ACTUAL PROBLEMS OF MODERN SCIENCE, EDUCATION AND TRAINING

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CONTENTS

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METHODOLOGY FOR USING INDEPENDENT WORK IN DEVELOPING STUDENTS' COMPETENCIES IN THE SUBJECT "COMPUTER SCIENCE AND INFORMATION TECHNOLOGY"

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Annotatsiya. Ushbu maqolada o'quvchilarning "Informatika va axborot texnologiyalari" faniga oid kompetensiyalarini shakllantirishda mustaqil ishning ahamiyati va uni amalga oshirish metodikasi tahlil qilingan. Shuningdek, maqolada o'quvchilarning mustaqil fikrlash, muammoni hal qilish va axborot bilan ishlash kompetensiyalarini shakllantirishga qaratilgan topshiriqlarni yaratish optimal metodikasi ko'rib chiqilgan.

Kalit so'zlar: *Informatika va axborot texnologiyalari, kompetensiya, mustaqil ish, o'quvchilar faoliyati, ta'lim metodikasi, mustaqil ta'lim topshiriqlari.*

Аннотация. В данной статье проанализировано значение самостоятельной работы и методика её осуществления в формировании компетенций учащихся по предмету "Информатика и информационные технологии." Также в статье рассмотрена методика создания заданий, направленных на формирование у учащихся компетенций самостоятельного мышления, решения проблем и работы с информацией.

Ключевые слова: *Информатика и информационные технологии, компетенция, самостоятельная работа, деятельность учащихся, методика обучения, самостоятельные учебные задания.*

Abstract. This article analyzes the significance of independent work in developing students' competencies in the subject "Computer Science and Information Technology" and the methodology for its implementation. The article also examines the methodology for creating assignments aimed at developing students' competencies in independent thinking, problem-solving, and working with information.

Keywords: *Computer science and information technology, competence, independent work, student activity, teaching methodology, independent learning assignments.*

Introduction

At present time, the problem of organizing independent learning activities and independent work of students in general education schools outside of class remains relevant. In this regard, a school teacher should design the organization of independent student work based on modern approaches. One of the problems in the rational organization of students' independent work lies in their lack of psychological readiness

for independent learning, insufficient level of necessary educational information for mastering the subject, and a culture of its use.

Independent work is provided by the teacher, but is performed by the students in the specified time without their direct participation. In this case, students consciously strive for self-awareness and independent achievement of the goal as a result of mental effort, putting their own efforts into action [1].

Literature Review

If we consider the independent work of schoolchildren from a didactic perspective, it is advisable to present it as an integral part of the educational process. According to Grishaeva A.P., Jonzakov A., Kovrova S.E., Kozireva O.A., Mirsanov U.M., and Orel A.E., independent work of students is an effort to create the necessary pedagogical conditions for the successful completion of certain tasks by students in the classroom and extracurricular activities, carried out under the guidance of the teacher, but without their direct participation [1-7].

The independent work as a didactic phenomenon has a dual nature. Firstly, it is an educational task, that is, the teacher proposes tasks that the student should perform and are aimed at developing the student's competencies, and secondly, it is a form of manifestation of independent work memory, corresponding thinking activity. It is also the student's creative imagination in the process of completing the learning task. In both cases, independent work contributes to the development of students' intellectual abilities in subjects and the formation of competencies.

Independent work creates opportunities for each student to engage in individual and collective activities [2]. In this case, the student must independently perform a number of tasks proposed in their lesson and extracurricular activities in their individual educational direction. This requires providing students with methodological developments and various didactic teaching aids for completing independent work. The introduction of a specific system for students to widely use these teaching aids is considered effective [4]. This remains one of the pressing issues facing general secondary schools today.

Research Methodology

The manuscript includes experimental work to validate the recommended tasks and information-educational environment, which are aimed at forming competencies in 8th-grade students. The results highlight the pedagogical conditions created for students' independent educational activities, emphasizing the development of skills such as information search, analysis, and practical application.

Analysis and Results

A theoretical analysis of the problems of organizing students' independent work shows that the use of search systems, information and educational environments, educational portals of the global network is considered effective in organizing their independent work, in particular, independent learning in the subject "Information and Information Technologies."

According to Pavlinov A.V., the use of the global network contributes to the activation of students' intelligence based on the creation of new methods for acquiring scientific knowledge, the modernization of educational courses, and the introduction of new pedagogical approaches to organizing independent work. It also develops their creative and intellectual abilities. According to Chistopol R.T., the use of the global network in the process of independent work of students in the study of subjects shapes their ability to learn independently through the use of information networks in real time.

Based on an analysis of the aforementioned literature, it was concluded that it is advisable to use the global Internet to develop students' competencies through the organization of independent learning and independent work.

At the same time, the following problems were identified in the organization of independent work of students using the global network, in particular, independent work on the subject "Informatics and Information Technologies":

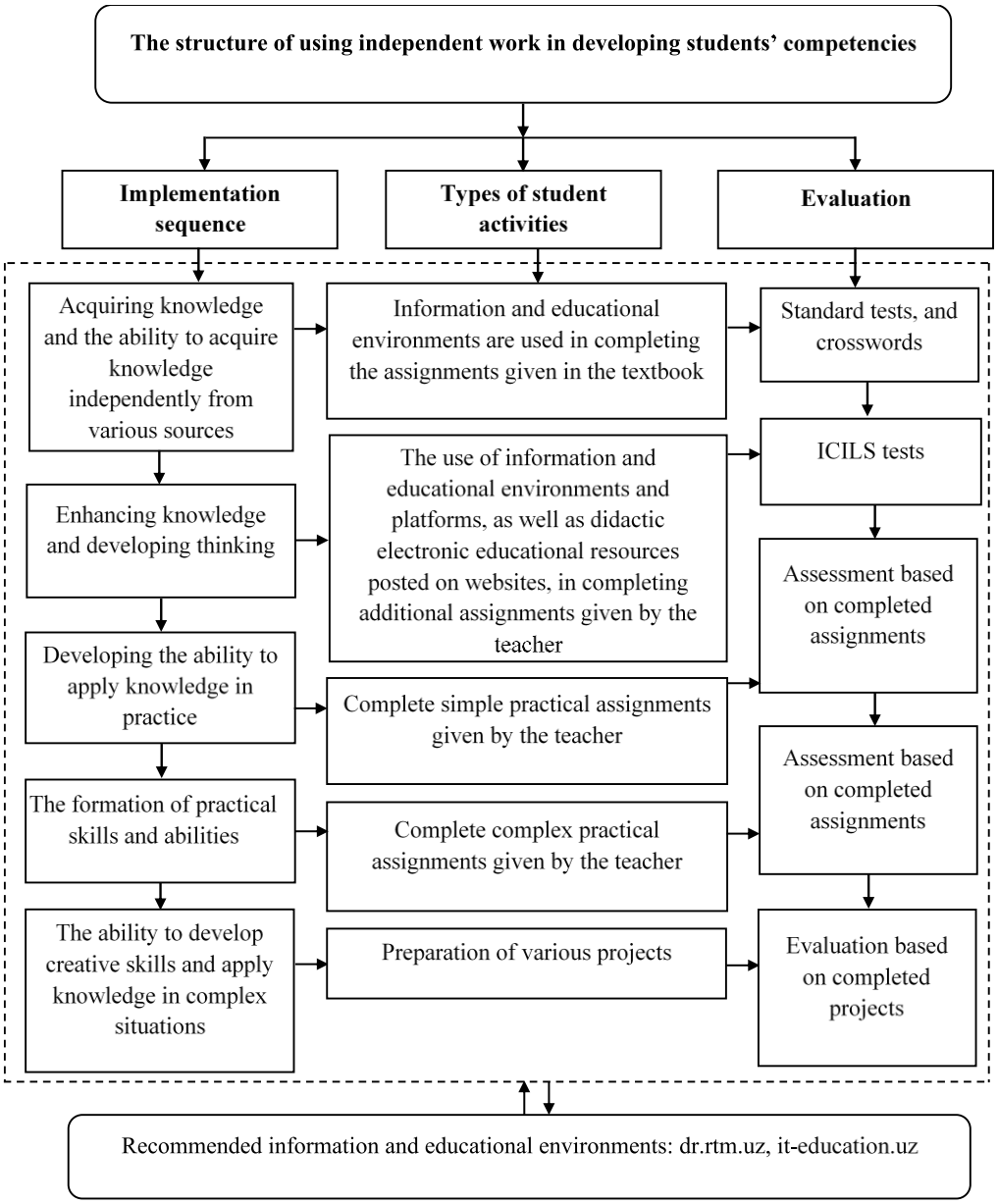

Figure 1. The structure of using independent work in shaping students' competencies.

- the lack of a scientifically sound system for organizing students' independent learning through the global network;
- lack of experience of teachers in the organization of independent education through the global network;
- the lack of a clear system for teachers to accept and evaluate students' independent assignments.

To address the aforementioned problems, we recommend using the following structure in organizing independent work for students of general education schools in the subject "Informatics and Information Technologies" (see in Figure 1).

Therefore, the systematic and rational organization of independent work by secondary school students in the subject "Informatics and Information Technologies" allows for a significant level of activation of the educational process, as well as the formation of basic and general competencies through the formation of information culture among students.

Therefore, when developing students' competencies in the subject "Informatics and Information Technologies," we recommend using the structure presented in Figure 1. This structure provides for the use of the global network by schoolchildren.

The introduction of global network technologies into the educational process and their targeted use help to develop creative abilities and competencies by activating independent work of students. On this basis, changing teaching aids and methods leads to a change in the content of the educational activities of schoolchildren. In this case, students will have the opportunity to receive various information, use educational environments, and conduct online self-testing.

Currently, the content of the textbook "Informatics and Information Technologies" for the 8th grade of general secondary schools of our country focuses on the formation of students' competencies in using the global Internet and creating various web pages and didactic tools. There is no possibility of fully mastering some of the topics given in the content of the subject "Informatics and Information Technologies" for the 8th grade during the lesson. This is one of the most pressing problems in today's secondary school practice. One of the solutions to these problems requires improving the methods of organizing students' independent work and educational activities.

The study is aimed at eliminating these problems, and also focuses on improving the methodology for organizing independent work in the formation of competencies in the subject "Informatics and Information Technologies" for 8th grade students of general secondary schools.

According to the conducted experimental work, the recommended tasks and information and educational environment are aimed at forming the competencies of 8th grade students in the subject "Informatics and Information Technologies" and create the following pedagogical conditions for students' independent educational activities:

- ❖ forms the culture and competencies of students in using the global internet;
- ❖ serves as educational and methodological support for students' independent educational activities;
- ❖ ensures individualized education of students;

- ❖ develops the culture of preparing various practical projects, creative abilities, and creative thinking of students;
- ❖ creates an opportunity for students to test their knowledge independently;
- ❖ modularity, asynchrony and comprehensiveness are provided for students;
- ❖ creates different ways of providing educational information for students and serves as methodological support for teachers.

Conclusions

In conclusion, when forming the competencies of secondary school students in the subject "Informatics and Information Technologies," it is advisable to pay attention mainly to the implementation of practical tasks in independent learning activities. In the process of independently implementing practical tasks, the student will have the opportunity to independently search for various information, analyze it and draw conclusions. As a result, the formation of students' competencies in the subject "Informatics and Information Technologies" is achieved.

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STAGES OF THE DEVELOPMENT OF PROFESSIONAL IDENTIFICATION IN PRIMARY SCHOOL TEACHERS ON THE BASIS OF AN ACMEOLOGICAL APPROACH

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Annotatsiya. Maqolada, boshlang‘ich sinf o‘qituvchilari kasbiy faoliyatining o‘ziga xos jihatlari, ularda kasbiy identifikatsiyani rivojlantirishga akmeologik yondashuvning pedagogik shart-sharoitlarini ishlab chiqishning ilmiy-metodologik asoslari, amaliyotga tadbiq etish shakllari va yo‘llari batafsil turli ilmiy tadqiqot ishlari natijalarini kuzatish, amaliyotdagi holatini tahlil qilish va ishlab chiqilgan taklif va tavsiyalarni o‘qituvchilar pedagogik faoliyatlariga tadbiq qilish natijasida olingan xulosalar asoslangan.

Kalit so‘zlar: *akme, kasbiy yetuklik, yondashuv, akmeologik yondashuv, kasbiy identifikatsiya, rivojlantish bosqichlari, pedagogik shart-sharoit.*

Аннотация. В статье освещаются специфические аспекты профессионалной деятелности учителей началных классов, научно-методические основы разработки педагогических предпосылок акмеологического подхода к развитию у них профессионалной идентичности. Также формы и пути внедрения в практику детализируются на основе наблюдений за результатами различных научно-исследовательских работ, анализа их состояния на практике и выводов, полученных в результате применения разработанных предложений и рекомендаций к педагогической деятелности педагогов.

Ключевые слова: *Акме, профессионалное совершенство, подход, акмеологический подход, профессионалная идентичност, этапы развития, педагогическая предпосылка.*

Abstract. The article highlights the specific aspects of the professional activities of primary school teachers, the scientific and methodological foundations for the development of pedagogical prerequisites for an acmeological approach to the development of their professional identity. The forms and ways of implementation into practice are also detailed based on observations of the results of various scientific research works, analysis of their state in practice, and conclusions obtained as a result of applying the developed proposals and recommendations to the pedagogical activities of teachers.

Keywords: *Acme, professional excellence, approach, acmeological approach, professional identity, stages of development, pedagogical prerequisite.*

Introduction

The current modern educational system requires elementary teachers not only to give students knowledge, but also to contribute to their personal and professional

development. Professional identification of teachers plays an important role in this process. The acmeological approach allows you to systematically and effectively control this development process. This article analyzes the acmeological stages of the development of professional identity in primary school teachers.

Literature Review

The development of professional identification of a primary school teacher is a multi-stage process, which can differ from each other in terms of the content of the group of teachers, professional experiences and pedagogical activity [1-5]. In determining the levels of development of the professional identification of the teacher, we developed, first of all, a holistic pedagogical system consisting of several stages by identifying individual components of the pedagogical system and combining them. Since the pedagogical identification of the teacher is manifested directly in the process of pedagogical activity, first of all, professional identification is carried out by the correct Organization of pedagogical activity in the creation of conditions for development [6-9].

The state policy on the development of professional identification in primary school teachers is reflected in the strategic goals and documents of the Republic of Uzbekistan in the field of Education. Special attention is paid to improving the skills of teachers and ensuring their professional development in the primary education system of the law on education and state educational standards. In this, it is important to identify the professional identity of each teacher and apply an individual approach aimed at improving the quality of Education [1].

The acmeological approach is considered to be related to the principles of individualization of education in public policy, this approach enhances the control and support processes of teachers in the public education system from the point of view of personal development [2].

