубежных специалистов предприятия.

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Jurisprudence

LEGAL REGULATION OF E-COMMERCE IN GEORGIA: CHALLENGES AND DEVELOPMENTS

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Abstract

The rapid global transition to digital platforms has sparked significant changes in the economy, with electronic commerce (e-commerce) emerging as a central component of modern trade. In this context, the legal regulation of e-commerce has become increasingly important, particularly in countries like Georgia. Following the EU-Georgia Association Agreement signed in 2014, Georgia has committed to harmonizing its legal framework with European Union standards, including regulations on e-commerce. This article explores the evolution and current state of e-commerce legal regulation in Georgia, examining key legislative developments, including the 2023 law on electronic commerce, and analyzing the challenges and opportunities faced by Georgian policymakers. The study also reviews the role of electronic contracts within e-commerce transactions and presents recommendations for further legislative improvements.

Keywords: *E-commerce, legal regulation, electronic contracts, Association Agreement, European Union, Georgia, digital economy, legal harmonization, data protection, consumer rights.*

1. Introduction

The shift towards digital platforms and the integration of emerging technologies into the global economy have created a new era of business practices. The rapid development of e-commerce has prompted many nations, including Georgia, to adapt their legal frameworks to the digital age. As of 2023, Georgia has introduced significant legal measures to regulate e-commerce, with the aim of aligning its practices with European Union standards, following the commitments made under the EU-Georgia Association Agreement.

2. The Legal Framework for E-commerce in Georgia

In June 2014, the EU-Georgia Association Agreement, which aims to establish a Deep and Comprehensive Free Trade Area (DCFTA), laid the groundwork for harmonizing Georgia's legal system with EU regulations. This agreement mandates that Georgia adopt legislation that meets EU standards on various issues, including e-commerce. Notably, Chapter 6, Article 127 of the Agreement emphasizes the importance of e-commerce for expanding trade opportunities and calls for cooperation on issues like consumer protection.

In this context, the Georgian Parliament passed the "Law on Electronic Commerce" in June 2023, which aims to regulate electronic commerce transactions and establish clear rules for the protection of consumers in the digital marketplace. The law covers various aspects, including electronic contracts, consumer rights, data protection, and the obligations of service providers.

3. Key Provisions of the Law on Electronic Commerce

The "Law on Electronic Commerce" introduces new legal concepts and regulations to the Georgian legal framework. One of the key provisions is the regulation of electronic contracts. Under the law, electronic contracts are defined as agreements made through electronic means, such as the internet. The law also establishes rules for the formation, acceptance, and execution of such contracts.

Furthermore, the law addresses consumer rights, mandating that service providers clearly disclose pricing information and provide mechanisms for error identification and correction. This provision ensures that consumers are fully informed before entering into online agreements. Moreover, the law requires that all commercial communications comply with the data protection regulations set forth in Georgia's Personal Data Protection Law.

Another important feature of the new law is the distinction between traditional contracts and electronic contracts. While traditional contracts are governed by the Civil Code of Georgia, the law recognizes that electronic contracts require specific provisions tailored to the digital environment.

4. The Role of Electronic Contracts in E-commerce

Electronic contracts play a crucial role in e-commerce transactions. These contracts, which are made through electronic means, are binding and enforceable under the new Georgian law. The law defines electronic contracts as agreements concluded through electronic devices, which facilitate the exchange of services and goods in a digital environment.

However, the regulation of electronic contracts in Georgia is not without its challenges. For instance, while the law provides basic guidelines for the formation of electronic contracts, there is no explicit reference to the specific terms and conditions that must be included in such contracts. This lack of clarity could lead to legal uncertainties regarding the enforceability of electronic contracts in Georgia.

To address these challenges, it is recommended that the Civil Code of Georgia be updated to include provisions that specifically address electronic contracts, ensuring that the terms and conditions of such contracts are clearly defined and enforceable.

5. Challenges in the Implementation of E-commerce Regulations

Despite the introduction of the "Law on Electronic Commerce," there are several challenges in the implementation of these regulations. One of the primary issues is the need for greater public awareness and education about the law, especially regarding the use of electronic signatures and the protection of personal data. While the law includes provisions for the protection of personal data, there is a need for further development of the infrastructure required to support secure transactions and the use of electronic signatures.

Moreover, the law currently does not address the use of electronic signatures in full detail, which is crucial for the authentication and security of electronic contracts. The implementation of a qualified electronic signature system, as outlined in the Law of Georgia on "Electronic Documents and Electronic Trust Services", is necessary to provide legal certainty for electronic transactions.

Another challenge lies in the regulation of cross-border e-commerce, which remains a grey area in the current legal framework. With the growth of global digital markets, it is essential for Georgia to develop regulations that address the complexities of international transactions, including jurisdictional issues, dispute resolution, and the enforcement of foreign judgments.

6. Future Developments and Recommendations

To strengthen the legal regulation of e-commerce in Georgia, it is recommended that the following measures be taken:

1. **Updating the Civil Code:** The Georgian Civil Code shall be amended to include specific provisions for electronic contracts. This would provide greater clarity and legal certainty regarding the formation and enforcement of digital agreements.

2. **Enhancing Public Awareness:** Public education campaigns should be launched to inform consumers and businesses about their rights and responsibilities under the new e-commerce law, especially concerning data protection and electronic signatures.

3. **Improving Electronic Signature Systems:** A robust electronic signature infrastructure shall be developed to ensure the security and authenticity of online transactions. The law shall explicitly recognize the legal validity of qualified electronic signatures.

4. **Cross-Border E-commerce Regulation:** Georgia shall adopt additional regulations that address the challenges of cross-border e-commerce, including international consumer protection, dispute resolution, and jurisdictional issues.

7. Conclusion

The introduction of the Law of Georgia on "Electronic Commerce" in Georgia marks a significant step toward regulating the rapidly growing digital economy. While the law provides a strong foundation for e-commerce regulation, challenges remain in areas such as the regulation of electronic contracts, the use of electronic signatures, and cross-border e-commerce. By addressing these challenges and implementing the recommended measures, Georgia can strengthen its legal framework and support the growth of a secure and efficient digital marketplace.

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**CERTAIN ASPECTS OF HUMAN RIGHTS PROTECTION IN ADMINISTRATIVE PROCEEDINGS IN
UKRAINE IN THE CONTEXT OF ECHR CASE LAW**

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**ОКРЕМІ АСПЕКТИ ЗАХИСТУ ПРАВ ЛЮДИНИ В АДМІНІСТРАТИВНОМУ СУДОЧИНСТВІ
УКРАЇНИ В КОНТЕКСТІ ПРАКТИКИ ЄСПЛ**

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Аналіз практики Європейського суду з прав людини (ЄСПЛ) у контексті адміністративного правосуддя України показує наявність системних проблем у забезпеченні прав людини в адміністративному судочинстві, що порушують як основні права громадян, так і ефективність правосуддя. Зокрема, ключові рішення ЄСПЛ, такі як «Бурак проти України», «Іванов проти України», «Кириленко проти України» та «Остапенко проти України», дозволяють виявити як національні недоліки в забезпеченні прав громадян, так і можливі шляхи їх усунення.