Mechanisms of material and spiritual support have also been introduced under the policy of encouraging teachers. Including: additional Masters for teachers for high qualifications and professional achievements; grants allocated by the state for advanced training courses. Awarding state awards to teachers who have introduced innovative techniques.

Through the study and introduction of foreign experiences in the public education system, projects are being implemented aimed at developing the professional identity of primary school teachers. In particular, teacher training programs are being developed in cooperation with UNESCO and UNICEF [3, 4].

Research Methodology

In the study, qualitative and quantitative methods were used harmoniously. As a qualitative method, an interview and observation were carried out with teachers of the primary class. The quantitative data was then collected by survey. The main criteria of the study were established in connection with the theoretical foundations of the acmeological approach and methodologies in the process of Professional Identification.

Analysis and Results

Based on the results of the study, it was justified that the development of professional identification in primary school teachers is desirable to be carried out at the following stages:

1. *Diagnostic stage.* In doing so, teachers identify their strengths and weaknesses in their professional activities. At this stage, methods of self-assessment and the use of expert conclusions were used.

By identifying their professional strengths and weaknesses, teachers were able to define the directions necessary for personal development. Surveys and observations conducted at this stage showed: 78% of teachers claimed to have a need to improve their skills. 65% of teachers reported that they were trying to develop specific strategies in their professional activities.

2. *Motivational stage.* At this stage, motivation is generated by stimulating teachers to be interested in their activities and identifying professional goals.

3. By encouraging teachers and developing an interest in their activities, their desire for professional development intensified. During the study, the skill of clearly setting professional goals among teachers increased by 40%. 70% of teachers were interested in new methodologies. There was also a growing desire to apply innovative technologies that were consistent with the practice.

4. Practical-stage of activity. At this stage, teachers apply their knowledge and skills in practice, carry out training and experience sharing processes. In the school education system, professional development programs on the concept of ”Master-shagord " are developed and work is carried out to effectively socialize young specialists in this direction to professional activities.

Teachers enriched their experience through the use of new techniques and technologies in their professional activities: the effectiveness of the use of interactive methods in training increased by 50%. As a result of the exchange of experience between teachers, 60% of new pedagogical ideas were developed.

5. Reflexive stage. At this stage, teachers analyze their activities in the previous stages and draw conclusions so that they can plan their professional achievements and goals.

Teachers analyzed their activities and developed specific plans for further professional development: the number of teachers who analyzed their activities reached 85%. Based on reflexive learning, 90% of teachers made improvements in their work. The motivation of teachers for self-development has increased significantly.

The results of the study showed that working on the basis of an acmeological approach was observed in primary school teachers: an increase in the level of Professional Identification; the application of an innovative approach to activity; the formation of self-development and assessment skills.

These results justify the fact that the acmeological approach is an important scientific argument for effective application in primary education.

The results of the study showed that the acmeological approach is an effective tool in the development of professional identification in primary school teachers. At the diagnostic stage, teachers will have the opportunity to understand themselves more

deeply. And the motivational stage increases their passion for activities. And in the practical and reflexive stages, teachers enrich their experience and take directions for future development.

The main differences of this research work from the previous studies are as follows:

1. Systematic application of the acmeological approach. While some aspects of the acmeological approach have been covered in previous studies, all stages of the approach (diagnostic, motivational, practical, reflexive) have been systematically applied in this work. This made it possible to delve deeper into the process of developing the professional identity of teachers [5].

2. A special approach aimed at primary school teachers. Most studies have been conducted in relation to the general education system or upper-class teachers. This study paid special attention to primary school teachers, since at this stage the professional identification of teachers significantly affects the quality of further education.

3. Introduction of innovative pedagogical technologies. This study examined the impact of the use of modern pedagogical technologies and interactive techniques on professional development. While previous research focused primarily on theoretical issues, a practice-oriented approach was prioritized in this work.

4. Reflexive analysis and personalized approach. In the research process, special attention was paid to the methodology of reflexive analysis, programs were developed based on the individual needs and capabilities of each teacher. This caused the study to produce accurate results.

5. The relevance of the results put forward. With general conclusions often drawn in previous studies, the following relevant aspects were identified in this study: the role of diagnostics and monitoring in professional identification; the effectiveness of incentive and motivation systems; modern technologies and their role in the professional growth of teachers.

6. An approach adapted to local conditions. In this work, the acmeological approach was adapted, taking into account the peculiarities of the educational system of Uzbekistan. Previous studies had often relied on foreign experience to disregard local conditions [6].

7. A wide range of empirical data. Extensive empirical data was collected through surveys, interviews, and observations during the study. This allowed for more accurate results compared to previous studies.

The main difference aspect of this study lies in the fact that it is based on a systematic, innovative and practical approach, as well as the development of special programs aimed at developing the professional identity of primary school teachers. This distinguishes it from previous studies and is of particular importance as an innovation.

Conclusions

In this study, on the basis of an acmeological approach, the stages of the process of developing professional identification of primary school teachers were systematically studied and analyzed. The results of the study showed that the combination of diagnostic, motivational, practical and reflexive stages significantly affects the

professional development of teachers. In particular, the application of modern pedagogical technologies and the implementation of an innovative approach have ensured that teachers take a fresh look at their activities. The effectiveness of the system of reflexive analysis and stimulation in the activities of teachers served to improve their professional qualifications and strengthen their motivation.

The use of the acmeological approach in the context of the national education system has shown its high efficiency. During the study, on the basis of a personalized approach, programs were developed that correspond to the needs and capabilities of teachers, which positively influenced their professional growth. Also, the content of the study is significant in that it serves to improve the quality of primary education and solve pressing issues that promote the development of teachers.

This study includes in its conclusions effective methods of developing the professional identity of primary school teachers and provides an important foundation for the further expansion of this process within the framework of the national education system and its implementation at other educational stages. In the course of further research, it is relevant to continue research on the long-term results of this approach and its application in different conditions. The results provide new opportunities to ensure professional and personal development of teachers and serve to improve the quality of Education.

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PSYCHOLOGICAL CHARACTERISTICS OF CADETS' LEARNING MOTIVATION IN MILITARY EDUCATIONAL INSTITUTIONS

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Annotatsiya. Ilmiy maqola "Harbiy ta'lim muassasalari kursantlarini o'qitish motivatsiyasining psixologik xususiyatlari" mavzusiga bag'ishlangan bo'lib, kursantlarning o'qish motivatsiyasiga ta'sir etuvchi psixologik omillarni o'rganadi. Maqolada motivatsiyani shakllantiradigan asosiy omillar, masalan, ichki va tashqi motivatsiya, shaxsiy maqsadlar, jismoniy va ruhiy tayyorgarlik, shuningdek, ijtimoiy muhit va stressga chidamlilik tahlil qilinadi.

Maqolada o'zbek olimlarining tadqiqotlari asosida kursantlarning bilim olish motivatsiyasi va uning shakllanishiga ta'sir etuvchi psixologik omillarni tushuntirishga harakat qilingan. Ichki motivatsiyani rivojlantirish, stressni boshqarish va o'quv jarayonida motivatsiyani oshirish uchun o'qituvchilar tomonidan yordam ko'rsatish muhimligi ta'kidlangan. Bundan tashqari, motivatsiyani oshirishda ijtimoiy muhit va sog'lom raqobatni rivojlantirishning o'rni ta'kidlangan.

Maqolada kursantlarning harbiy ta'lim muassasalarida o'qishga bo'lgan qiziqishi va ishtiyoqini oshirishga qaratilgan o'quv motivatsiyasini oshirish bo'yicha amaliy tavsiyalar berilgan.

Kalit so'zlar: *motivatsiya, element, pedagogik texnologiyalar, usullar, vositalar, psixologik xususiyatlar, tadqiqot usuli, fikrlash usuli, dasturlashtirilgan vazifalar, ichki motivatsiya, tashqi motivatsiya, ichki omillar, tashqi omillar, ruhiy salomatlik, psixologik muhit.*

Аннотация. Научная статья посвящена теме "Психологические особенности мотивации обучения курсантов военных учебных заведений" и рассматривает психологические факторы, влияющие на мотивацию обучения курсантов. В статье анализируются ключевые факторы, формирующие мотивацию, такие как внутренняя и внешняя мотивация, личные цели, физическая и умственная подготовленность, а также социальная среда и стрессоустойчивость.

Опираясь на исследования узбекских ученых, в статье делается попытка объяснить мотивацию обучения курсантов и психологические факторы, влияющие на ее формирование. Подчеркивается важность развития внутренней мотивации, управления стрессом и обеспечения поддержки со стороны преподавателей для повышения мотивации в процессе обучения. Кроме того, подчеркивается роль социальной среды и развития здоровой конкуренции в повышении мотивации.

В статье представлены практические рекомендации по усилению мотивации обучения, направленные на повышение интереса и энтузиазма курсантов к обучению в военных учебных заведениях.

Ключевые слова: *мотивация, элемент, педагогические технологии, методы, инструменты, психологические характеристики, метод исследования, метод мышления, программированные задания, внутренняя мотивация, внешняя мотивация, внутренние факторы, внешние факторы, психическое здоровье, психологическая среда.*

Abstract. This scientific article is dedicated to the topic “Psychological Characteristics of Cadets’ Learning Motivation in Military Educational Institutions” and examines the psychological factors influencing cadets’ learning motivation. The article analyzes key factors shaping motivation, such as intrinsic and extrinsic motivation, personal goals, physical and mental preparedness, as well as the social environment and the ability to cope with stress.

Drawing on the research of Uzbek scholars, the article attempts to explain cadetsə learning motivation and the psychological factors affecting its formation. The importance of fostering intrinsic motivation, managing stress, and ensuring support from instructors to enhance motivation in the learning process is emphasized. Additionally, the role of social environment and the development of healthy competition in boosting motivation is highlighted.

Practical recommendations for strengthening learning motivation are presented in the article, which aim to increase cadets' interest and enthusiasm for education in military institutions.

Keywords*: motivation, element, pedagogical technologies, methods, tools, psychological characteristics, research method, thinking method, programmed tasks, intrinsic motivation, extrinsic motivation, internal factors, external factors, mental health, psychological environment.*

Introduction

Learning motivation is a crucial element of any educational process. The learning motivation of cadets directly impacts their academic activities as well as their professional training. In military educational institutions, the learning process encompasses not only academic knowledge but also moral and physical aspects. Consequently, cadets’ learning motivation has distinct psychological characteristics that contribute to their academic success and help them address social, psychological, and professional challenges.

This article analyzes the psychological aspects of learning motivation in military educational institutions. Utilizing the research of Uzbek scholars, it examines the internal and external factors influencing the formation of learning motivation, as well as the psychological state and diverse aspects of motivation among students in military institutions.

Literature Review

The study of learning motivation, particularly in the context of military educational institutions, has been a focal point for researchers worldwide. In Uzbekistan, scholars have contributed significantly to understanding the psychological characteristics of cadets' learning motivation, emphasizing the interplay of intrinsic and extrinsic factors, as well as the role of the social and psychological environment.

Intrinsic and Extrinsic Motivation. Intrinsic motivation, defined as the internal drive to engage in activities for personal satisfaction, has been extensively studied by Uzbek researchers. Yuldashev Sh., in his work "Psychological Preparedness and Motivation of Cadets," highlighted the importance of intrinsic motivation in military education [1]. He argued that cadets with high intrinsic motivation are more likely to achieve academic and professional success due to their personal commitment and self-driven goals. Similarly, Toshpulatov A. emphasized the role of personal aspirations and enthusiasm for the profession in shaping intrinsic motivation [2]. His research demonstrated that cadets who are confident in their professional growth exhibit higher levels of motivation and engagement in their studies.

Extrinsic motivation, driven by external rewards and recognition, has also been explored. Nasirova B. examined the impact of external incentives, such as rewards and teacher support, on cadets' motivation [3]. Her findings revealed that extrinsic factors, particularly those delivered through structured support systems, play a significant role in reinforcing motivation within the military environment. This aligns with global research, which suggests that a balance between intrinsic and extrinsic motivation is essential for sustained engagement in learning activities (Deci & Ryan, 2000) [5].

Physical and Mental Health. The physical and mental well-being of cadets is another critical factor influencing their learning motivation. Sharipov S. conducted a study on the impact of stress management skills on cadets' motivation [4]. He found that cadets who effectively manage stress are more likely to maintain high levels of motivation. Sharipov's work underscores the importance of providing psychological support and stress management training to cadets, as stress can significantly hinder their academic and professional performance. This is consistent with international studies that highlight the correlation between mental health and academic motivation (Salmela-Aro & Upadyaya, 2014) [6].

Social and Psychological Environment. The social environment, including peer relationships and instructor support, has been identified as a key factor in shaping cadets' motivation. Yuldashev and Nasirova both emphasized the role of healthy competition and collaboration in fostering motivation [1, 3]. Their research suggests that a positive and transparent social environment, where cadets feel supported by their peers and instructors, significantly enhances their motivation. This is supported by global findings that highlight the importance of a supportive learning environment in promoting student engagement and motivation (Bandura, 1997) [7].

Pedagogical Approaches. Uzbek scholars have also explored the role of pedagogical technologies and methods in enhancing learning motivation. Toshpulatov and Nasirova both advocated for the use of innovative teaching methods, such as programmed tasks and interactive learning tools, to increase cadets' interest and engagement [2, 3]. These

methods align with modern educational practices that emphasize active learning and student-centered approaches (Hattie, 2009) [8].

The existing body of research by Uzbek scholars provides valuable insights into the psychological characteristics of cadets' learning motivation. Key findings highlight the importance of intrinsic and extrinsic motivation, the impact of physical and mental health, and the role of the social and psychological environment in shaping motivation. However, there is a need for further research to explore the long-term effects of these factors and to develop more comprehensive strategies for enhancing motivation in military educational institutions.

Research Methodology

The research methodology for this study employs a mixed-methods approach, combining both qualitative and quantitative research techniques to analyze the psychological characteristics of cadets' learning motivation in military educational institutions. This methodology ensures a comprehensive understanding of the psychological factors influencing cadets' learning motivation, providing a robust foundation for practical recommendations.

Analysis and Results

Psychological Foundations of Learning Motivation. Learning motivation primarily comprises two interconnected components: intrinsic motivation and extrinsic motivation. Intrinsic motivation is the desire to engage in activities for personal satisfaction, interests, and self-benefit. Extrinsic motivation, on the other hand, is related to external incentives, such as rewards, punishments, or evaluations by others. Both types of motivation play a vital role in shaping the learning motivation of cadets.

Particularly in military educational institutions, analyzing cadets' motivation requires considering not only their academic knowledge but also their physical and moral preparedness. These aspects have been thoroughly addressed in the scientific works of Uzbek researchers. For example, Yuldashev Sh. (2018), in his work "Psychological Preparedness and Motivation of Cadets," emphasized the relationship between motivation and internal and external factors in military education. He also underlined the importance of developing intrinsic motivation among cadets to achieve higher levels of motivation.