1. Бурак проти України (2020)

У справі "Бурак проти України" позивач скаржився на порушення права на справедливий судовий розгляд, зокрема через відмову в апеляційному оскарженні адміністративного рішення. Суд у справі дійшов висновку, що позивач не мав реального доступу до апеляційного розгляду, що призвело до порушення його прав, гарантованих статтею 6 ЄКПЛ. Враховуючи важливість ефективного правового захисту, це рішення вказує на необхідність удосконалення механізмів апеляційного оскарження в Україні.

Недолік: Відсутність реального доступу до апеляційного оскарження в деяких адміністративних справах, що обмежує ефективність судового захисту.

Шлях вирішення: Необхідно реформувати процесуальні норми, аби забезпечити реальний доступ до апеляційних судів, зокрема за рахунок спрощення процедури оскарження та встановлення чітких гарантій права на справедливий розгляд адміністративних справ.

2. Іванов проти України (2019)

В справі «Іванов проти України» йшлося про порушення права на доступ до суду через надмірно високі судові збори, які ускладнюють доступ до правосуддя, зокрема для осіб із низьким рівнем доходу. ЄСПЛ встановив, що надмірні судові витрати порушують принцип рівності перед законом та доступу до правосуддя, що є порушенням статті 6 ЄКПЛ.

Недолік: Надмірні судові збори, які значно обмежують доступ до правосуддя для малозабезпечених осіб.

Шлях вирішення: Запровадження більш гнучкої системи судових витрат, яка дозволяє знижувати або звільняти від сплати зборів осіб, що перебувають у скрутному фінансовому становищі, або введення прогресивної шкали зборів для забезпечення більш широкого доступу до судового процесу.

3. Кириленко проти України (2020)

У справі «Кириленко проти України» ЄСПЛ розглядав питання невиконання адміністративними органами рішень суду, що призвело до порушення права на ефективний судовий захист. ЄСПЛ вказав, що невиконання судових рішень порушує статтю 6 ЄКПЛ, оскільки знецінює саму сутність правосуддя і надає адміністративним органам фактичну можливість ігнорувати рішення суду.

Недолік: Невиконання судових рішень, що підриває довіру до судової системи і порушує право на ефективний правовий захист.

Шлях вирішення: Вдосконалення механізмів примусового виконання судових рішень та посилення відповідальності органів влади за невиконання рішень судів. Також необхідно розвивати інституційні засоби для забезпечення більш оперативного виконання судових рішень.

4. Остапенко проти України (2023)

Справу "Остапенко проти України" стосувалась проблеми нечесності в адміністративному процесі, а саме питання упередженості суду та відсутності реальних

гарантій для позивача у справах, що стосуються прав власності та житлових прав. ЄСПЛ у своїй постанові зазначив, що суди не забезпечили належної об'єктивності та не надали достатньо переконливих підстав для прийняття рішення, що порушило принцип справедливого суду.

Недолік: Недостатня об'єктивність і нечесність у процесі прийняття судових рішень, що порушує принципи справедливості та рівності перед судом.

Шлях вирішення: Впровадження кращих практик для забезпечення прозорості і неупередженості суддів, розвиток системи внутрішнього контролю за якістю судових рішень, а також організація навчальних програм для суддів щодо міжнародних стандартів прав людини та справедливості.

Висновки

Практика ЄСПЛ вказує на численні недоліки в адміністративному правосудді України, зокрема у таких аспектах, як забезпечення реального доступу до правосуддя, ефективне виконання судових рішень, а також гарантування справедливого та об'єктивного розгляду справ. Усі розглянуті справи, зокрема «Бурак проти України», «Іванов проти України», «Кириленко проти України» та «Остапенко проти України», демонструють потребу в системних реформах, спрямованих на покращення доступу до суду, забезпечення своєчасного виконання судових рішень, а також у посиленні гарантій неупередженості суддів і об'єктивності судового процесу.

У контексті цих проблем ключовими кроками для вдосконалення адміністративного правосуддя в Україні є:

1. Спрощення та удосконалення процесуальних норм щодо доступу до правосуддя.
2. Реформа судових зборів і механізмів їх застосування.
3. Вдосконалення системи примусового виконання судових рішень.
4. Покращення суддівської практики щодо забезпечення неупередженості та об'єктивності розгляду адміністративних справ.

Ці кроки можуть суттєво покращити ефективність адміністративного правосуддя в Україні та забезпечити належний рівень захисту прав людини в адміністративних справах.

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Mathematical sciences

HOMOTOPIC RELATION IN TOPOLOGICAL GROUPS

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Abstract

In the article, the homotopy relation of continuous functions acting on topological groups is studied. It was also studied that the homotopy relation is an equality relation

Keywords: group, function, homotopy, topology, space

In the first half of the twentieth century Cauchy, Weierstrass, Hausdorff, Reiman, Klein, Poincaré etc. as a result of the excellent researches of mathematicians, topology is developing in two directions: general topology and algebraic topology. In general, the purpose of topology is to classify topological spaces. Algebraic topology, however, classifies topological spaces mainly according to a coarser equivalence relation called homotopy. It is known that a homotopy is a function $T: X \times [0,1] \rightarrow Y$ defined as $T(a, 0) = f(a), T(a, 1) = \varphi(a)$ with $\forall a \in X$ by continuous functions f and φ satisfying the relation $f|_K = \varphi|_K$ for any subset K of the topological group $\langle X, \cdot \rangle$ (where $\langle Y, \cdot \rangle$ is the topological group). This homotopy connection is denoted as $f \simeq \varphi$. Considering the discontinuity of the composition of continuous functions, the following lemmas can be given.

Lemma 1. If $\langle X, \cdot \rangle, \langle Y, \cdot \rangle, \langle Z, \cdot \rangle$ are topological groups and $f, f': X \rightarrow Y, \varphi, \varphi': Y \rightarrow Z$ are continuous functions, then $f \simeq f'$ and $\varphi \simeq \varphi'$ are $\varphi \circ f \simeq \varphi' \circ f'$.

Lemma 2. If topological groups have a homotopy relation, then this relation is an equality relation.

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WAYS TO SOLVE SCHOOL MATHEMATICS PROBLEMS USING THE CONCEPTS OF COMPARISON THEORY AND THEIR PROPERTIES

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САЛЫСТЫРУ ТЕОРИЯСЫНЫҢ ҰҒЫМДАРЫ МЕН ОЛАРДЫҢ ҚАСИЕТТЕРІН ПАЙДАЛАНЫП МЕКТЕП МАТЕМАТИКАСЫНЫҢ ЕСЕПТЕРІН ШЕШУ ЖОЛДАРЫ

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Abstract

The article is devoted to studying the applications of concepts from comparison theory in the school algebra curriculum. It explains the place of the main concepts of comparison theory in school mathematics, focusing on systematizing their arithmetic and algebraic applications. For instance, comparison theory is used in solving first-degree equations with two variables, finding remainders when one number is divided by another, verifying the correctness of arithmetic operations, determining the period length when converting a fraction into a decimal, and other similar tasks. The divisibility rules used in schools are proven, and the method for determining the period length of a repeating decimal is demonstrated.