Factors Influencing Cadets' Learning Motivation. The factors affecting cadets' learning motivation can be divided into several groups, including the following:

1. Internal Factors: These factors are related to the cadet's personal interests, goals, and desire for self-improvement. High expectations and aspirations regarding their education and activities contribute to the development of intrinsic motivation. Toshpulatov A. (2016), in his research, highlighted cadets' personal aspirations, enthusiasm for their profession, and confidence in professional growth as key elements shaping intrinsic motivation.

2. External Factors: External incentives, such as rewards, recognition, and support, play a significant role in shaping learning motivation. Additionally, the social environment and encouragement provided by instructors and management teams help reinforce motivation. Nasirova B. (2019) examined cadets' attitudes toward external

incentives and concluded that external motivational factors, particularly those delivered through teacher support, are strengthened within the military environment.

3. Physical and Mental Health: Physical fitness and mental well-being also significantly influence cadets' learning motivation. Healthy cadets, both physically and mentally, tend to have higher levels of motivation. However, cadets in military educational institutions often face high levels of stress, which can impact their motivation. Psychologist Sharipov S. (2017) studied the impact of stress management skills on learning motivation and emphasized that overcoming stress contributes to enhancing motivation.

4. Social and Psychological Environment: The presence of healthy competition and collaboration among cadets, along with the support provided by mentors and leaders, plays a crucial role in shaping motivation. Positive and transparent relationships within the group strengthen cadets' motivation for the learning process.

Recommendations for Enhancing Learning Motivation.

1. Developing Intrinsic Motivation: To boost cadets' learning motivation, it is essential to nurture their intrinsic motivation. This can be achieved by helping cadets set clear goals, emphasizing the importance of professional growth, and encouraging them to strive toward their objectives.

2. Implementing Stress Management Techniques: Reducing stress levels and increasing cadetsə engagement in the learning process require the development of effective stress management methods. Providing psychological support, conducting training sessions on stress coping strategies, and establishing effective communication with cadets can significantly enhance their motivation.

3. The Role of Educators in Strengthening Motivation: Instructors play a critical role in shaping cadets' motivation. They should encourage cadets to pursue self-improvement, recognize their achievements, and provide consistent support to foster a positive learning environment.

4. Positively Shaping Social Environment and Competition: Promoting healthy competition and strengthening social connections among cadets can help increase motivation. Encouraging mutual assistance, collaboration, and celebrating successes together contribute to a more motivated and engaged learning process.

Conclusions

The psychological characteristics of cadets' learning motivation in military educational institutions are complex and influenced by numerous factors. Intrinsic and extrinsic motivation, personal and professional goals, the social and psychological environment, and stress management abilities significantly impact the formation of motivation. To enhance cadetsə learning motivation, it is crucial to develop their intrinsic motivation, implement stress management methods, and ensure consistent support from instructors. Additionally, fostering healthy competition and collaboration in the social environment contributes to increased motivation among cadets.

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THE IMPORTANCE OF AESTHETIC THINKING FOR PRIMARY SCHOOL TEACHERS

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Annotatsiya. Ushbu maqolada bo‘lajak boshlong‘ich sinf o‘qituvchilarida estetik tafakkurning ahamiyati haqida. Estetik ong boshlang‘ich sinf o‘qituvchisi pedagogik faoliyatining eng muhimligi, o‘quvchilarda estetik tuyg‘u va qarashlarni shakllantirishga, ularning ijodiy qobiliyatlarini rivojlantirishga, shaxsning har tomonlama barkamol rivojlanishiga hissa qo‘shishga yordam berishi haqida bayon etilgan.

Kalit so‘zlar: *estetik tafakkur, estetik qarashlar, ijodiy estetika, estetik munosabat, estetik fikrlash, estetik anglash, estetik ong.*

Аннотация. В данной статье речь идет о важности эстетического мышления у будущих учителей начальной школы. Утверждается, что эстетическое сознание является важнейшей частью педагогической деятельности учителя начальных классов, способствует формированию у учащихся эстетических чувств и взглядов, развитию их творческих способностей, способствует всестороннему развитию личности.

Ключевые слова: *эстетическое мышление, эстетические взгляды, творческая эстетика, эстетическое отношение, эстетическое сознание.*

Abstract. This article is about the importance of aesthetic thinking in future elementary school students. It is stated that aesthetic consciousness is the most important part of the pedagogical activity of the primary school teacher, that it helps to form aesthetic feelings and views in students, to develop their creative abilities, and to contribute to the comprehensive development of the individual.

Keywords: *aesthetic thinking, aesthetic views, creative aesthetics, aesthetic attitude, aesthetic thinking, aesthetic awareness, aesthetic consciousness.*

Introduction

Aesthetic education is based on values reflected in historical documents and literary works, such as “Avesta” and the “Qur’an,” which convey ideas of kindness, humanity, and spirituality while shaping teachers’ aesthetic views and ideals. The role of folk traditions, particularly language and literature, in conveying these ideas further supports this foundation.

Literature Review

Aesthetic culture is perceived as a level of spiritual development expressed through emotional experiences and spiritual enjoyment [1-14]. In the pedagogical process, this culture manifests itself through the development of an aesthetic attitude toward art and reality, as well as the cultivation of aesthetic feelings, taste, and skills. This is significant for both students and teachers, as it contributes to forming well-rounded individuals capable of creative activity. “It is well-known that aesthetics, as a branch of philosophy, synthesizes the achievements of all arts-related sciences and uses these findings to educate individuals through beauty, guiding them toward truth. The rules and principles developed by aesthetics are universal to all arts disciplines. For instance, laws regarding style, rhythm, and composition apply to all art forms. Aesthetics formulates and applies general rules for art [15].”

Pedagogical practice plays a key role in shaping teachers’ aesthetic culture. Elective courses, creative associations, and excursions assist primary school teachers in integrating aesthetic education into their activities. Extracurricular activities, such as student clubs and creative workshops, foster emotional and aesthetic relationships with the profession and the arts.

From a scientific and pedagogical perspective, analyzing the importance of aesthetic thinking for primary school teachers involves viewing the concept of aesthetics as a fundamental element in shaping harmonious perception of reality among young learners. Teachers’ aesthetic thinking serves to develop students’ emotional and sensory relationships with the world, which is essential for comprehensive education and upbringing.

Aesthetics, as a meta-category of modern philosophy, emphasizes the need to understand the interconnection of aesthetic phenomena across various fields of human activity. In pedagogy, this is manifested through the integration of aesthetic components into the educational process, aiding children in developing a perception of beauty, harmony, and an emotional relationship with the world. Primary school

teachers should not only deliver knowledge but also contribute to the development of aesthetic perception through art, nature, and social phenomena.

Research Methodology

In pedagogical practice, it is important to consider both the objective and subjective aspects of aesthetic thinking. Objective idealistic concepts (e.g., Socrates, Plato, Augustine, Hegel) view beauty and aesthetic qualities as eternal phenomena existing independently of human perception. For teachers, this means utilizing examples of symmetry, harmony, and order—observable in materials, objects, and nature—to illustrate objective beauty. Subjective idealistic concepts (e.g., Jung, Kant, Schopenhauer, Nietzsche) emphasize the significance of inner aesthetic consciousness, emotions, and perceptions. Teachers must nurture children's ability to feel and realize aesthetics through their subjective experiences, especially for young students who are just beginning to perceive the world individually.

The dualistic concept, which seeks to harmonize the objective and subjective aspects of aesthetic thinking, holds great importance in the educational process [16]. Aesthetics should be presented both as an objective phenomenon (external beauty) and as a subjective experience (students' internal perception). Teachers should explain beauty as an objective phenomenon—through examples from nature or art—while encouraging students to recognize and connect with the emotions linked to that beauty.

Materialistic concepts of aesthetics (e.g., Heraclitus, Aristotle, Leonardo da Vinci) emphasize that aesthetic phenomena originate from real objects and events. In primary education, this implies that teachers' aesthetic thinking should aim to help children see and appreciate the beauty in the surrounding world. Using tangible objects such as nature, art, and music enables children to develop aesthetic emotions through direct interaction with reality.

From a scientific-pedagogical perspective, aesthetic thinking is a crucial component in shaping the worldview and personality of primary school teachers, influencing their ability to educate and develop students. Aesthetic consciousness is a form of social consciousness closely linked to an individual's moral and spiritual development. Its role in pedagogical activity must be highlighted, as it enables teachers to perceive and reassess the surrounding world, fostering complex aesthetic feelings, taste, and thinking in students. Aesthetic consciousness encompasses the perception, feeling, and evaluation of reality, forming during the process of aesthetic activity and significantly impacting creative and educational practices [17]. For primary school teachers, developing this consciousness allows them to more effectively influence students' emotional and value-based development, creating conditions for their spiritual growth.

Aesthetic thinking helps teachers integrate art, music, and literature into the educational process, enriching students' perception of reality and aiding their emotional-intellectual development. As Sher A. notes, "Human beings, endowed with various facets of consciousness, illuminate, reflect upon, and analyze different aspects of the world, drawing conclusions. One of these facets of consciousness is aesthetic awareness. Aesthetic awareness not only organizes the aesthetic process but also fosters aesthetic relationships, shaping inner refinement. It actively participates not only in perceiving aesthetic values and objects but also in creating new aesthetic values.

This continuous contribution of aesthetic awareness plays a decisive role in creating works of art, beautifying living conditions, and improving production environments, among other contexts [18].”

Analysis and Results

Teachers’ aesthetic thinking is closely intertwined with the moral aspects of their work. This connection aids in fostering moral and spiritual values in students, which is especially significant at the primary education stage. Historically, aesthetic feelings have developed alongside moral norms, making them inseparable in the context of pedagogical activity. A teacher with developed aesthetic consciousness can impart profound feelings of beauty and moral righteousness to students, contributing to their holistic development.

Aesthetic consciousness evolves within a historical framework, influenced by art, cultural norms, and social values, shaping the perception and interpretation of aesthetic categories. In pedagogy, this is reflected in the use of historical and cultural examples that help cultivate a sense of belonging to both national and global cultures in students. From an aesthetic perspective, a teacher’s ability to develop students’ historical and cultural awareness not only nurtures their artistic taste but also broadens their worldview.

Aesthetic consciousness is inherently linked to art, which significantly influences its development. Art is one of the most vital sources for shaping an aesthetic perception of the world. In pedagogical practice, this means that teachers should actively incorporate works of art into the educational process to develop students’ emotional and aesthetic experiences. Art facilitates the expression and understanding of complex emotions, promoting the growth of aesthetic sensitivity and imagination.

For primary school teachers, it is crucial to begin shaping students’ aesthetic perception of the world from an early age. This contributes to developing their emotional sensitivity, aesthetic taste, and capacity for creative self-expression. Pedagogical technologies aimed at fostering aesthetic thinking support the comprehensive development of the individual and enhance their ability to perceive beauty in everyday life. Teachers themselves must possess a high level of aesthetic consciousness and be able to convey this through various activities-from art and music to an appreciation of nature and the surrounding reality.

Conclusions

In conclusion, aesthetic consciousness is a fundamental component of a primary school teacher’s pedagogical activity. It aids in cultivating students’ aesthetic feelings and perspectives, developing their creative abilities, and contributing to their all-round development as individuals.

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APPLICATION OF DIGITAL LEARNING TECHNOLOGIES IN SCHOOL EDUCATION

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Annotatsiya. Maqolada raqamli o'qitish texnologiyasini maktab ta'limida qo'llash masalalari ko'rib chiqilgan. O'quvchilarning turli faoliyat turini tanlash, shuningdek mustaqil rivojlanishi va mustaqil o'qishi hisobidan ta'lim sifatini oshirishda raqamli texnologiyalarning imkoniyatlari tavsiflangan. Fizika fanidan onlayn-kurslarni joriy etish natijalari, o'quv jarayonini samarali tashkil etish uchun uning innovatsion imkoniyatlari keltirilgan.

Kalit so'zlar: *raqamli texnologiyalar, raqamli o'qitish texnologiyalari, ta'lim platformasi, ta'lim resurslari, onlayn-kurslar.*

Аннотация. В стате рассмотрены вопросы применения цифровых технологий обучения в школном образовании. Описаны преимущества цифровых технологий для повышения качества обучения за счет расширения возможностей для выбора разных видов деятелности, а также удовлетворения потребности учащихся в саморазвитии и состоятелности обучения. Приведены результаты внедрения онлайн – курса по физике, эго инновационные возможности для эффективной организации учебного процесса.

Ключевые слова: *цифровые технологии, цифровые технологии обучения, образовательная платформа, образовательные ресурсы, онлайн – курсы.*

Abstract. The article considers the issues of using digital learning technologies in school education. The advantages of digital technologies for improving the quality of education by expanding the opportunities for choosing different types of activities, as well as satisfying the needs of students for self-development and consistency of learning are described. The results of the implementation of an online course in physics, its innovative capabilities for the effective organization of the educational process are presented.

Keywords: *digital technologies, digital learning technologies, educational platform, educational resources, online courses.*

Introduction

Information technologies, social networks, the Internet have firmly entered all spheres of society. With the help of informatization tools, each person can access various information resources. The goal of informatization of education, in its essence, is long-term and therefore continues to remain relevant. The introduction of modern

information technologies into the educational process allows for the effective organization of the educational process in the information environment.

The Decree of the President of the Republic of Uzbekistan dated May 11, 2022 № UP-134 “On approval of the national program for the development of school education in 2022-2026” provides for a radical improvement in the quality of school education, providing secondary schools with information and communication technologies [1].

Indeed, the changes taking place directly affect the sphere of school education, requiring serious qualitative transformations of both the subjects of education themselves - their personal and professional competencies, and all processes and types of activities - educational, pedagogical, methodological, managerial, etc. In the near future, both the content of education and the educational process with its traditional forms, methods and technologies, and the social and educational processes that determine the value attitude of students to the changing world will be actively transformed.

Digital technologies will create conditions for the successful implementation of individual characteristics of students by expanding the opportunities for choosing different types of activities, as well as satisfying the need for self-development and independent learning. It is obvious that the use of digital technologies in education will not be limited to the school or university education system; they will become an active and effective tool for additional and independent learning. The digital environment will increasingly integrate with pedagogical practice. Even today, a teacher can organize group research and project activities of students online. A noticeable trend is the use of mobile devices by schoolchildren in education; in the near future, promising technologies based on big data analysis, neural networks, artificial intelligence technology, as well as virtual and augmented reality will begin to come to schools. The use of these technologies will allow for the maximum personalization of the educational process for each student. Technological renewal entails the formation of a new educational environment, the key features of which are: educational motivation; priority of the activity component with an emphasis on research and project activities; priority of independent educational activities with a serious reflective component; balance of individual and collective forms of organization of learning; openness to cultural and educational resources of other spheres of society, etc. In the transformed educational environment, students will increasingly become the subject of their own educational activity [2, 3].

Literature Review

The use of digital technologies in the educational process of secondary schools is of great importance in improving the quality of education.

The theoretical foundations of digitalization of education are considered in the works of many researchers, such as U.Sh. Begimkulova [4], K.T. Olimov [5], A.A. Verbitsky [2], N.V. Shamova [6], N.P. Gorcharuk, E.M. Khromova [3], G.A. Kruchinina [7] and others.

In scientific literature, the concept of “digital technologies” is considered by authors quite narrowly. Thus, in the dictionary - reference book of terms of normative and technical documentation, the concept of “digital technologies” is interpreted as

technologies that use computers or other modern equipment to record code pulses and signals in a certain sequence and with a certain frequency [8].

Most authors understand digital technologies in education as a way of organizing a modern educational environment based on digital and information and communication technologies.

Many authors, such as Abdukadirov A.A. [9], Kruchinina G.A. [7] and others, have studied the problems of introducing digital and information and communication technologies into the educational process.

Despite a large number of studies, the problem of introducing digital technologies into the process of teaching exact subjects in secondary schools has not been sufficiently studied and requires a practical solution. The need for this is also due to the fact that exact subjects play an important role in the intellectual development of schoolchildren and are aimed at the formation of universal educational actions.

Digitalization of the school education system consists not only of the technical side of creating digital analogues of educational literature, documents and mass availability of high-speed Internet, but also accompanies the formation of a flexible educational environment. There is a need to use huge information resources and search for new technologies and tools applicable not only in the republican, but also in the international educational space.

Research Methodology

The methodological basis of the research is systemic approaches, general scientific methods of analysis, works in the field of digital learning, digital didactics, and the practice of school teaching using digital technologies.

This study is based on the results of the analysis of studentsə knowledge acquisition in the subject “Physics”, as well as on the results of theoretical analysis of materials and research on the problem of digital learning.

Theoretical research methods were used: study and analysis of normative-pedagogical, scientific-methodical literature and Internet resources on the research problem; study of technical documentation on software for digital educational technologies, comparative analysis of the capabilities of digital didactics tools in comparison with the information and communication structure of the educational institution; study and generalization of domestic and foreign experience in using digital didactics tools in professional education.

Analysis and Results

Let us consider the use of digital technologies in the educational process of secondary school using the example of the discipline “Physics”, which is related to the exact subjects.

Taking into account the fact that today every educational organization is obliged to create a digital educational environment, teachers can use its capabilities in the educational process. Many educational organizations as one of the course management systems or virtual learning environments often use various educational platforms that are a web application that provides the ability to create author's online courses.

The placement of material within the online course “Physics” in the educational platform developed by us can be organized using the resources “File”, “Folder”, which make it possible to upload the main and additional educational material in the form of documents in Word, Excel and other formats, as well as multimedia presentations to accompany the theoretical and practical educational material. In the same way, practical work, assignments for independent work are posted in the educational platform. Feedback is organized through the “Assignment” element of the system, where students send their completed work to the teacher for checking. The teacher, in turn, checks the submitted work, evaluates it and comments on it.

The system provides a resource called “Hyperlink” for posting video content, which allows posting links to Internet resources for their further use in the educational process. For example, in order to show students visually the implementation of teaching methods and tools within the topic “Study of Wave Oscillations”, you can prepare links to Internet resources of video recordings of physics teachersə lessons, during which active and interactive teaching methods, modern teaching tools are used, and pedagogical interaction is carried out. Students in class, having followed the links, study the video material, and then discuss what they saw and offer solutions to problem situations during the discussion, analyze the effectiveness of the methods, tools and techniques used for teaching and interaction. The “Hyperlink” resource can also be used to post original video lectures recorded using a professional camera, mobile phone, or video conferencing programs. In this case, video lectures can be posted on a social network in contact, where large amounts of information can be uploaded, and the link is posted on the educational portal.

Another interesting resource is the “Interactive Lecture” resource, which allows the teacher to post theoretical material and simultaneously control the process of its study by creating test assignments at the end of each point of the educational lecture. In this case, a student who has not passed the test control is not allowed to study further material. Teachers have the opportunity to do the work both during and outside of school hours.

The following elements of online courses on the Forum platform also help to create interactivity in classes. The use of these elements allows teachers to discuss various organizational aspects of the educational process, organize joint discussions of current issues studied by the discipline.

Classes conducted in the conditions of distance learning in the discipline “Physics” allow creating an increased level of interactivity in theoretical and practical classes. The advantage of the systems is that they allow students and teachers to communicate in real time, discuss current issues of physics, and also perform work in small groups.

Control events held within the framework of the online course can be organized using the “Test” element. The teacher creates a bank of test tasks in advance, and then tests if necessary. This element significantly simplifies the assessment procedure, since the assessment is displayed automatically immediately after the test is completed and is visible to students.

In the world of digital technologies, for the purposes of organizing the control of knowledge, skills and abilities, as well as independent work of students, a free and

simple Online Test Pad constructor can be used, with the help of which you can create various tests, tasks, problems, crosswords, surveys, dialogues, logic games, as well as electronic workbooks on disciplines.

Conclusions

Thus, the use of digital learning technologies in the teaching of physics in secondary schools provides teachers with expanded opportunities to organize classes in the context of digitalization of education and has a positive educational effect on the quality of the educational process as a whole, the quality of knowledge, skills and abilities acquired by students. The various approaches to organizing the educational process using digital technologies and tools in the teaching of the discipline “Physics” presented in the article will serve as methodological assistance for teachers to improve their level.

Transformation of teaching practice with innovative implementation of digital technologies at all levels can lead to a noticeable improvement of traditional and formation of qualitatively new educational results, development of potential of each student. It is such transformations that are an integral part of digital transformation of school education.

Thus, despite the rapid expansion of access to digital technologies and their active use in the educational process, the number of those who are able to successfully solve complex problems in an environment saturated with them is only a small part of those trained, but in recent years their number has been increasing.

It is necessary to change the work of the educational system in such a way that the general literacy and ability to solve non-standard problems of school graduates are higher than that of modern intelligent computer systems.

Teachers must show students how to properly use technology to support their learning, how to interact with these technological tools and devices for learning purposes so that the number of such school graduates increases and the new digital divide is reduced.

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DEVELOPMENT OF PHYSICAL FITNESS OF SCHOOL STUDENTS THROUGH SPORTS AND HEALTH TOURISM: APPROACHES AND METHODS

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Annotatsiya. Ushbu maqola maktab o‘quvchilarida jismoniy tayyorgarlikni rivojlantirishda sport-sog‘lomlashtirish turizmining ahamiyati bayon qilingan. Suningdek sport-sog‘lomlashtirish turizmining o‘quvchi yoshlarning jismoniy faollikni oshirishda samarali vosita ekanligi, o‘quvchilarning umumiy salomatligiga ta’siri tahlil qilingan.

Kalit so‘zlar: *jismoniy tayyorgarlik, maktab o‘quvchilari, turizm, jismoniy tarbiya, sog‘lom turmush tarzi, sport mashg‘ulotlari, metodika.*

Аннотация. В статье рассматривается значение спортивно-оздоровительного туризма в развитии физической подготовленности школьников. В ходе исследования была проанализирована эффективность

спортивно-оздоровительного туризма как действенного инструмента повышения физической активности студентов и эго влияние на общее состояние здоровья студентов.

***Ключевые слова**: физическое воспитание, школьники, туризм, физическое воспитание, здоровый образ жизни, спортивная подготовка, методика.*

Abstract. This article describes the importance of sports and health tourism in developing physical fitness among schoolchildren. It analyzes the effectiveness of sports and health tourism as an effective tool for increasing physical activity among schoolchildren and its impact on the general health of students.

***Keywords:** physical training, schoolchildren, tourism, physical education, healthy lifestyle, sports training, methodology.*

Introduction

The task is to rapidly develop tourism in the country, to rapidly develop other types of tourism, including ecological, educational, sports, medical and health-improving, and others, along with traditional cultural and historical tourism, to strengthen the social significance of tourism through the development of children's, adolescents', and youth tourism, and to organize and implement new tourism destinations in the regions. [1].

Today, the issue of developing physical education and health of schoolchildren is gaining urgent importance. Modern lifestyle, dependence on technology and inactivity are causing health problems among young people. In such conditions, it is important to form a healthy lifestyle of schoolchildren and involve them in active movement by using sports and health tourism activities as a means of physical education [2].

Sports and recreation tourism activities serve not only physical development, but also broaden students' worldview, understanding of national values, and strengthening respect for natural and historical places. This also plays an important role in educating the younger generation in the spirit of patriotism. In many countries of the world, there is a growing trend to ensure the physical and mental health of schoolchildren and develop their social skills by introducing sports and health tourism activities. In this regard, one of the urgent issues is the study of advanced foreign experiences in the development of physical fitness through sports and health tourism and their adaptation to local conditions.The development of the tourism sector in our country is one of the priorities of state policy. Organizing sports and health tourism activities among schoolchildren and involving them in them will have a positive impact not only on increasing their physical fitness, but also on their personal development and future activities.

The above makes the topic relevant, as it is of great importance in the modern educational process in the formation of a physically and spiritually healthy generation and requires innovative approaches.

Literature Review

Sports and health tourism, in addition to increasing physical activity, helps students to get rid of negative habits that are contrary to a healthy lifestyle. Tourism activities help students develop such qualities as teamwork, leadership, and self-awareness. In addition, hiking in nature allows for natural physical activity.

The game methods used in the tourism process are interesting and effective for young students. For example, sports competitions, walks along various routes (routes), and completing various topographical tasks provide them with not only physical but also mental development. This has a positive effect on the general health of young students and their success in their studies. Physical fitness is an important factor in maintaining the health of students and developing their willpower. Tourism, in turn, is an effective way to improve the mental (psychological) and physical condition of young students by creating new experiences and memories [3]. Also, through sports and health tourism, students not only engage in physical activity, but also develop positive qualities such as teamwork and nature conservation [4].

Research Methodology

There are a number of practical ways to promote physical fitness through tourism. Some of them are as follows: To increase the interest of young students in physical activity through exercises specialized in tourism in outdoor sports-health tourism activities in the heart of nature. Creating an opportunity for active recreation along with physical exercises by holding sports games in the heart of nature. Increase their endurance by having active rest in nature, physical training in nature [4, 5, 6].

Analysis and Results

In order to confirm the scientific hypothesis about the development of physical fitness of schoolchildren through the tool of sports and health tourism, a sports and health tourism program developed by us was implemented among schoolchildren. In our research, the participants of the pedagogical experiment were divided into two groups, control and experimental groups. The students of the experimental group were involved in training according to the program of sports and health tourism, and the students of the control group were included in the training according to the traditional program. participated in physical training.

The students of the experimental group went on walks, specialized in nature tourism exercises, sports games, and excursions. In the pedagogical experiment, the physical and mental (psychological) changes of the students in the experimental group compared to the students in the control group revealed the following positive indicators:

1. Increase in physical strength and general endurance, involvement in sports and health tourism activities Cardiovascular system activity and breathing abilities improved significantly in the students.

2. It was observed that the mental (psychological) condition improved, the activities in nature reduced the stress level and improved the psychological condition of the students.

3. The skills and abilities of team participation in trainings have increased: Through team sports trainings and trips, students' ability to work with a team has developed.

✓ Effectiveness of physical training (according to indicators)

✓ Strength and Endurance: Endurance levels increased by 15% among students who participated in tourism training.

✓ Speed and coordination: It was determined that the speed and coordination level of the students who participated in the tourism training was 12% higher than that of the control group.

✓ Motivation: Due to the increased motivation of students for physical activity, they began to pay more attention to their health.

Conclusions

1. It was determined that the use of sports and health tourism in developing the physical fitness of schoolchildren is highly effective.
2. Through tourism, not only the physical abilities of schoolchildren develop, but also their worldview expands and teamwork skills develop.
3. Engaging in sports and health tourism training is important in strengthening the health of students and educating them based on a healthy lifestyle. This not only has a positive effect on the health of students, but also increases their motivation and responsibility for studying.
4. Organization of sports and health tourism activities in schools develops the feeling of love for the Motherland and appreciation of national values among young students. Taking into account that the development of the tourism sector is one of the urgent directions in our country, this type of training is important for the future training of personnel in the field.

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MODERN TEACHING METHODS IN THE PREPARATION OF STUDENTS OF MEDICAL SPECIALTIES

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Annotatsiya. Etakchi universitetlar va ilmiy markazlarda yuqori malakali ilmiy kadrlar tayyorlash har doim jamiyat rivojlanishining eng kuchli tomonlaridan biri sifatida tan olingan. Yuqori malakali kadrlar tayyorlash tizimini isloh qilishga muvofiq, moslashish masalasi ko‘tarilmoqda, ta’limda yangi texnologiyalar joriy etilmoqda. Jarayon talabalarning malakasini va bitiruvchilarning raqobatbardoshlik darajasini milliy va xalqaro miqyosda tayyorlash va baholashni talab qiladi.

Kalit so‘zlar: *texnologiya, ta’lim, akme, texnika.*

Аннотация. Подготовка научных кадров высшей квалификации в ведущих университетах и научных центрах всегда признавалась одной из наиболее сильных сторон развития общества. В соответствии с реформированием системы подготовки кадров высшей квалификации поднимается вопрос адаптации, внедрены новых технологий в образовании. Процесс требует подготовки и оценки компетентности студентов и уровень конкурентоспособности выпускников, как на национальном, так и на международном уровне.

Ключевые слова: *технологии, образование, акме, методика.*

Abstract. The training of highly qualified scientific personnel at leading universities and research centers has always been recognized as one of the strongest sides of the development of society. In accordance with the reform of the system of training highly qualified personnel, the issue of adaptation is raised new technologies in education are introduced. The process requires the preparation and assessment of students’ competence and the level of graduates’ competitiveness, both at the national and international levels.

Keywords: *technology, education, acme, method.*

Introduction

The modern technology of learning from “from knowledge to skills,” based on the logic of science, should be transformed into a technology based on the patterns of cognitive activity of the student, who should turn from an object into a subject of learning, and further into a technology of self-development and self-improvement. This approach to teaching foreign languages is caused by the need to overcome the crisis in education, which would contribute to the training of specialists of a new formation, who are prepared not only for professional skills, but who speak foreign languages,

allowing specialists to self-development, self-improvement, and professional growth. It is precisely these goals that are set by acme linguistics. Historically, acme linguistics arose from acmeology, a science formed at the junction of natural, social and humanitarian disciplines that study the patterns and mechanisms of human development when they reach the highest level.