The article provides the necessary theoretical information on comparison theory, including its key concepts and properties, and discusses how these properties can be used to solve problems in school mathematics. Effective ways of applying methods from comparison theory to solve school mathematics problems are highlighted. The theoretical material is connected to practical problems, with a detailed analysis of remainders by modulus, the comparability of numbers.

Аңдатпа

Мақала салыстыру теориясының ұғымдарының мектептегі алгебра курсына қолданыстарын зерттеуге арналған. Мектеп математикасындағы салыстыру теориясының негізгі ұғымдарының орны түсіндіріледі, олардың арифметикалық және алгебралық қолданыстарын жүйелеуге көңіл бөлінеді. Мысалы, салыстыру теориясы арқылы екі айнымалы бірінші дәрежелі теңдеуді шешуде, санды санға бөлгенде қалдықты табу, арифметикалық амалдың дұрыс орындалғандығын тексеру, жай бөлшекті ондық бөлшекке айналдырғандағы период ұзындығын табу, тағы сол сияқты мәселелерде қолданады. Мектепте қолданылатын бөлінгіштіктің белгілері дәлелденеді, жай бөлшекті ондық бөлшекке аударғандағы период ұзындығын табу жолы көрсетіледі.

Мақалада салыстыру теориясы бойынша қажетті теориялық мәліметтер келтірілген және салыстыру теориясының негізгі ұғымдары мен қасиеттері және олардың қасиеттерін пайдаланып мектеп математикасының есептерін шешу жолдары қарастырылады. Мектеп математикасының есептерін шешуде салыстыру теориясының әдістерін қолданудың тиімді жолдары көрсетілген. Теориялық материал практикалық есептермен байланыстырылып, модуль бойынша қалдықтар, сандардың салыстырымдылығы жан-жақты талданады.

Аннотация

Статья посвящена исследованию применения понятий теории сравнения в школьном курсе алгебры. Объясняется место основных понятий теории сравнения в школьной математике, уделяется внимание систематизации их арифметических и

алгебраических применений. Например, теория сравнения используется при решении линейных уравнений с двумя переменными, нахождении остатка при делении одного числа на другое, проверке правильности выполнения арифметических операций, определении длины периода при преобразовании обыкновенной дроби в десятичную и в других подобных задачах. В статье доказываются признаки делимости, показывается способ нахождения длины периода при преобразовании обыкновенной дроби в десятичную.

В статье приводятся необходимые теоретические сведения по теории сравнения, рассматриваются основные понятия и свойства теории сравнения, а также способы их использования для решения задач школьной математики. Показаны эффективные пути применения методов теории сравнения при решении задач школьного курса математики. Теоретический материал связан с практическими задачами, подробно анализируются остатки по модулю, сравнимость чисел.

Keywords: comparative numbers, modulus, comparison properties, applications of comparisons.

Түйінді сөздер: салыстырымды сандар, модуль, салыстырулардың қасиеттері, салыстырулардың қолданыстары.

Ключевые слова: сравнимые числа, модуль, свойства сравнения, применение сравнений.

Өзектілігі: Салыстырулар теориясын қолдану есептерді шешудің маңызды дағдыларын дамытуға және нақты жағдайларда математикалық тұжырымдамаларды қолдануға ықпал етеді. Ол сондай-ақ алгебра, сандар теориясы, математикалық логика және дискретті математика сияқты күрделі математикалық салаларға негіз береді. Қазіргі әлемде аналитикалық ойлау және математикалық сауаттылық дағдыларын дамытудың маңыздылығын ескере отырып, салыстыру теориясының элементтері оқушыларға күрделі математикалық ұғымдарды түсінуге және оларды практикалық қолдану үшін негіз құруға көмектеседі.

Сандардың элементар теориясының маңызды мәселелерінің бірі болып табылатын салыстырулар теориясының негізіне тоқталайық. Салыстыру жөніндегі ұғымды ең алғаш рет қолданған Гаусс, ол бір санның екінші санға бөлінгіштігі ұғымымен тығыз байланысты екенін айтқан. Бұл ұғым бізге әсіресе берілген сандардың бірі екіншісіне бөлінетін-бөлінбейтінін және де қандай қалдық қалатынын білу керек болғанда аса қажет болмақ.

k -алдын-ала белгіленген бүтін он сан болсын. Бұл жерде k -ны салыстыру модулі деп атайтын боламыз. Егер a және b екі бүтін сан беріліп және олардың айырмасы $a - b$ немесе $b - a$ оң бүтін k санына бөлінетін болса, онда a мен b екі сан k модулі бойынша өзара салыстырымды делінеді және ол $a \equiv b \pmod{k}$ түрінде жазылады. Ал оқылуы: k модулі бойынша a саны b санымен салыстырымды. a мен b сандары салыстыру мүшелері деп аталады. Мысалы, 29 бен 74 сандары 5 модулі бойынша өзара салыстырымды

$$29 \equiv 74 \pmod{5}$$

Салыстырулардың кейбір қасиеттерін еске сала кетейік.

1-қасиет (рефлексивтік қасиеті). Кез келген сан өзімен өзі салыстырымды:

$$a \equiv a \pmod{k}$$

2-қасиет (симметриялық қасиеті). Егер $a \equiv b \pmod{k}$ болса, онда

$$b \equiv a \pmod{k}$$

3-қасиет (транзитивтік қасиеті). Егер

$$a \equiv b \pmod{k} \text{ және } b \equiv c \pmod{k}$$

болса, онда

$$a \equiv c \pmod{k}$$

болады.

4-қасиет. Салыстырудың кез келген мүшесін бір жағынан екінші жағына кері таңбамен көшіруге болады.

5-қасиет. Модульдары бірдей екі не бірнеше салыстыруларды мүшелеп қосуға не азайтуға болады.

6-қасиет. Модульдары бірдей екі не бірнеше салыстыруларды мүшелеп көбейтуге болады.

Салдар. Егер $a \equiv b \pmod{k}$ болса, онда n -кез келген натурал сан болғанда, $a^n \equiv b^n \pmod{k}$ болады. Басқаша айтқанда, салыстырудың екі жақ бөлігін де бірдей дәрежеге шығаруға болады.

7-қасиет. Егер

$$f(x) = a_0 x^n + a_1 x^{n-1} + \dots + a_n$$

бүтін $a_0, a_1, \dots, a_n$ коэффициентті полином болса және де егер бүтін r мен s үшін $r \equiv s \pmod{k}$ болса, онда $f(r) \equiv f(s) \pmod{k}$ болады.