Research Methodology

Acme linguistics traces the development of this concept since ancient times. In the Greek education system, it was understood as the way to achieve mastery by copying the teacher. In the modern world, the content of this concept is defined as a complex consisting of a representation of the planned learning outcomes, a set of learning models, criteria for choosing the optimal model for these specific conditions. Acme linguistics is a field of not only scientific, but also practical activity that examines and uses patterns, factors and mechanisms of development and self-development of an adult student in order to achieve the highest results in teaching a foreign language. In other words, language here acts as a means of achieving a personal “acme.” At the present stage, teachers of higher educational institutions face the task of ensuring that students master the educational material with maximum accuracy and as firmly as possible. But after all, what seems optimal to the teacher may not be available to the student. Therefore, the teacher should take into account the individual psychophysical characteristics of the student and even adapt to them. In the personality-oriented teaching methodology, it is quite generally accepted that each type of personality has its own successful strategies for learning a foreign language.

The development of the idea of differentiated pedagogy in the light of all that has been said earlier requires the following:

1) identification of students with a tendency to different ways of language acquisition;

2) offering them different tasks for each type of student;

3) impact on all channels of perception and processing of information;

Analysis and Results

The teacher should understand that there may be a discrepancy between the student’s linguistic personality and the teacher’s linguistic personality. And he should be able to smooth out a possible conflict through flexible application and change of training tactics. Since the foreign language teaching system is one of the elements of the professional education system, all of the above is relevant to it. Therefore, the main principle of teaching a foreign language is its (learning) personality-oriented orientation, focusing on the linguistic personality of the learner. The personality-oriented nature of teaching a foreign language dictates the need to rethink both the teaching activity of the teacher and the student’s activity and position on language acquisition. The student becomes the main subject of the educational process. The educational process is not based on the priorities of the educational material: the initial one is the student as the subject of the educational process. To implement this provision, it is necessary to introduce didactic and methodological technologies into practice, the purpose of which (at all stages of training) is not the accumulation of

knowledge and skills, but the constant enrichment of creative experience, the formation of a mechanism for self-organization and self-realization of the personality of each "student." In other words, we are talking about finding a way beyond the narrow framework of linguistic aspects of teaching a foreign language in the field of personal relationships and interests of subjects of the pedagogical process.

Since both linguistics and psycholinguistics consider language not as a certain system of linguistic means, but as one of the aspects of human activity - social (speech activity is mental and creative activity), then teaching a foreign language aimed at forming the trainees' traits of a secondary linguistic personality is a conscious (cognitive) and creative process, and not "programmed behavior."

Leontiev A.A. notes that in the educational process of a foreign language, there are at least two opportunities to interest a student. The first is related to the construction of the "proposed circumstances" in such a way that the student actually finds himself in a situation where he has to act one way or another. In the second case, we are talking about a situation in which a student performs a "reincarnation" ("transfer") into a person acting in these circumstances. Thus, in the second case, we are talking about so-called techniques that "simulate" situations of real speech communication (for example, playing out given sample dialogues). It is quite obvious that in the light of the new didactic and methodological paradigm, it is the first opportunity that should occupy an increasingly significant place in the lesson, gradually "displacing" other possibilities of the student's interest.

Since the student is understood as an intellectual (thinking) and autonomously (independently) acting individual, his speech activity (however, as well as language acquisition) is influenced by his general, constantly changing speech experience (including in his native language), as well as individual experience in language acquisition and communication in this language. If this is the case, then the educational process should activate the intellectual abilities, knowledge and speech experience available to each student, his "emotions and moods" and develop these personal parameters.

Conclusions

Therefore, it is important to build the educational process in such a way that the student, solving certain communicative tasks, feels the need and has the opportunity to realize his own intentions, i.e., he acts on his own behalf. At the same time, the process of learning a foreign language should not be aimed at the formation of correct speech (most often based on a given sample) and the development of students' skills of speech response, and speech adaptation and communicative situation (at the level of speech behavior). The focus should be on learning the ability to generate and understand statements within an authentic situation at the level of textual activity.

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BENEFITS OF FLIPPED CLASSROOM MODEL TO ADDRESS FOSSILIZATION AND OVERGENERALIZATION IN SPEAKING ENGLISH

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Annotatsiya. Mazkur maqolada ingliz tilida gapirish kompetentsiyasini rivojlantirishda ikkita muhim muammo - fosilizatsiya va noo‘rin umumlashtirishni (overgeneralization) bartaraf etishda “Flipped Classroom” modelining afzalliklari o‘rganilgan. Fosilizatsiya - bu ikkinchi til o‘rganuvchilaning nutqidagi xatoliklarning odat tusiga kirganligi bo‘lsa, ortiqcha umumlashtirish esa o‘rganilgan qoidalarning noto‘g‘ri kontekstlarda qo‘llanilishini anglatadi. Ushbu maqolada “Flipped Classroom” modelining bu muammolarni hal qilishdagi afzalliklari yoritilgan. Mazkur model an’anaviy dars qismlarining yangicha tartiblash orqali talabalarning dars jarayonida faolligini oshirishga yordam beradi. Maqola so‘nggida, talabalarda og‘zaki nutqning aniqligi va ravonligini yaxshilash uchun darslarga ushbu modelni integratsiya qilish bo‘yicha tavsiyalar berilgan.

Kalit so‘zlar: *Flipped Classroom, fosilizatsiya, noo‘rin umumlashtirish, gapirish kompetentsiyasi, kommunikativ topshiriqlar, fikr-mulohaza bildirish.*

Аннотация. Данное исследование рассматривает преимущества модели перевернутого класса (Flipped Classroom) для решения двух основных проблем при развитии устных навыков в английском языке: фоссилизации и избыточной генерализации. Фоссилизация означает стабилизацию ошибок в речи учащихся, изучающих второй язык, а избыточная генерализация – неправильное применение изученных правил в разных контекстах. Это исследование изучает способы решения этих проблем с помощью модели перевернутого класса, которая изменяет традиционную учебную среду, вынося контент за пределы класса и вовлекая учащихся в более активные занятия на уроках. Исследование завершено рекомендациями по интеграции методов перевернутого класса в преподавание английского языка для улучшения точности и беглости речи.

Ключевые слова: *Flipped Classroom, фоссилизация, избыточная генерализация, устные навыки, коммуникативные занятия, корректирующая обратная связь.*

Abstract. This study explores the benefits of implementing Flipped classroom model as a tool for overcoming two major language problems in developing oral skills in English- fossilization and overgeneralization. Fossilization refers to the stabilization of errors in second language learners’ speech, while

overgeneralization means the usage of particular learned rules inappropriately in different contexts. This research explores the ways of addressing these challenges via “Flipped classroom” model, which inverts traditional learning environment with content outside of class and engaging them more engaging activities during classes. The study concludes with recommendations for integrating flipped classroom methods into English language teaching to foster more accurate and fluent speech.

Keywords: *Flipped classroom, fossilization, overgeneralization, speaking skill, communicative activities, corrective feedback.*

Introduction

In language learning, the challenges vast majority of students come across are “overgeneralization” and “fossilization” which negatively affect their accuracy and fluency. Fossilization implies that learners’ errors become automatic and resistant to correction, whereas overgeneralization means misusing the rules learned in other contexts. These two problems really delay linguistic development, especially when it comes to speaking.

Feasible solution may come from the concept of the flipped classroom, which was designed to redefine traditional classroom dynamics. In this model learners receive the content out of class in the form of videos and reading materials and then in face-to-face classes students are required to accomplish some activities on those materials. This teaching model promotes active participation, peer interaction, and immediate feedback, which could minimize errors, ultimately provide more accuracy and fluency in language production.

The study explores the effectiveness of the flipped classroom in addressing fossilization and overgeneralization in English speaking. The main question is: how does the flipped classroom model help learners overcome these challenges and improve their spoken English?

Objectives:

-to explore the effect of flipped classroom strategies on minimizing fossilization in spoken English.

-to assess the role of flipped classroom techniques in minimizing overgeneralization in learners’ speech.

-to identify the most effective elements in flipped classrooms that help promote speaking skills effectively.

Literature Review

Fossilization occurs when certain linguistic errors become permanent, even after receiving corrective feedback. According to Selinker (1972) fossilization is another obstacle to linguistic improvement in that learners' interlanguage is the transitional stage between their first language and target language, stabilizes at a non-native level of proficiency [1]. In this context, some factors influence fossilization: it may be insufficient exposure to native-like input, limited opportunities for feedback, and a lack of opportunities for practice.

Overgeneralization refers to the belief that language learners apply the rule of language in one context to other contexts where such rules do not work. Often, this process leads to the creation of errors in pronunciation, grammar, and usage. For example, the suffix "-er" can form a noun denoting the person performing an action from a verb indicating the action (e.g., teach-teacher, build-builder). However, this rule is not applicable in the following cases: "cooker" refers to a cooking device, while "cook" refers to a person who cooks; "smaller" is the comparative form of the adjective "small." According to Brown (2007), overgeneralization occurs because learners strive for simplicity in language rules, yet they may fail to comprehend exceptions or nuances [2].

Bergmann and Sams (2012) have advanced the concept known as the flipped classroom, in which traditional pedagogical roles are reversed. Learners explore new information remotely, often through online videos, and work out problems, discuss, and engage in practical activities when coming to campus [3]. This leads to active learning, learner autonomy, and peer collaboration [4, 5]. It has meant that in language teaching, learners approach the grammar, vocabulary, and pronunciation exercises before coming to class, where speaking with peer support and under the guidance of the teacher takes place [6, 7].

According to Johnson and Hill (2016) research shows that the flipped classroom has the potential to support language learners by providing more opportunities for speaking and, importantly, for interaction in a fluid and low-stakes environment [8]. Indeed, through discussion with peers, immediate feedback, and reflection on their own production, learners may start to self-correct overgeneralizations and avoid fossilization [9, 10].

Research Methodology

Mixed-methods are used in this research, where quantitative analysis of learner performance is combined with qualitative insights obtained through interviews and classroom observations. The present study investigates the effectiveness of the flipped classroom model in overcoming fossilization and overgeneralization in speaking, as well as learners' perceptions of its effectiveness. In the present research, the respondents consist of 166 higher education EFL learners whose major is teaching languages and who are divided to either the experimental or the control group. The groups receive two kinds of teaching in a flipped classroom approach and through the traditional approach of the classroom.

Pre-test and Post-test tests were applied to measure students speaking accuracy and fluency. Furthermore, in order to assess interaction pattern and activities that are organized based on new approach, several classroom observations were carried out. Semi-structured interviews with learners and instructors were also conducted in order to collect their perception regarding the flipped classroom model. There is given some samples relating fossilization in pronunciation:

Table 1. Overgeneralization in pronunciation.

Word	Correct pronunciation	Wrong pronunciation	Base word	Pronunciation the base word
Kindle	/ˈkɪn.dl/	/ˈkaɪn.dl/	Kind	/kaɪnd/

Lively	/ˈlaɪv.li/	/ˈlɪv.li/	Live	/lɪv/
Variety	/vəˈraɪə.ti/	/veəˈriə.ti/	Vary	/ˈveə.ri/
Blood	/blʌd/	/bluːd/	Balloon	/bəˈluːn/
Palace	/ˈpæl.ɪs/	/pleɪs/	Place	/pleɪs/
Quilt	/kwɪlt/	/kɪlt/	Guilt	/gɪlt/
Chew	/tʃuː/	/tʃ juː/	Few	/fjuː/

Table 2. Fossilization in pronunciation.

Word	Wrong pronunciation	Correct pronunciation	Word	Wrong pronunciation	Correct pronunciation
first	/fyo'st/	/fɜːst/	Heading	/hɪdɪŋ/	/hedɪŋ/
girl	/gyol/	/ gɜːl/ / gɜːrl/	Character	/tʃ ærəktə(r)/	/kærəktə(r)/
student	/student/	/stjuːdnt/ /stuːdnt/	Thank	Senk	/θæŋk/
minute(n)	/mɪnut/	/ˈmɪnɪt/	professor	/professɪr/	/prəˈfesə/ /prəˈfesər/
write	/vraɪt/	/raɪt/	said	/seyd/	/sed/

The experimental group received a 12-week flipped classroom intervention, whereby learners watched instructional videos at home and spent class time in speaking exercises, while the control group received traditional instruction, consisting of lectures and speaking activities delivered in class time. Both groups also received corrective feedback on speaking errors throughout the term.

Analysis and Results

The experimental group significantly outperformed the control group in fluency and accuracy during the post-test. The statistics also indicated that the flipped classroom model reduced errors of fossilization and overgeneralization in students' oral speech during lessons. This can be seen, particularly, in the improvement of students' accuracy in their speech by utilizing more accurate grammar structures.

Interviews revealed that a sense of confidence increases significantly in the experimental group due to the new opportunities. They mentioned that corrective timely feedback in the classroom helped them understand their errors and avoid common overgeneralizations. The control group reported that as they could not receive sufficient corrective feedback on their speech, they felt frustration. The main reason for this, as they confirmed, was short of time that was allocated for feedback in face-to-face classes. A further reason for this improvement, as experimental group stated, due to pre-class tasks they could identify their misunderstandings and mistakes on a specific topic beforehand, so that during in-class activities they were able to work on them with a teacher.

According to the results, 91.5% of students found pre-class simple exercises and tasks effective, while 77.1% of students considered learning new topics through pre-class videos and reinforcing the more complex parts in face-to-face classes to be more effective. Therefore, pre-class tasks in the flipped classroom model are beneficial for students (as given in Table 3).

Table 3.

Aspects of survey	**Percentage**
Effectiveness of pre-class simple exercises and tasks	91.5%
Effectiveness of learning new topics through pre-class videos and reinforcing complex parts in face-to-face classes	77.1%
Effectiveness of video, audio-format learning materials, and presentations for better understanding of topics	93.1%
Preferred method for developing speaking competence	
- Pair work	56.9%
- Small group work	25.5%
- Individual work	17.6%
Support for implementing online games	81.4%
Preferred activities	
- Participating in discussions on interesting topics	46.8%
- Participating in debates	47.3%
- Rote memorization	27%
Rating of communication level with teacher in English	
- Unsatisfactory	31.3%
- Satisfactory	15%

According to the results, 91.5% of students found pre-class simple exercises and tasks effective, while 77.1% of students considered learning new topics through pre-class videos and reinforcing the more complex parts in face-to-face classes to be more effective. Therefore, pre-class tasks in the flipped classroom model are beneficial for students.

The majority of students (93.1%) agreed that video and audio-format learning materials, as well as presentations, were helpful for understanding the topics better. Additionally, 56.9% of students found working in pairs and 25.5% found working in small groups more effective for developing their speaking competence. On the other hand, individual work was considered more convenient by a relatively small minority (17.6%). The implementation of online games was supported by the majority of students (81.4%). Furthermore, participating in discussions on interesting topics (46.8%) and engaging in debates (47.3%) was considered much more interesting to them compared to rote memorization (27%).

Additionally, based on the overall data, most respondents rated their level of communication with the teacher in English during lessons as unsatisfactory (31.3%) and satisfactory (15%). A similar situation was observed in the ratings of their communication with peers in English.

Classroom observations showed that the learners in the flipped classroom were more engaged in peer-to-peer interactions that allowed them to negotiate meaning and get immediate corrective feedback. Moreover, the collaborative nature of activities in the flipped classroom was particularly useful for the learners to self-correct fossilized errors.

Research results reveal that the flipped classroom offers distinct benefits when tackling fossilization and overgeneralization. They include high level of interaction

during in-class activities, adequate time for immediate feedback and more teacher-student interaction.

These results really point out how important active speaking practice and immediate feedback are in overcoming the most common problems in language learning. The principle of learner autonomy and peer collaboration inherent in the flipped classroom model can be fruitfully integrated into the ESL curriculum to enhance more accurate and fluent speaking.

One of the primary benefits noted by students was the opportunity for more targeted practice and correction during in-class speaking activities. By engaging with instructional content beforehand, students reported feeling more prepared and confident in speaking tasks. Several students emphasized that this preparation allowed them to focus on overcoming fossilized errors. As one student mentioned:

"Before the flipped classroom, I would always make the same mistake with tenses, but when we practiced in class after watching the video, I had time to focus on those mistakes and get immediate feedback. I could correct myself faster, and I didn't keep repeating the same error."

Students also highlighted how the flipped classroom helped them avoid overgeneralization, particularly in grammar and vocabulary use. The opportunity for repeated practice in class allowed students to apply and refine the rules they had studied on their own. According to feedback, students appreciated receiving corrective feedback both from peers and from the teacher during speaking activities. One student shared:

"In the flipped classroom, I don't just listen to the teacher; I also learn from my classmates. If I say something like "cooker" instead of 'chef', someone will usually point it out, and then the teacher will help explain why it's wrong."

Although the study had promising results, there were limitations in the duration of the intervention and sample size. Long-term effects and larger participant groups could be further explored in future research.

Conclusions

Flipped classroom strategies should be integrated by teachers, especially for speaking practice, to promote error correction and fluency. The institutions should provide the necessary technological infrastructure to reinforce flipped learning. Further research is suggested to be conducted on other fields of language acquisition, such as writing and listening, using the flipped classroom model.

This study has revealed that the flipped classroom model can be one of the methods to overcome fossilization and overgeneralization in English speaking by offering learners more opportunities for interactive practice, collaborative learning, and immediate corrective feedback, which in turn fosters more accurate and fluent speech. As language educators continue to explore innovative methods for improving spoken English, the flipped classroom holds considerable promise as a tool for providing better language acquisition outcomes.

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ANTHROPOCENTRIC ASPECT OF QUANTITY EXPRESSIONS IN UZBEK AND ENGLISH LANGUAGES

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Annotasiya. Ushbu maqolada miqdor-adadning o‘zbek va ingliz tillarida ifodalanishining antropotsentrik jihati, bu ikki tilda insonning dunyoni idrok etishi, madaniyati, urf-odatlari va dunyoqarashini aks ettiruvchi miqdoriy xususiyatlarni ifodalash bilan bog‘liq bo‘lgan lingvistik birliklarni o‘rganishning ifodalanishi ko‘rib chiqiladi. Ushbu maqolada sonlar, idiomalar, to‘plam iboralari, shuningdek, miqdor bilan bog‘liq grammatik tuzilmalarning xususiyatlari o‘rganilgan.

Kalit so‘zlar: *o‘zbek va ingliz tillari, idiomalar, lingvistik birliklar, miqdor-adad iboralari.*

Аннотация. В этой стате рассматривается антропоцентрический аспект выражения количества в узбекском и английском языках, каким образом представляет собой исследование языковых единиц, связанных с выражением количественных характеристик, отражающих человеческое восприятие мира, культуры, обычаи и мировоззрение в этих двух языках. В данной стате изучены особенности числительных, идиом, устойчивых выражений, а также грамматических конструкций, связанных с количеством.

Ключевые слова: *узбекский и английский языки, идиомы, языковых единицы, выражения количества*

Abstract. The article discusses issue of the anthropocentric aspect of quantity expression in Uzbek and English languages, how linguistic units related to the expression of quantitative characteristics reflect human perception of the world, culture, customs and worldview in these two languages. In this article different aspects of the language, as the features of numerals, idioms, set expressions, as well as grammatical constructions related to quantity are studied.

Keywords: *Uzbek and English languages, idioms, linguistic units, quantity expression.*

Introduction

Considering the issue of the anthropocentric aspect of quantity expression in Uzbek and English languages is a study of how linguistic units related to the expression of quantitative characteristics reflect human perception of the world, culture, customs and worldview in these two languages. In this context, the features of numerals, idioms, set expressions, as well as grammatical constructions related to quantity are considered.

Literature Review

Main aspects of the research

Anthropocentricity-Both languages demonstrate how quantitative expressions are linked to human experience:

Uzbek is more community and tradition-oriented, which is evident in collective and socially oriented expressions.

English emphasizes individualism more, which is evident in expressions related to personal achievement and freedom of choice.

The anthropocentric aspect of quantity expressions in Uzbek and English highlights the universality of human cognitive processes while showcasing the influence of cultural and linguistic diversity. Both languages demonstrate how human perception shapes numerical and figurative expressions, albeit filtered through different cultural lenses. These anthropocentric traits underscore the shared human experience while revealing unique cultural identities.

For example, Khorezm’s folk songs, riddles, rapes and poems are characterized by fragments of human birth, every year of their lives, or specific age characteristics, which can be good example of the anthropocentric aspect of quantity expressions.

According to our observations, Azerbaijani, Turkish, Turkmen, Kazakh, Kyrgyz, Uighur, Bashkir, Tatar Turkic peoples such as the creations of this group of works most of them are recognized as a special genre.

We observed the works of the poem who had lived in the central regions of Uzbekistan Jumanbulbul, Fazil Yuldash son of Islam, the samples we received the above-mentioned works very close with character features.

The songs and poems depicted in other regions of Uzbekistan, apart from Khorezm, have little to do with such works. Therefore, such poems about the person's age and life are not recognized in the Uzbek folklore genre. The works of our poets, are included in the category "Autobiographical works." In some sources of Ergash Djumanbulbul's autobiographical work "Biography" is included in the genre of poems.

Mirzaev T. also considers this work as autobiographical work. Indeed, in the poem "My days," these poems refer to a more personal life and the socio-economic lifestyle of the time, and their autobiographical features are more prominent in them.

Mirzaev T. also evaluates this work as an autobiographical work in Khorezm epics, there are also poems with the line "My Days," but they are presented in a slightly different way. For example, in the epic "Gorugli" there are such lines:

In one I did not know good and bad,
In two I recognized my parents,
In three they gave me language,
In four I threw stones [1].

Khorezm epos have their own poems "My days" but they are somewhat different. The epic "Gurughli" focuses on the age characteristics of the person, and the poet's life in the poet reflects the attitude of the people to him. In Khorezm's historic epic "Davlatyorbek," a more perfect form of this genre was given.

In Uzbek literature there are more ancient examples of this genre. For example, the poet describes the age characteristics of human beings in the section entitled "The title of the book and his old age" by Yusuf Hos Hojib's "Qutadgu bilig." Describing the situation of his 40, 50, 60 years old, he urges the young man to abandon his youth and not to abolish youth.

Research Methodology

Different methods were used during the research, such as comparative-typological, as well as methodological and structural method. Numerals and cultural context.

Analysis and Results

In the Uzbek language, many numerals have a symbolic meaning that is associated with cultural and religious traditions. For example:

- The number 7 has a sacred meaning associated with the traditions of Islam religion: yetti iqlim ("seven climates"), yetti avlod ("seven generations"), sakkiz jannat ("eight heavens") and others.
- The number 40 is associated with rites and rituals, such as qirq kun ("forty days" after death), keeping 40 days caring of a baby and parents from different spiritual demons [2].

There is also number symbolism in English, but it is often associated with mythology, folklore, or everyday traditions: The number 13 is considered unlucky due to superstition: Friday the 13th. The number 7 is perceived as lucky: lucky seven.

Idiomatic expressions-The Uzbek language is rich in proverbs and sayings related to quantity, which often express folk wisdom:

Bir gap bilan ikki ish bitadi (“One word solves two problems”).
Yetti marta o‘lchab, bir marta kes (“Measure seven times, cut once”).
Qirq yil qirg‘in bo‘lsa, ajali yetgan o‘ladur. (If there is a war for forty years, the one who has reached the end of his life will die [3].

The English language also has many set expressions with numerals:

Two heads are better than one ("Two people are better than one").
At sixes and sevens ("Confused").[4]

Indeed, “the appearance of age-old elements in various genres of folk oral creativity, such as riddles, songs, proverbs, and epics, indicates the extreme antiquity of this form [5].

Folklorist Safarov O. also agrees with this idea and considers the frequent use of certain numbers in the number genre of Uzbek children's folklore to be related to shamanism. Because the presentation of children's age stages in the form of 3, 5, 7, 9, 20, 40, and the repetition of days or years are associated with some kind of worship of them and magic in numbers [6].

Nowadays comparative typological research is being conducted in English and Uzbek linguistics to collect, study, classify, describe, and organize proverbs related to common borrowed words. In modern linguistics, interest in studying and researching words and other language units that express concepts that embody the lifestyle, national customs, and activities of different peoples is growing day by day.

There are a number of studies in Uzbek linguistics devoted to the study of the linguistic characteristics of proverbs [7].

Grammatical aspects - in Uzbek, quantity is expressed by using suffixes and postpositions:

-ta as a countability indicator: bitta, uchta (“one, three”).
Use of reduplication for emphasis: ko‘p-ko‘p, oz-oz.
In English, quantitative categories are conveyed through:
A clear distinction between countable and uncountable nouns.
Use of words that emphasize uncertainty: a few, a little [8].

Conclusions

It can be revealed that, the anthropocentric approach to studying quantity in the Uzbek and English languages allows us to identify differences in worldviews and cultural values. The Uzbek language emphasizes traditions, collectivism and the sacredness of numbers, while the English language reflects pragmatism, individualism and rationality in the perception of quantitative categories.

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EXPLORING LINGUISTIC LACUNAE: A COMPARATIVE ANALYSIS OF ENGLISH AND UZBEK PROVERBS

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Annotatsiya. Ushbu maqola ingliz va o‘zbek tillaridagi maqollarni qiyosiy tahlil qilish orqali leksik kamchilik tushunchasini o‘rganadi. Tildagi madaniy va tarixiy farqlarni o‘rganib chiqib, aniq so‘z yoki iboralarning boshqa tilda to‘g‘ridan-to‘g‘ri ekvivalenti yo‘qligi holatlarini aniqlaymiz. Ushbu tadqiqot tilning madaniy o‘ziga xoslikning aksi sifatida ahamiyatini ta’kidlaydi va samarali madaniyatlararo muloqot haqida tushuncha beradigan lakunalar tasnifini taklif qiladi.

Kalit so‘zlar: *Lingvistika, leksik birliklar, lingvomadaniyatshunoslik, lakuna, maqollar, subyektiv lakunalar, kommunikativ lakunalar, matn lakunalar, madaniy makon lakunalar, paralingvistik lakunalar.*

Аннотация. В данном исследовании исследуется понятие лексического дефицита посредством сравнительного анализа английских и узбекских пословиц. Изучая культурные и исторические нюансы языка, мы выявляем случаи, когда конкретные слова или фразы не имеют прямого эквивалента на другом языке. В этом исследовании подчеркивается важность языка как отражения культурной идентичности и предлагается классификация

пробелов, которая дает представление об эффективной межкультурной коммуникации.

Ключевые слова: *Лингвистика, Лексические единицы, Лингвокултура, Лакуны, Пословицы, Субъективные лакуны, Коммуникативные лакуны, Текстовые лакуны, Лакуны культурного пространства, Паралингвистические лакуны.*

Abstract. This article explores the concept of lexical lacunae through a comparative analysis of proverbs in English and Uzbek. By examining the cultural and historical nuances embedded in language, we identify instances where specific words or phrases lack direct equivalents in another language. This research highlights the significance of language as a reflection of cultural identity and offers classifications of lacuna, providing insight into effective intercultural communication**.**

Keywords*: Linguistics, Lexical Units, Linguoculture, Lacuna, Proverbs, Subjective Lacunas, Communicative Lacunas, Textual Lacunas, Cultural Space Lacunas, Paralinguistic Lacunas.*

Introduction

Studying the spiritual and cultural values and characteristics of the people of the world, and enriching the literary field with lexical units is one of the most pressing issues of our time. Implementing the relationship between language, society and culture is considered one of the problems of modern linguistics. In this article, the issues of the linguistics involve not only describing language phenomena but also shedding light on the culture and relationships associated with those phenomena during the research process, which holds significant importance.

Nowadays, the study of differences in languages, particularly in modern fields of the linguistics such as translation and lingua-culture, is increasing. While comparing words, texts in different languages, we may not be able to find an equivalent word in another language. Cultures in world languages always interact and cooperate, this phenomenon ensures their continuous development. Furthermore, difference among some languages, namely, differential aspects of languages may arise. This is a phenomenon, which is studied in modern linguistics as “Lacuna”. Lacuna – (lat. Lacuna “a gap, a hole”) [1].

Canadian linguists Vinay J.P. and Darbelnet J. introduced the term “lacune” and they gave a definition to the term: “If a word in one language cannot find an alternative in another language, there is always lacune phenomenon” [2].

Literature Review

The concept of lexical lacunae is a rich field of study that explores how different languages reflect unique cultural, social, and historical experiences. V.G. Gak highlights the gaps in a language's lexical system, suggesting that the absence of certain words can indicate a lack of shared cultural experiences [3]. This notion is supported by S. Vlaxov and S. Florin, who define lacunae as terms or phrases that encapsulate distinct cultural realities not found in other languages [4].

Ogursova O.A. further emphasizes that these lacunae represent lexemes without direct equivalents in other languages, while Bykova G.V. describes them as virtual lexical essences that can manifest in syntactic forms when needed for communication [5]. This idea aligns with the observations of Italian linguists Bentivogli L. and Piantas E., who note that lexical lacunae often require circumlocution in other languages, highlighting the intricacies of conveying specific cultural notions [6].

The historical development of the lacuna model by Russian ethnopsycholinguists Markovina and Sorokin provides a framework for identifying and analyzing these gaps in intercultural studies [7]. Bykova and Pylaev O.B. point out that despite the significance of lacunae, there remains a lack of comprehensive understanding and a unified approach to their study in global linguistics.