Мектеп математикасында салыстыру теориясының элементтерін көп жерде қолданады. Мысалы, салыстырулар теориясы арқылы екі айнымалы бірінші дәрежелі теңдеуді шешуде, санды санға бөлгенде қалдықты табу, арифметикалық амалдың дұрыс орындалғандығын тексеру, жай бөлшекті ондық бөлшекке айналдырғандағы период ұзындығын табу, тағы сол сияқты мәселелерде қолданылуы қарастырылады.

Енді мысалдар келтірейік.

1) жай бөлшекті ондық бөлшекке айналдырғандағы период ұзындығын табу керек.

Мысалы: $\frac{1}{7}$ -ні ондық бөлшекке айналдырайық:

$$\frac{1}{7} = 0,142857142857$$

Мұнда 142857 - қайталанатын период. Период ұзындығын табу үшін $10^k \equiv 1 \pmod{7}$ теңдігін шешеміз. Осылайша, $k = 6$ екенін анықтаймыз, демек, период ұзындығы – 6.

2) екі айнымалы бірінші дәрежелі теңдеуді шешу

Берілген теңдеу: $3x + 4y \equiv 1 \pmod{5}$

Шешуі:

1. $\pmod{5}$ -ке салыстыру арқылы теңдеуді қарастырамыз.

$$3x + 4y \equiv 1 \pmod{5}$$

2. x пен y -тің мүмкін болатын мәндерін тауып, теңдеуді қанағаттандыратын шешімді табамыз.

Мысалы, $y=0$ деп алайық:

$$3x \equiv 1 \pmod{5}$$

Мұны шешу үшін 3-ке кері элемент табамыз ($3 \cdot 2 \equiv 1 \pmod{5}$), сонда:

$$x \equiv 1 \cdot 2 \equiv 2 \pmod{5}$$

Демек, $x=2, y=0$ – бір шешімі.

3) Санды санға бөлгенде қалдықты табу.

$a = (5622 + 179 - 346) \cdot 923$ санын 23-ке бөлгендегі шығатын теріс емес ең кіші қалдықты табу керек.

$5622 + 179 - 346 = 5455$ және 923 сандарын 23-ке бөлгендегі қалдықтарын табайық. Бөлгенде қалдықтар 4 және 3 екенін көреміз, онда салыстырулардың қасиеттерінен $a \equiv 4 \cdot 3 \equiv 12 \pmod{23}$ шығады. Демек, іздеп отырған қалдық 12-ге тең.

4) Амалдардың дұрыс орындалғандығын тексеру.

$8740297 - 561245 = 8179052$. 9 және 11 арқылы амалдардың дұрыс орындалғандығын тексеру керек.

а) 9-бен тексеру. Сандарды олардың цифрларының қосындысымен алмастырайық. Сонда:

$$37 - 23 \equiv 32 \pmod{9}, \quad 14 \equiv 32 \pmod{9}$$

Бұл салыстыру дұрыс. Бірақ арифметикалық амалдар дұрыс орындалғандығына әлі сенбейміз.

Сондықтан 11 арқылы тексереміз.

б) 11- мен тексеру.

$$8740297 \equiv (7 + 2 + 4 + 8) - (9 + 0 + 7) \equiv 5 \pmod{11}$$

$$561245 \equiv (5 + 2 + 6) - (4 + 1 + 5) \equiv 3 \pmod{11}$$

$$8179052 \equiv (2 + 0 + 7 + 8) - (5 + 9 + 1) \equiv 2 \pmod{11}$$

Ендеше, $5 - 3 \equiv 2 \pmod{11} \rightarrow 2 \equiv 2 \pmod{11}$

Сонымен, ақиқат салыстыру шықты.

Демек, 11 модуль де арифметикалық амалдың дұрыс орындалғандығын көрсетеді.

Қорытынды

Сонымен, салыстыру теориясының ұғымдары мектеп математикасына тиімді қолданудың маңыздылығы жан-жақты зерттеліп, оның арифметикалық және алгебралық есептерді шешудегі рөлі нақты мысалдармен дәлелденген. Салыстыру теориясының негізгі қасиеттері мен әдістерін жүйелі түрде қарастыра отырып, мектеп оқушыларының логикалық ойлау қабілетін дамытуға және математикалық сауаттылығын арттыруға ықпал ететіндігі анықталған.

Зерттеу нәтижесінде салыстыру теориясын мектеп математикасында қолдану оқушылардың абстрактілі ойлауын жетілдіріп, күрделі математикалық ұғымдарды жеңіл қабылдауына мүмкіндік беретіні дәлелденді. Бұл әдістерді оқу процесінде қолдану математикалық білімді тереңдетіп қана қоймай, оқушылардың өздігінен іздену және талдау жасау дағдыларын қалыптастырады.

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Medical sciences

SCREENING STUDIES OF HEARING IN CHILDREN OF SCHOOL AGE IN DUSHANBE

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СКРИНИНГОВЫЕ ИССЛЕДОВАНИЯ СЛУХА У ДЕТЕЙ ШКОЛЬНОГО ВОЗРАСТА В УСЛОВИЯХ ДУШАНБЕ

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Objective of the study. To analyze pilot hearing screening examinations of primary school students in Dushanbe.

Materials and methods of the study. Screening examinations were conducted in a group of 143 primary school children in two schools in Dushanbe. Screening examinations were conducted using the "Sensory Organ Research Platform" based on the audiometric procedure for determining the hearing threshold. A positive result of the examinations was considered to be a hearing threshold of 25 dB or more for at least one frequency, in at least one ear. A subjective assessment was also given based on questionnaires for parents.

Results. Positive results of the screening examinations, in accordance with the accepted criteria, were obtained in 23.8% of the examined children. 24 children (70.6% of all cases of hearing impairment) were referred for additional examinations. Bilateral hearing loss was detected in 50.0% of children with hearing impairments. **Conclusions.** The obtained results confirmed that hearing impairments are observed in a large number of school-age children. Based on the obtained results, it is possible to recommend the use of the "Hearing Screening Program" in regular medical examinations in schools.

Цель исследования. Провести анализ пилотных скрининговых обследований слуха у учеников начальных классов в Душанбе.

Материалы и методы исследования. Скрининговые обследования проводились в группе 143 детей начальных классов в двух школах города Душанбе. Скрининговые обследования были проведены при помощи «Платформы исследований органов чувств», на основе аудиометрической процедуры определения порога слышимости. За положительный результат обследований принималась величина порога слышимости, составляющая 25 дБ и более для хотя бы одной частоты, хотя бы в одном ухе. Также была дана субъективная оценка на основе анкет для родителей.

Результаты. Положительные результаты скрининговых обследований, в соответствии с принятыми критериями, были получены у 23,8% обследованных детей. 24 ребенка (70,6% всех случаев слуховых нарушений) были направлены на дополнительные обследования. Двусторонняя тугоухость была обнаружена у 50,0% детей с нарушениями слуха.

Выводы. Полученные результаты подтвердили, что нарушения слуха наблюдаются у большого количества детей школьного возраста. На основе полученных результатов можно рекомендовать использование «Программы скрининговых обследований слуха» в регулярных медицинских обследованиях в школах.

Keywords: children, hearing, Tajikistan, Dushanbe.

Ключевые слова: дети, слух, Таджикистан, Душанбе.

Введение. Слух является необходимым инструментом в развитии каждого ребёнка. Психомоторное и эмоциональное развитие могут быть нарушены, если у ребёнка проблемы со слухом. Отсутствие информации, принимаемой слуховым путём в ранних годах жизни, в значительной степени ограничивает или даже делает невозможным развитие речи. Если нарушение слуха будет обнаружено в раннем периоде, оно может эффективно лечиться. Диагноз, поставленный как можно в более раннем возрасте, позволяет назначить пациенту соответствующую диагностику и лечение. Очень важным элементом в лечении являются программы скрининговых обследований слуха. В течение многих лет во всем мире развиваются разные программы скрининговых обследований слуха. К числу самых популярных относится скрининг слуха новорожденных, благодаря которому в некоторых странах почти у всех новорожденных детей проводятся обследования слуха [8, 15].

Результаты программы, проведенной в Польше, а также скрининговых обследований слуха новорожденных, проводимых во всём мире свидетельствуют о том, что врожденные нарушения слуха появляются у 2-7 из 1000 новорожденных [1, 14]. Анализируя результаты и научные пособия, стоит обратить внимание на методы и правила анализа результатов обследований. В дальнейшем у ребёнка могут появиться приобретенные нарушения слуха, которые не будут обнаружены в скрининговом обследовании слуха новорожденного. Могут появиться также генетические нарушения, которые сопровождается прогрессирующая тугоухость. Согласно научным исследованиям, каждая необнаруженная тугоухость, даже небольшой степени, может значительно влиять на языковое, социальное и эмоциональное развитие ребёнка, а также на его способности и достижения в процессе обучения [13].

Минимальные нарушения слуха, особенно только в одном ухе, могут остаться незамеченными. Они могут быть причиной проблем с пониманием речи, особенно в шумном окружении, а также проблем с определением источника звука, что может вызывать трудности в учёбе. Как показывают многие исследования, ученики с нарушением слуха не достигают таких же успехов в школе, как их ровесники с хорошим слухом. Судя по многим исследованиям, около 40% детей школьного возраста с односторонним нарушением слуха остаются на второй год [9]. Одной из самых частых причин приобретенных нарушений слуха является отит среднего уха. Гнойное воспаление среднего уха является самой частой болезнью в детстве. Исследования разных популяций показывают, что 76-95% всех обследованных детей, хотя бы раз в жизни перенесли такое воспаление [9]. Повышается также количество случаев потери слуха на высоких частотах из-за шума, связанное с прослушиванием громкой музыки через наушники [3]. К другим причинам, вызывающим нарушения слуха, относятся инфекционные болезни, например, свинка (эпидемический паротит) или корь, менингит, механические травмы или холестеатомы [5, 11, 12].

Программы скрининговых обследований слуха среди детей школьного возраста позволяют быстро обнаружить нарушения слуха и оперативно назначить соответствующее лечение, реабилитацию и профилактику.

Сотрудники кафедры оториноларингологии Таджикского государственного медицинского университета имени Абуали ибни Сино совместно с профессором Скаржиньским П.Х. с его сотрудниками из Мирового центра слуха из Польши организовали и провели пилотную программу скрининговых обследований слуха в Душанбе, целью которой была презентация разработанного оборудования, а также организационных разработок, позволяющих проводить массовые обследования. Обследования проводились при поддержке Национального медицинского центра Министерства здравоохранения Республики Таджикистан (Душанбе, Таджикистан), Отдела Торговли и Инвестиций Посольства Польши в Ташкенте.

Во время пилотных обследований были проведены аудиометрические скрининговые обследования в школах, была осуществлена классификация обнаруженных нарушений слуха, а также были проведены специализированные медицинские консультации. Дополнительной целью пилотной программы было распространение знания на тему потенциальных причин появления нарушений слуха и возможности их предупреждения, диагностики, лечения и реабилитации среди специалистов и родителей в Таджикистане.

Материалы и методы исследования. Суть пилотного исследования, проведенного в Душанбе, была проверка исследовательских приборов, а также процедур проведения диагностики. Полученные результаты и выводы показали, что возможно проведение эпидемиологических исследований, при которых в зависимости от общепринятой модели исследований можно определить размер репрезентативной пробы, беря во внимание влияние всех факторов, которые могут воздействовать на частоту появления нарушений слуха, или провести исследование всей популяции.

Обследование выполнено в двух выбранных школах в Душанбе из 500 общедоступных начальных школ Таджикистана. Школы, в которых были проведены пилотные исследования, были выбраны нами в произвольном порядке. На выбор школ повлиял процент родителей, выражающих согласие на участие детей в скрининговом обследовании слуха, а также основание, что школа не является специализированной и интеграционной. В конечном итоге для пилотных исследований было выбрано 2 школы: первая с большим количеством детей в первом классе, и вторая, меньшая по размеру школа, в которой было только два первых класса. Пилотная программа скрининговых обследований слуха была проведена рабочей группой ЛОР - клиники ТГМУ им. Абуали ибни Сино при сотрудничестве с Институтом физиологии и патологии слуха Польши.

Обследование слуха было проведено в начальных школах в Душанбе в ноябре 2012 года. В обследованиях приняло участие 143 ученика в возрасте 7-8 лет из двух общеобразовательных школ. Из-за значительной разницы в благосостоянии общества для проведения пилотных обследований были выбраны две общеобразовательные и общедоступные школы, при чем в одной из них обучение ведется на таджикском языке, а в другой – на русском.

Аудиометрические обследования слуха были проведены при помощи «Платформы исследований органов чувств», инновационного телеинформатического прибора, соединяющего аудиометр класса IV с компьютерной системой, позволяющей соединяться с научной системой «SZOK», при помощи которой есть возможность выполнять статистические исследования, а также оценивать собранные результаты обследований врачами-специалистами (оториноларингологами, аудиологами, логопедами) [11].