Moreover, Benjamin Whorf's perspective on linguistic gaps suggests that the absence of certain words or grammatical structures can shape speakers' worldviews, reinforcing the idea that language and culture are intricately intertwined. In summary, the exploration of lexical lacunae underscores the significance of language as a reflection of cultural identity and perception, revealing how linguistic gaps can influence thought and communication across different societies.

In my view, a word that defines cultural, social, historical life of a nation, may not have an alternative form in another language; this is referred as "lacuna".

There are different types of lacunas in linguistics. Usmonova Sh. classifies socio-cultural lacunas in her textbook "Linguaculturalogy" as follows [7-8]:

- ✓ Subjective lacunas which reflect the national and cultural characteristics of representatives of different linguacultural communities;
- ✓ Communicative lacunas of activities that reflect national and cultural characteristics in the interaction of various activities;
- ✓ Textual lacunas arising from the characteristics of texts;
- ✓ Cultural space lacunas;
- ✓ Paralinguistic lacunas.

According to Y.A. Sorokin's classification will be divided into four large groups [8]:

1) subjective lacuna reflecting national-cultural features of communicators who belong to various linguacultural societies (colour symbolics, digital symbolics characteristic features of this or that nation)

2) activity-communicative lacunas reflecting national-cultural specificity of various kinds of activity (gestures, household or daily behavior)

3) The textual lacunas arise in the special specificity of the text as a tool of communication, for example, belles-letters lacunas arise in the fiction as a communicative distance between the author and reader.

4) The lacunas of cultural space specify discrepancies in ratings of cultural space (environmental world, mode of life, stock of knowledge, cultural fund) of the representatives of linguocultural societies.

The classifications of lacunae by Usmonova Sh. and Sorokin Y.A. provide valuable frameworks for understanding how cultural factors create linguistic gaps. While both scholars recognize the importance of subjective and textual lacunae, Usmonova's broader approach that includes non-verbal elements offers a more comprehensive

understanding of communication. In contrast, Sorokin's focus on cultural evaluations highlights the complexities of intercultural interactions. Together, these frameworks enrich the field of linguistics, underscoring the need for ongoing research into the implications of lacunae for effective communication across cultures.

Most scholars studied the lacuna term itself and its types. This article gives information about lacunas in proverbs in English and Uzbek languages. While analyzing proverbs, I faced some words which have no equivalent form either an English or Uzbek languages.

Research Methodology

This study employs a qualitative approach to analyze linguistic lacunae in English and Uzbek proverbs. The qualitative approach used in this study is primarily **thematic analysis.** Thematic analysis allows for an in-depth interpretation of the meanings of proverbs, considering the cultural significance of specific words or phrases that may not have direct equivalents in the other language. The comparative method serves as a fundamental framework for the study, facilitating a thorough examination of lexical lacunae in proverbs and enhancing the understanding of language as a reflection of cultural identity. The research involves a detailed comparative examination of selected proverbs from both English and Uzbek languages. The study utilizes established classifications of lacunae provided by scholars such as Sh. Usmonova and Y.A. Sorokin. Through cultural contextualization, the research provides a comprehensive understanding of how language and culture intersect, highlighting the significance of proverbs as cultural artifacts that convey deeper meanings and values.

Analysis and Results

Based on the notions that we have looked through above, we tried to find and define the lacunas in English proverbs and their Uzbek equivalents.

Jolly/happy/as a sandboy, As. [9] (G'amsiz oshim, da'vosiz boshim) - In this proverb "sandboy" is a lacuna in the Uzbek language. We cannot find a word which defines the sandboy. In Bristol, England there is a basin called the Bathurst. There is an Ostrich Inn in this city. The Inn is next to Red Cliff caves which were a source of sand. The little boys were hired to collect sand from the caves. They collect the sand to spread to the floor of the Inn to soak up the beer. For this reason, they are called "sandboys." Sandboys were extremely happy when they got paid money. As a result, the expression "as happy as a sandboy" implying blissful contentment appeared. As it an event related to only English history, there is no equivalent for this word and the proverb "G'amsiz oshim, da'vosiz boshim" was chosen to give the meaning.

It can be understood from this proverb that if we and our family are healthy and we do not have any problem with life issues, so we can eat our meal without any concern, this means that we do not have any anxiety. "Da'vosiz boshim" - if we have no quarrel or trouble with somebody or we have no complaint, at this time we feel peaceful.

It can be concluded that the proverb in English and Uzbek languages gives the meaning of happiness although English version includes lacuna which has no equivalent to translate.

Whigs bathing and walk away with their clothes, Catch the (Dushman terisidan do‘sting uchun po‘stin bich). – “Whigs” historically refers to a political faction in Britain during the 17th to 19th centuries. They were known for their support of constitutional monarchism and parliamentary supremacy, in contrast to the Tories, who favored royal authority [10]. In the proverb “Whigs” can be understood as a metaphor for people who are carefree, indulgent, or perhaps naive. “Whigs” represents those who might be taken advantage of due to their lack of caution or seriousness. The proverb means that you can take Whigs that is your enemy’s clothes while they are having a bath. It implies that you can take advantage because of their ignorance. In this proverb, the lacuna is “Whigs” referring to a political group. In Uzbek language it cannot be translated as one word and difficult to explain. In Uzbek proverb the word “dushman” was chosen as a partial equivalent as it gives the meaning of taking advantage.

Work and no play make Jack a dull boy, All. (So‘z o‘lchovi oz, ozning ma’nosi soz). “Jack” – has traditionally been viewed as a representative name for an ordinary man, making it relatable to a wide audience. The name appears frequently in English literature and folklore, often symbolizing the average person. In various contexts, “Jack” can symbolize youthfulness and playfulness, contrasting with the seriousness of work. The name “Jack” fits well phonetically within the structure of the proverb, contributing to its memorable meaning. This proverb means that if the person only works without taking a rest, playing or relaxing, it makes person’s life boring. The word “dull” means “boring”. Besides working, the person should spend time on developing his\her other skills, namely, everything should be in a balance. In the Uzbek language there is not an equivalent word, so “So‘z o‘lchovi oz, ozning ma’nosi soz” was chosen to give the meaning.

Ota ko‘rgan o‘t yo‘nar;
Ona ko‘rgan to‘n bichar.

Wise child that knows its own father, It is a. -“To‘n” is a national costume of Uzbek people. It is made of cloth and cotton. This cloth is mostly worn by men in cold weather.” To‘n/Chopon” is preserved as a symbol of uzbek people. In the ceremonies, anniversaries “to‘n” is given as a precious gift for men.

It can be understood from this proverb that the child does what their parents do. In children’s life, the influence of parents is vital. It conveys that the experiences and teachings of both the father and mother play a crucial role in shaping the future path and character of their children. It highlights the importance of parental guidance and upbringing. In English there is not direct translation of this proverb. “Wise child that knows its own father, It is a” was chosen as an alternative form. This proverb means that true wisdom involves understanding one’s origins, heritage and identity. It implies that recognizing and acknowledging one’s roots, such as family, history can lead to self-awareness and insight.

Eshak Makkaga borgani bilan hoji bo‘lmas. (All are not the saint that go to the church) - “hoji” is a person who went to Makka to perform muslim duties. “Hoji” is also used to address with respect to men who are the elderly or have religious

knowledge. This word defines a person who is perfect and wise. That is the reason why, some Uzbek people gives a name adding “hoji”, for example, Hojimurod, Hojiakbar, Hojiniyoz, Hojibek, Hojiboy, Hojiali, Hojiburhon and etc. It can be understood from this proverb that if the person only goes to the religious places, such as, masjid, not performing the duties that are fixed in the religion, he\she is not considered as a religious person, namely “hoji”. Genuine skills, knowledge, and character are what truly define a person's worth, rather than superficial involvement. It emphasizes that actions and true intentions are more important than mere appearances or rituals. In English “All are not the saint who go to the church” was chosen as an equivalent form. This proverb means that not everyone who appears to be good or righteous (such as those who attend church) is genuinely virtuous or moral. It suggests that outward appearances can be deceiving and that true character is revealed through actions and behavior rather than just participation in religious or social rituals.

The findings show that lacunae are critical for comprehending cultural identity, demonstrating how language and culture overlap.

Usmonova and Sorokin’s classifications provide useful insights into the different forms of lacunae seen in the languages investigated. Proverbs serve as a channel for cultural values, and the lack of direct parallels emphasizes the importance of greater international understanding. The study supports the notion that linguistic gaps might influence thought and communication, demanding further investigation into their ramifications.

Conclusions

This research underscores the significance of lexical lacunae in the interplay between language and culture. Through the comparative analysis of proverbs in English and Uzbek, the study illustrates how linguistic gaps reflect cultural identities. The exploration of lacunae contributes to the field of linguistics and emphasizes the importance of continued research into the cultural factors that shape language. Future studies could further investigate other languages to enhance our understanding of intercultural communication and dialogue.

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QUANTITATIVE INDICATORS OF CONTAMINANTS IN COTTON SEED AND SEARCH FOR WAYS FOR THEIR SEPARATION FROM THE FRAGMENTS

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Annotatsiya. Ushbu tadqiqot paxta xomashyosidan aralashmalarni olib tashlashni o‘rganadi, paxta chig‘anoqlariga chuqur singib ketgan kichik aralashmalarga e’tibor beradi. 6A-12M vintli tozalagich kabi an’anaviy tozalash usullari, ayniqsa, yuqori namlik sharoitida, nozik aralashmalarni ajratishda tolaning chigallashishi va past samaradorlik kabi qiyinchiliklarga duch keladi. Ushbu muammolarni hal qilish uchun quritish va tozalash samaradorligini oshirish uchun issiq havo ta’sirini o‘z ichiga olgan takomillashtirilgan vintni tozalagich dizayni taklif qilindi. Eksperimental sinovlar Buxoro 6-II navli g‘o‘zada o‘tkazildi, bunda harorat, vintning aylanish tezligi va qoziq egilish burchagining tozalash samaradorligi va chigitning mexanik shikastlanishiga ta’siri baholandi. Natijalar shuni ko‘rsatdiki, optimal parametrlar - to‘r yuzasi va vintli qoziq orasidagi 10 mm masofa, 180 rpm aylanish tezligi va qoziqning egilish burchagi - 53,6% tozalash samaradorligiga erishdi va urug‘larning mexanik shikastlanishini 1,7% ga kamaytirdi. Taklif etilayotgan dizayn quritish va tozalash jarayonini sezilarli darajada yaxshilaydi va paxta sanoati uchun amaliy yutuqlarni taklif etadi.

Kalit so‘zlar: *Paxta, nopoklik paxta xomashyosi, namlik, mexanik shikastlanish, dizayn tozalash mash qurilmasi.*

Аннотация. В этом исследовании изучается удаление примесей из хлопкового сырья, уделяя особое внимание мелким примесям, глубоко внедрившимся в хлопковые ленты. Традиционные методы очистки, такие как очиститель шнекового типа 6А-12М, сталкиваются с такими проблемами, как спутывание волокон и низкая эффективность отделения мелких примесей, особенно в условиях высокой влажности. Для решения этих проблем была предложена усовершенствованная конструкция очистителя шнекового типа, включающая воздействие горячего воздуха для повышения эффективности сушки и очистки. Экспериментальные испытания проводились на хлопке сорта Бухара 6-II, оценивая влияние

температуры, скорости вращения шнека и угла наклона ворса на эффективность очистки и механическое повреждение семян. Результаты показали, что оптимальные параметры — расстояние 10 мм между поверхностью сетки и ворсом шнека, скорость вращения шнека 180 об/мин и угол наклона ворса 80° — достигли эффективности очистки 53,6% и снизили механическое повреждение семян до 1,7%. Предложенная конструкция значительно улучшает процесс сушки и очистки, предлагая практические достижения для хлопковой промышленности.

Ключевые слова: *Хлопок, примеси хлопкового сырья, влажность, механические повреждения, конструкция очистного сетчатого устройства.*

Abstract. This study investigates the removal of impurities from cotton raw materials, focusing on small impurities deeply embedded in cotton slivers. Traditional cleaning methods, such as the 6A-12M screw cleaner, face challenges like fiber tangling and low efficiency in separating fine impurities, especially under high moisture conditions. To address these issues, an improved screw cleaner design was proposed, incorporating hot air exposure to enhance drying and cleaning efficiency. Experimental tests were conducted on Bukhara 6-II grade cotton, evaluating the effects of temperature, screw rotation speed, and pile inclination angle on cleaning efficiency and mechanical damage to seeds. Results showed that optimal parameters—10 mm distance between the mesh surface and screw pile, 180 rpm screw rotation speed, and 80° pile inclination angle—achieved a cleaning efficiency of 53.6% and reduced mechanical damage to seeds to 1.7%. The proposed design significantly improves the drying and cleaning process, offering practical advancements for the cotton industry.

Keywords: *Cotton, impurity cotton raw materials, humidity, mechanical damage, design cleaning mesh device.*

Introduction

Numerous investigations have revealed that contaminants must be removed from cotton raw materials during processing. Impurities are categorized into two sizes (types). Large impurities are those that are larger than 8 mm in size, whereas little impurities are those that are smaller. Quantitative and qualitative measures are used to detect impurity levels in cotton raw materials. The quantitative indicator measures the overall amount of impurities in the raw material (in units and percentages), whereas qualitative indicators describe the size of the impurities and their interaction with fibers in cotton slivers.

Impurities are located on the surface and inside the cotton slivers, and their raw material particles are combined to varying degrees. Accordingly, small impurities are deeply embedded in the raw material, and their separation from the slivers requires rather complex methods, mainly the use of mechanical impact forces. Large impurities are mainly located on the surface of the raw material slivers. Since their connection with the fiber is quite loose, their separation from the fiber does not pose a big problem. [1, 2].

Prior to learning about the designs, tools, and techniques used to remove tiny impurities from cotton, we will learn about the fundamentals of impurity adherence to the fiber and cleaning effectiveness. Additionally, when choosing the technological characteristics of cleaning machines, we will take into account the primary control advancements and calculating procedures.

Literature Review

The problem to be solved and the statement of the problem.

Currently, the process of cleaning cotton raw materials from waste is based on impact and dragging cotton pieces on a mesh surface. The main essence of the cleaner is to reduce the adhesion force between the waste particle and the fiber under the influence of dynamic forces (impact, vibration, shaking, etc.), to set the particle in relative motion in the raw material composition and to remove it from the raw material mass. Such processes play different roles in setting the waste in motion [3-6]. Impact force is the most important factor, which is the main part of the cleaning process. In addition to the positive side, it is necessary to take into account the negative effects of impact force. For example, if the impact force is too high, the fiber and the grain can be damaged under its influence, or large impurities in the composition can turn into small impurities. Therefore, it is of great importance to determine the optimal values of impact force and use them in moderation.