Обследования проводились в тихих помещениях в соответствии с процедурой определения порогослышимости. Была определена величина порогов слышимости воздушной проводимости в диапазоне частот от 500 до 8000 Гц. За результат обследований, выходящий за пределы нормы, принимается величина порога слышимости, составляющая 25 дБ и более для хотя бы одной частоты, хотя бы в одном ухе [10]. Перед обследованием родители детей давали письменное согласие на проведение обследований, а также заполняли добровольную анкету, предназначенную для ребенка, которая касается потенциальных причин появления нарушений слуха у ребенка, перенесенных болезней, ушных шумов и возможных трудностей в учебе. В общем было собрано 100 анкет (69,9% всех анкетированных), полученных от родителей, дети которых принимали участие в пилотной программе. Результаты проведенных обследований были высланы через Интернет в научную систему ИФПС – «SZOK», где, в соответствии с принятыми критериями, были выделены положительные результаты обследований, а также произведено разделение на тугоухость одностороннюю и двухстороннюю. Затем специалисты Мирового центра слуха ИФПС на

основе результатов скрининговых обследований, а также анкетных данных, в соответствии с критериями, принятыми во время проведения программ в Польше, разделили детей на следующие группы [11]: – контроль – те дети, которым необходима дальнейшая специализированная помощь; – профилактика – родители этих детей были проинформированы о профилактике нарушений слуха, а также о факторах, которые могут стать причиной развития обнаруженной тугоухости легкой степени. Более того, положительные результаты обследований слуха, отдельно для каждого уха, были разделены на 3 типа аудиограмм [9]: – низкочастотная тугоухость – LFHL (англ. Low frequency hearing loss) – при которой величина порога слышимости для частот 500 и/или 1000 Гц составляет по крайней мере 25 дБ, однако для частот 500, 1000 и 2000 Гц величина порога не превышает 20 дБ; – высокочастотная тугоухость – HFHL (англ. High frequency hearing loss) – при которой величина порога для частот 4000 и/или 8000 Гц была больше 20 дБ, однако для частот 500, 1000 и 2000 Гц величина порога не превышала 20 дБ; – другие – остальные положительные результаты скрининговых обследований, при которых величины порога слышимости свыше 20 дБ появлялись по крайней мере для двух любых частот. Для определения статистической значимости различий между

группами применялся критерий хи-квадрат при уровне $p < 0,05$. Статистический анализ выполнен с использованием пакета «Statistica 10.0».

Представленные результаты исследований показывают, что стоит проводить такого вида скрининговые исследования, которые должны охватить всю популяцию детей.

Результаты исследования и их обсуждение. Автоматический анализ полученных результатов скрининговых обследований слуха, проведенных при помощи системы «SZOK», показал, что процент детей с положительным результатом тональной аудиометрии, в соответствии с принятыми критериями, составляет почти 23,8% (34 ученика). Было замечено, что 50,0% случаев тугоухости (17 учеников) являются тугоухостью двусторонней (табл. 1).

У детей из школы №15 в группе 25 учеников (22,7%) был получен положительный результат скрининговых обследований слуха, однако в школе №2 такой результат был получен у 9 учеников (27,3%). В обеих школах был отмечен похожий расклад односторонней и двусторонней тугоухости. Статистический анализ не показал различий в частоте появления детей с положительным результатом скринингового обследования в школах, охваченных пилотными исследованиями ($C2 = 3,28$, $p = 0,128$). Не отмечено также различий в частоте появления одно- или двусторонних нарушений слуха в зависимости от школы, в которой проводились обследования ($C2 = 2,19$, $p = 0,398$). На основе результатов скрининговых обследований, а также собранных анкетных данных, врачи-аудиологи и отоларингологи из ИФПС рекомендовали 24 ученикам (70,6% всех случаев тугоухости) обратиться за дальнейшей специализированной помощью. Родители оставшихся 10 учеников с положительным результатом обследований были проинформированы о профилактике нарушения слуха.

Среди всех ушей с положительным результатом скринингового обследования слуха в 31,4% случаев (16 ушей) была обнаружена низкочастотная тугоухость (LFHL), в 25,5% – высокочастотная тугоухость (HFHL), однако остальные 43,1% были нарушениями слуха, включающими в себя все исследуемые частоты (табл. 2). Низко и высокочастотные нарушения появлялись чаще в правом ухе, однако другие виды тугоухости – чаще в левом. Статистический анализ не показал статистически значимых различий в частоте появления отдельных типов тугоухости в школах, охваченных пилотными исследованиями ($C2 = 4,11$, $p = 0,112$).

Было замечено, что среди 17 детей с положительным результатом обследования слуха с обеих сторон у 5 из них в обоих ушах наблюдалась низкочастотная тугоухость. Результаты проведенного опроса представлены в табл. 3. Анкетные данные показали, что в группе детей, направленных на контрольные обследования, только у 37,4% из них ранее было проведено обследование слуха, и этот процент был незначительно выше, чем в группе детей, у которых результат обследования был положительным. Анализ не показал, что родители детей с положительным результатом скринингового обследования статистически значимо чаще замечали появление этой проблемы, особенно у детей, направленных на контрольные обследования ($C2 = 5,29$, $p = 0,094$). Дети с неправильными результатами скрининга, направленные на контрольные обследования слуха, статистически значимо чаще проходили, лечение по поводу воспаления ушей ($C2 = 15,01$, $p = 0,002$) по сравнению с результатами детей с правильными результатами скринингового обследования. Насморк во время проведения обследования в школе выявлялся статистически значимо чаще в обеих группах детей с положительным результатом скринингового обследования (в группе детей с рекомендованной профилактикой: $C2 = 10,87$, $p = 0,015$, в то время как у детей, направленных на контрольные обследования: $C2 = 16,09$, $p = 0,001$).

Дети, направленные на контрольные обследования, хуже слышат учителя, стоящего у доски ($C2 = 11,57$, $p = 0,010$), в то время как дети с положительным результатом значительно чаще имеют неудовлетворительные достижения в учебе (в группе детей с рекомендованной профилактикой: $C2 = 12,87$, $p = 0,002$, в то время как у детей, направленных на контрольные обследования: $C2 = 17,10$, $p = 0,001$). Появление ушного шума сравнивалось как в группе детей с правильным, так и неправильным результатом скринингового обследования слуха, а частота их появления не была статистически значима (в группе детей с рекомендованной профилактикой: $C2 = 2,74$, $p = 0,935$, в то время как у детей, направленных на контрольные обследования: $C2 = 4,09$, $p = 0,073$).

Результаты пилотной программы скрининга слуха среди первоклассников из Душанбе указывают на то, что у 1 из 3 учеников есть проблемы со слухом различного генеза, и чаще всего на почве катара верхних дыхательных путей.

Таблица 1.

Общее число учеников с тугоухостью, а также частота проявления односторонней и двухсторонней тугоухости с разделением на школы

№ школы	Число обследованных детей	Число и процент учеников с тугоухостью		
		Односторонняя	Двухсторонняя	Всего
2	110	4(4,4%)	5(5,6%)	9 (27,3%)
15	33	13(52,0%)	12(48,0%)	25 (22,7%)
Всего	143	17(50,0%)	17(50,0%)	34 (23,8%)

Таблица 2.

Количество и частота появления положительных результатов исследования слуха

Вид тугоухости	Количество ушей и частота появления
Низкочастотная LF HL	16 (31.4%)
Высокочастотная HF HL	13 (25.5%)
Другие виды тугоухости	22(43.1%)

Таблица 3.

Процентное соотношение ответов на отдельные вопросы анкеты с предусмотренным разделением полученного результата скрининговых обследований слуха

Вопрос из анкеты	Результаты скрининга слуха		
	Отрицательный	Рекомендации по профилактике	Направление на контрольное обследование
Проводились ли ранее обследование слуха у ребёнка	25,0%	31,6%	37,4%
Проходил ли ребёнок лечение из-за воспаления уха	15,7%	23,4%	33,8%
Хорошо ли ребёнок слышит учителя, стоящего у доски	96,8%	86,3%	74,2%
Слышит ли ребёнок шум, свист в тишине	9,1%	10,1%	14,1%
Был ли у ребёнка насморк во время обследования	23,2%	42,4%	53,2%
Имеет ли ребёнок плохие результаты учёбы в школе	11,8%	14,2%	28,9%

Скрининговые программы способствуют не только обнаружению детей со снижением слуха, а также с другими нарушениями слуха, например, ушными шумами. Как указывается в литературе, частота появления ушных шумов составляет 13,0-37,7%. Анализ данных из опросника показал, что у 9-14% обследованных детей появляются ушные шумы. Во время скрининговых обследований в Польше было обнаружено, что почти 32% детей с хорошим слухом подтверждает наличие ушных шумов.

Заключение. Полученные результаты подтверждают, что в развивающихся странах население мало информируется на тему нарушений слуха. У многих детей школьного возраста наблюдаются проблемы со слухом, но учителя и опекуны их часто не замечают. Однако даже небольшие проблемы со слухом могут стать причиной коммуникативных, эмоциональных или образовательных трудностей, поэтому важно обнаружить нарушения слуха как можно раньше (в том числе и ушные шумы). Этому способствуют программы скрининговых обследований, которые помогают быстро выделить детей с нарушениями слуха из группы риска, чтобы как можно быстрее назначить соответствующее лечение и реабилитацию, и таким образом повысить качество жизни пациентов и их семей.

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Pedagogical sciences

DIGITAL TOOLS AND MOBILE PLATFORMS FOR ENHANCING FOREIGN LANGUAGE COMPETENCE

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Abstract

The article explores the role of digital tools and mobile platforms in improving competence in a foreign language. The advantages of using technologies such as accessibility, flexibility and personalization of learning, as well as the impact of mobile applications (Duolingo, Babbel, Memrise) and new technologies such as virtual and augmented reality on the development of language skills are considered. Key factors such as the motivation of students and the opportunity to practice the language in real conditions are analyzed. The article also discusses limitations, including the lack of live communication with native speakers and technical problems. The importance of integrating digital tools with traditional teaching methods to improve the effectiveness of learning foreign languages is emphasized.

Keywords: digital tools, mobile platforms, foreign language competence, online courses, mobile applications, language skills.

Introduction. Modern society is going through a period of rapid changes associated with technological development and globalization. These processes have affected all spheres of life, including education, where new approaches and teaching methods are aimed at improving skills and competencies. In recent decades, the integration of digital technologies and mobile platforms, which contribute to more effective mastering and development of language competencies, has taken a particularly important place in teaching foreign languages. Digitalization of education allows teachers and students to use new methods and tools for advanced language learning, as well as provides access to materials and educational resources from around the world.

The competence of a foreign language in the context of educational goals covers several aspects. According to M.Canelo [1] and E.Fauziati [2], language competence includes not only knowledge of vocabulary and grammar, but also the ability to use language in various contexts, which requires a high level of communicative flexibility. The modern model of foreign language competence also includes components such as intercultural communication, the ability to understand and create textual and oral statements in different situations, as well as critical and creative thinking skills. It is important that this competence is focused not only on mastering language skills, but also on developing general cultural awareness and the ability to interact effectively in an international environment.

Foreign language competence is a set of knowledge, skills and abilities that ensure an individual's ability to effectively use a foreign language in various communicative contexts. It includes not only grammatical, lexical and phonetic knowledge, but also the ability to apply them in practice in various types of speech activity, such as oral and written speech. The most important components of foreign language competence are lexical competence, which involves the possession of a rich vocabulary and the ability to use a word correctly in different contexts, as well as grammatical competence, which consists in knowing and correctly applying the grammatical structures of the language. Phonetic competence is also an important part, which includes the ability to pronounce words and phrases correctly, observing the rules of stress and intonation.

In addition, foreign language competence implies the presence of socio-cultural competence, which consists in knowledge of the cultural characteristics of communication in countries where the language being studied is used, as well as discursive competence, which provides the ability to build logical, consistent and meaningful statements, both orally and in writing. Strategic competence is also an important component, which includes the ability to effectively use various speech strategies to overcome

difficulties encountered in the communication process, such as paraphrasing or using context to understand unfamiliar words.

The importance of foreign language competence cannot be overestimated. Firstly, it is an important condition for successful intercultural communication, since it allows not only to overcome language barriers, but also to understand the cultural characteristics of other peoples. Secondly, knowledge of foreign languages significantly expands professional opportunities, since many areas of activity, especially in the context of globalization, require interaction with international partners and colleagues. Thirdly, learning foreign languages promotes cognitive development by improving memory, attention, analytical abilities and general intellectual flexibility. Fourthly, it is a key element of the educational process, which opens access to the world's scientific, literary and cultural achievements. In general, foreign language competence is a necessary condition for full participation in a modern globalized society.

In recent years, digital tools and mobile platforms have played an important role in expanding opportunities for learning foreign languages. These technologies provide access to a variety of resources, including online courses, mobile applications, language communities and forums, which allows students to develop speaking, writing, reading and listening skills.

Research shows that the use of mobile platforms significantly increases students' motivation, improves their ability to apply language in real life and makes the learning process more interactive. For example, the works of S.Loewen [3] and M.Essafi [4] emphasize that mobile language learning applications such as Duolingo, Babbel and Memrise provide a unique opportunity for students to practice language anytime, anywhere. Modern technology also contributes to the creation of personalized and adaptive educational paths. According to R.Tiwari's research, the use of artificial intelligence and machine learning in mobile applications helps to track student progress and adapt content according to their individual needs and level of knowledge [5]. This, in turn, allows you to achieve deeper and more effective language acquisition. Such platforms are becoming not only tools for meaningful learning, but also an important addition to traditional teaching methods, creating a synergy between classical learning and new digital approaches.

Digital tools for learning foreign languages are diverse and can be classified according to several criteria, including the type of learning tasks, the format of user interaction, the level of engagement and the content used. Depending on the tasks solved by the tools, they can be divided into those that develop individual language skills, such as listening comprehension, pronunciation, reading, writing, as well as grammar and vocabulary. For example, platforms such as FluentU and BBC Learning English, which offer users audio content, podcasts and dictation, can be used to improve listening comprehension. Applications such as «Elsa Speak» and «Speechling», which use voice technology to analyze and improve pronunciation, will be useful for pronunciation development. Reading platforms such as LingQ and Beelinguapp provide adapted texts for different levels, which helps students develop reading and comprehension skills. To improve writing, there are platforms such as Lang-8 and Grammarly, which offer the practice of writing texts and grammar checking [6].

Digital tools can also be classified according to the type of user interaction. Some of them offer active interaction with language material through interactive exercises and games. An example of such platforms is «Duolingo» and «Quizlet», where students can participate in game tasks and tests, which makes the learning process more fun and effective. Other tools, like Tandem and HelloTalk, allow you to communicate with native speakers, which helps to develop communication skills and improve the socio-cultural aspects of the language. For a more personalized approach, there are systems using artificial intelligence, such as Babbel and Lingvist, which adapt content and tasks depending on the student's level and progress [5].

By format, digital tools can be mobile applications, online courses, or video platforms. Mobile apps such as Duolingo, Memrise and Babbel offer short lessons and assignments available anytime, anywhere, which is especially convenient for people with busy schedules.

Online courses and platforms, such as Coursera and edX, provide more structured training with the possibility of obtaining certificates. Video lessons and online classes with teachers, such as «Italki» and «Preply», provide an opportunity to practice the language in real time and receive personalized recommendations from experts. In addition, digital tools can use multimedia materials, which allows you to create more diverse and effective ways of learning. Video platforms such as FluentU and Yabla offer online learning, which helps to develop listening skills and improve knowledge in the context of cultural and social aspects of the language. Gaming platforms such as «Mondly» and «Lingvist» integrate game elements into the learning process, which increases student motivation and makes it more fun.

Audiobooks and podcasts, such as «Audible» and «Librivox», help improve speech perception skills and introduce various accents and communication styles [7].

Integrating technology into traditional techniques requires an approach that combines the best qualities of both digital and traditional tools. For example, digital platforms such as Duolingo can be integrated into a course for students to work independently, while face-to-face classes focus on more complex tasks such as conversational practice and advanced grammar study. A number of universities around the world, such as the University of Cambridge, actively use a combined approach, in which online courses and self-learning platforms such as Rosetta Stone complement traditional lectures and seminars.

Blended learning is a model in which traditional learning methods are complemented by online resources, which makes it possible to master materials more effectively. In this context, the use of digital tools makes it possible to optimize the educational process, making it more flexible and accessible. For example, at the University of California, within the framework of foreign language courses, platforms such as Busuu and Moodle are used, for online classes aimed at developing conversational skills and practical skills. Blended learning allows students to learn theory and grammar at a comfortable pace, and then actively apply their knowledge in face-to-face classes.

In addition, the use of video tutorials and online platforms for language practice, such as FluentU, gives students the opportunity to put their knowledge into practice in different contexts, from everyday conversation to business communication. This combination of offline and online learning makes the learning process more fun and productive, as students can learn the language according to their needs and schedule.

Digital tools, in particular mobile applications, play an important role in individualizing learning. Applications such as Memrise or Lingvist use algorithms that adjust to the student's level and offer tasks that match their personal progress. As a result of this approach, learning becomes more effective, as students work with material that exactly meets their needs.

For example, Stanford University uses personalized learning through adaptive language learning applications such as Babbel and Duolingo, which select lessons and assignments based on the individual level and progress of the student. This allows each student to work at their own pace, increasing motivation and speeding up the process of language acquisition [8].

Using digital platforms to evaluate learning outcomes allows teachers to track student progress more effectively. Digital tools such as Quizlet, Google Classroom or Edmodo provide teachers with the ability to quickly assess students' knowledge through tests, questionnaires and control tasks. These platforms allow the integration of various monitoring methods such as self-assessment, peer assessment and regular testing.

An example of the effective use of digital assessment tools is the experience of the Open University in the UK. This educational organization uses the Moodle platform to conduct online exams and tests, as well as to track student progress in real time. This approach allows teachers to quickly receive feedback on learning outcomes and adjust the learning process.

In turn, the Grammarly application can be used to automatically check grammatical errors and analyze students' written works. This not only saves teachers time, but also helps students improve their writing skills by getting accurate recommendations for correcting mistakes [8]. Digital tools and mobile platforms are of particular importance in the process of learning a foreign language, including for the development of various types of competence.

Linguistic competence, which includes knowledge of grammar, vocabulary and correct sentence construction, can be effectively developed using applications such as Duolingo, Memrise and Babbel. These tools allow users to learn new words, improve grammar skills, and work with speech correctness through interactive exercises and tests. Also, an online dictionary such as Google Translate or Linguee provides users with the ability to translate words and phrases, thereby improving their understanding of the structure of the language and its application in real situations.

Socio-cultural competence, which includes knowledge of the cultural characteristics and traditions of the countries speaking the language being studied, can also be developed through digital resources. Applications such as Tandem or HelloTalk provide the opportunity to communicate with native speakers, which helps not only improve conversational skills, but also to understand cultural differences, customs and traditions. Video tutorials and podcasts with native speakers, available on platforms such as YouTube or Spotify, deepen knowledge about sociocultural contexts, allowing the user to learn more about the lives and mentalities of people who speak a given language.

The discursive competence associated with the ability to conduct conversations in various situations, from formal to informal, can also be improved with the help of digital technologies. Video

conferencing platforms such as Skype or Zoom provide excellent opportunities to practice communication, whether it's business negotiations or everyday conversations. Language learning apps such as Italki and Preply offer courses with teachers, which makes it possible to practice different types of speech situations and use the language in live communication.

Strategic competence, which consists in the ability to choose the best methods and approaches to learning, is an important part of the language learning process. Class scheduling and scheduling applications such as Anki and Quizlet allow the user to organize their learning process and make efficient use of time. Adaptive online courses such as Lingvist or Busuu help you choose the optimal level and pace of learning, and gaming applications such as Duolingo offer exciting and motivational elements, which helps to consolidate the material through game mechanisms.

However, despite the obvious advantages, such tools are not without limitations. One of the main challenges is the lack of live communication with native speakers, which is difficult to compensate for through digital platforms. It is also important to take into account the issues of technical accessibility and adaptation of technologies for different users. Nevertheless, given the constant development of technology, we can expect new opportunities to integrate digital tools with traditional teaching methods.

The prospects for further research in this area are related to the study of the most effective ways to integrate mobile platforms and digital technologies into the educational process, as well as the development of more complex and interactive teaching methods such as virtual and augmented reality. In the future, we can expect even more innovative solutions that will allow students to achieve a high level of competence in a foreign language, not limited to standard methods. For teachers and students, it can be recommended to make more active use of the possibilities of digital tools in combination with traditional teaching methods. An integrated approach, including both the use of mobile applications and real communication with native speakers, can lead to the most effective results in learning foreign languages.

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