Another method of intensively moving small and large dirt particles is to create vibrations (vibration) of the raw material particles, thereby ensuring a gradual decrease in the adhesion force between the dirt particles and the fiber over a certain period of time. In this method, it is assumed that the reduction of friction force in the theory of vibration is a targeted effect on the dirt particles. In this way, the mixtures are separated into grades and the porous media are compacted.

When it comes to cotton raw materials, the process is quite complex, and no single law can be accepted as universal. The purification of impurities occurs in a certain direction, and its result depends on many factors. Therefore, the composition of impurities, their location in the raw materials, in general, has a random nature, and their study requires deep statistical data. It should be noted that the method of mathematical statistics should serve as the basis of theory here. Mathematical statistics is usually based on the results of practical (experimental) research.

Research Methodology

Accordingly, in these studies, we use the method of planning experiments. Until now, in the cotton industry, mainly UXK brand and 6A-12M type screw cleaners have been used to clean cotton from small and large impurities. During the cleaning process, the cotton stays in each section of the 6A-12M machine for 30-35 seconds, during which the screw piles repeatedly beat the cotton and clean it from small impurities. The 6A-12M machine has been used effectively in cotton ginning enterprises until recently, but in recent years it has been used less often due to its shortcomings. One of the main reasons for this is that during processing, cotton becomes tangled due to the twisting motion, in which case, when cleaning cotton, the cotton mass remains under the

influence of twisting motion between the screw steps, without being shaken, and this leads to tangled cotton [2].

Another disadvantage of this machine is that in it, the cotton raw material is cleaned mainly using a mesh surface and drums with pegs. The efficiency of this process depends on the mass fraction of organic impurities in the cotton and the intensity of the movement of cotton along the mesh surface and the interaction with the screw pegs. Therefore, the efficiency of separating fine impurities in the cotton raw material in these devices is low, the main reason for this is the difficulty in separating fine impurities due to the high moisture content of the cotton components. In this case, the pile size is several times larger than the size of the impurities, and as a result of hitting the impurities in the cotton with a large impact force, they are crushed and penetrate between the cotton fibers. In this case, the larger the pile size in relation to the size of the impurities, the greater the above negative effect. Or, conversely, the smaller the ratio of dirt to pile size, the less likely it is that the dirt will be crushed and penetrate the fiber mass. Also, since the cotton pieces are subjected to a twisting motion between the screw steps without the cotton mass being shaken, the cleaning of dirty impurities decreases, and the constructive improvement of screw cleaners designed to clean cotton from small impurities, the optimal size of the working bodies, and the selection of optimal values for the cleaning efficiency are hypothesized. The conducted studies show that it is an urgent issue to find methods that allow the cotton to be dried and cleaned in the gin, when the cotton impurities are not very high, with the cotton being maximally cleaned, by additionally exposing it to hot air.

Analysis and Results

Analyzes show that it is possible to maximize the surface area of seeded cotton by combing it under the influence of hot air. In order to solve this problem, it was proposed to use an improved auger cleaner design, which allows the seed cotton to be exposed to hot air in a combined way, i.e. during movement. The proposal is to improve the drying efficiency by increasing the intensity of the effect of the drying agent on the cotton raw material during cotton transportation in the proposed screw cleaner, as well as the effective movement of cotton in the cut state.

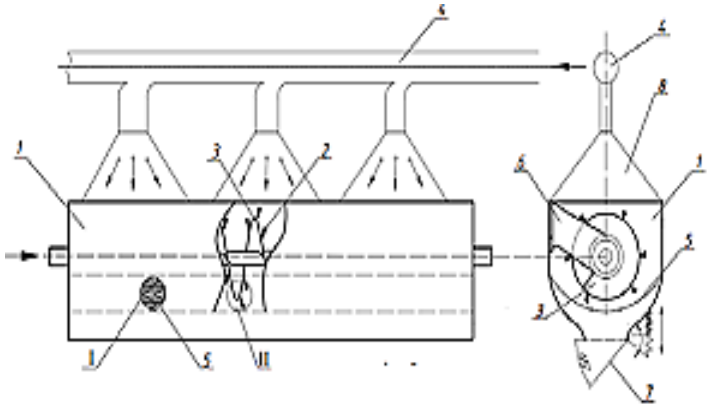

Figure 1. Construction of the cotton seed cleaner system from contaminations.

In the intensive temperature zone, the cotton raw material is simultaneously partially cleaned of fine chaff and foreign impurities. The design problem is solved in a way

that is similar to the one in the picture. In the device for drying, cleaning and transporting cotton raw material, the lower part of the screw auger is made cylindrical, consisting of a perforated surface and a special pipe for separating fine chaff and foreign impurities. The screw auger blades are installed on the outer perimeter with pegs, which are installed at an angle of 5-10° to the vertical axis of the ducts (as given in Figure 1). In order to improve the heat and mass transfer in the cotton raw material movement zone and increase the area of effect of the heat agent, an air inlet pipe is installed above the pipe flange to provide heat. This design of the device allows you to mix the cotton raw material with a heat agent and ensure its drying and cleaning from small foreign impurities and debris during transportation. The device has a support device made of sheet steel and a pipe 1. To separate foreign impurities and waste and exhaust the used hot air, a perforator 5 is installed in the lower part of the pipe, under which a waste separation pipe 7 is installed, along with a cover and a spring, and when filling with foreign impurities and waste, the filled impurities are discharged as a result of the movement of the barrier cover 7 under the influence of gravity. To improve heat and mass transfer in the cotton movement area and increase the area of effect of the heat agent, an air channel 4 is installed in the upper part of the pipe for heat supply. Screw auger blades 3 are installed on the pipe frame 1 using a bracket 6. Screw auger blades 3 have triangular pegs 2 along the outer perimeter [3]. The proposed design solves the problem in the following way: in the device for drying, cleaning and transporting raw cotton, the lower part of the screw auger is made cylindrical, consisting of a perforated surface and a special pipe for separating small chips and foreign impurities. The screw auger blades are installed on the outer perimeter with pegs, which are installed at an angle of 5-10° to the vertical axis of the capacity pipes. In order to improve the heat and mass transfer in the cotton raw material movement zone and increase the area of influence of the heat agent, an air inlet pipe for heat supply is installed above the pipe network. Such a design of the device allows for mixing the cotton raw material with the heat agent and ensures effective drying of the cotton raw material and cleaning it from small foreign impurities and weeds during its transportation.

Usually, when the moisture content of cotton is higher than 13-14 %, it is dried in drying drums. If the moisture content is lower than 13 %, it is recommended to dry it in drying equipment with low energy consumption. The effective implementation of the cleaning process after drying cotton seeds largely depends on the amount of dirt in the cotton, as well as its moisture content. In most cases, when drying cotton seeds in drying drums, the moisture content in it exceeds the norm, which leads to a decrease in the efficiency of the cleaning machines of the UHC. This, in turn, not only leads to an increase in the amount of dirt in the fibers obtained during the ginning process, but also creates inconveniences for the efficient operation of the ginning machines. Having noted the above, in this article, it is recommended to dry and clean seeded cotton in additional equipment depending on the degree of contamination and the amount of moisture content, and experimental tests were conducted to determine the operating modes that

ensure the efficiency of the equipment. Experimental tests were carried out on the test sample of the equipment shown in Figure 2.

The tests were carried out on cotton of Bukhara 6-II grade with a moisture content of 11.4 % and impurities of 1.9 % after passing through the UHC flow line in a screw cleaner with a length of 6 meters. The quality indicators of cotton after the UHC machine were determined by taking samples in the laboratory at the plant. Also, using an electric heater (SFO-40/3 t), a hot air flow with a temperature of 100-140-180 ℃ is directed to the cotton pieces in the screw cleaner through the air pipe after the screw dryer and the upper part of the cleaner are installed. Then, samples are taken from the cotton, and the cotton moisture content, fiber and seed heating temperatures, and the amount of impurities are determined. When hot air hits the screw cleaning drum, it heats up very quickly. Our scientists have proven that due to the low moisture content of cotton, moisture removal occurs at a very slow rate. Therefore, in order to prevent the cotton from overheating in the drum, it is constantly stirred in the screw drum and the heat exchange process is improved. The main goal of the experiment is to reduce the cotton seed to a state of fine particles in a Figure 2. Drying and cleaning device short time and increase the rate of moisture removal, as well as improve the separation of fine impurities in the cotton composition and reduce the amount of impurities in the gin drum, thereby improving the ginning process and obtaining high-quality fiber.

Figure 2. Drying and cleaning device image.

Indeed, the results of the experiment show that when cotton is separated into elementary pieces and dried with its relative surface area maximized, it is possible to reduce the moisture content to 2-4% in a very short time by heating the fiber, and the total amount of fine impurities in the ginned cotton can be reduced to 0.8-1.5% for types I and II cotton. In Figure 3 graphs of the dependence of cotton moisture and soiling on the drying temperature and the length of the auger cleaner are presented.

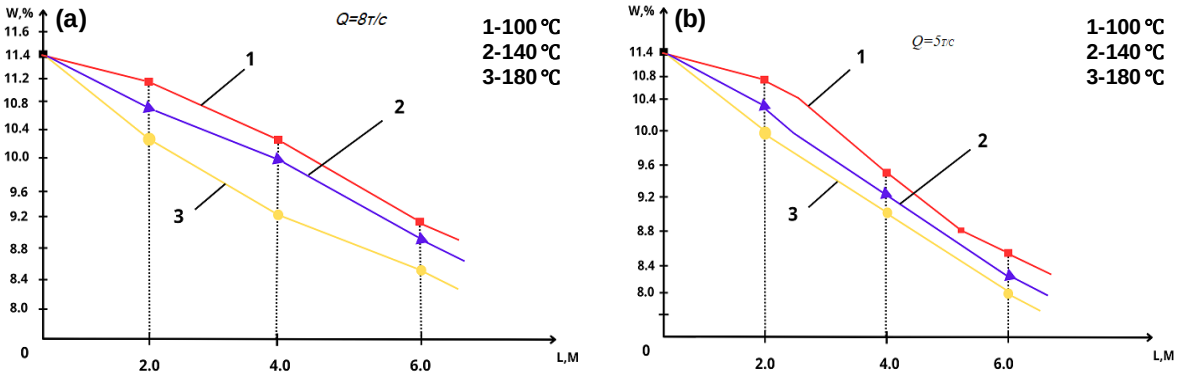

Figure 3. Temperature dependence moisture amount released from cotton seed: (a) type I and (b) type II.

The effect of temperature on the moisture separation process is significant, and the moisture content in a 6 m long dryer with a working efficiency of 5 t/s at a hot air temperature of t- 100 ℃ decreased from 11.4% to 8.9%, at t- 140 ℃ to 8.7% and at t- 180 ℃ to 8.5%. The working efficiency (in Figure 3) decreased by 9.6-9.2-8.9% at Q=8 t/s and at temperatures of t=100-140- 180 ℃, respectively. It can be seen that the working efficiency decreased by 0.70-0.5-0.4% compared to Q=5 t/s, in accordance with the decrease in cotton. During the research, it is important to determine the main factors affecting the damage of the seed and the increase in free fibers in the composition of the impurities in the device. During the movement of cotton pieces on the mesh surface, they are repeatedly exposed to the impact of the pins on the screw blades. Therefore, the change in the quality indicators of the cotton pieces with seeds during the movement of the mesh surface along the mesh surface depends on the distance between the mesh surface and the screw pin, and it is of great importance to determine this distance through experimental testing [4].

Studies have shown that increasing the distance from the screen to the pile, in turn, leads to a decrease in cleaning efficiency [5, 6]. Also, reducing the distance leads to a decrease in the quality indicators of cotton seed, namely; mechanical damage to the seed and an increase in free fibers in the composition of dirty impurities. Experiments are carried out using multifactorial planning, that is, a TOT 23 experiment is conducted. Here: 2 - the number of levels; 3 - the number of factors; the number of tests is 23 = 8.

The procedure for systematic experiments is as follows:

1. The influencing factors and output parameters of the optimization process are selected.

The input factors that require optimization in terms of value are:

X_1-Distance between the mesh surface and the screw pile, 12 (mm),

X_2-Spindle rotation frequency 200 (rpm), X_3-Spindle pitch angle 10 (degrees).

The following indicators were obtained as output factors:

Y_1- Cleaning efficiency of the device (%),

Y_2- Amount of mechanical damage of the grain in the device (%).

The experimental results are presented in Table 1 below the input planning matrix.

Table 1. Experimental design and results.

№	Factors				Cotton cleaning efficiency %					The amount of mechanical damage to the seed %				
	X_0	X_1	X_2	X_3	Y_{11}	Y_{12}	Y_{13}	Y_{sum}	S_i^2	Y_{21}	Y_{22}	Y_{23}	Y_{sum}	S_i^2
1.	+	-8	-180	-8	41,6	43,0	42,9	**42.5**	**0.61**	2,64	2,85	2,71	**2.73**	**0.01**
2.	+	+12	-220	-8	42,2	39,4	43,7	**41.7**	**4.77**	2,75	2,73	2,82	**2.76**	**0.0023**
3.	+	-8	+220	-8	41,4	40,1	43,4	**41.6**	**1.76**	2,95	3,72	2,79	**3.15**	**0.244**
4.	+	+12	+220	-8	44,4	43,8	45,6	**44.6**	**0.84**	2,78	2,86	2,76	**2.8**	**0.002**
5.	+	-8	-180	+12	54,7	54,2	52,9	**53.9**	**1.73**	2,14	2,25	2,09	**2.16**	**0.0016**
6.	+	+12	-180	+12	30,3	29,5	31,8	**30.5**	**2.73**	2,36	2,38	2,42	**2.39**	**0.0009**
7.	+	-8	+220	+12	39,2	40.1	42,4	**40.5**	**0.885**	2,52	2,74	2,66	**2.64**	**0.254**
8.	+	+12	+220	+12	31,4	30,5	33,3	**31.73**	**1.9**	2,24	2,34	2,42	**2.33**	**0.0045**
Total:								**327.03**	**15.22**	**Total:**			**20.96**	**0.519**

We reprocess the obtained results and construct the following regression equations Y_1- We write the equation for the cleaning efficiency of the device in the following form:

$$Y_1 = 40.87 - 3.74x_1 - 1.27x_2 - 1.72x_3 + 2.30x_1x_2 - 0.99x_1x_3 - 1.7x_2x_3 + 1.35x_1x_2x_3$$

Y_2- Calculation of the coefficients in the equation for the amount of mechanical damage to the grain:

$$Y_2 = 2.62 - 0.98x_1 + x_2 - 1.19x_3 + 1.2x_1x_2 + 0 - 0.2x_2x_3 - 1.6x_1x_2x_3$$

Since the equation is adequate, the mathematical model is analyzed. Analysis can be conducted only on the coded pattern of factor values. Numerical analysis of the equations is presented in Figures 4, 5, and 6.

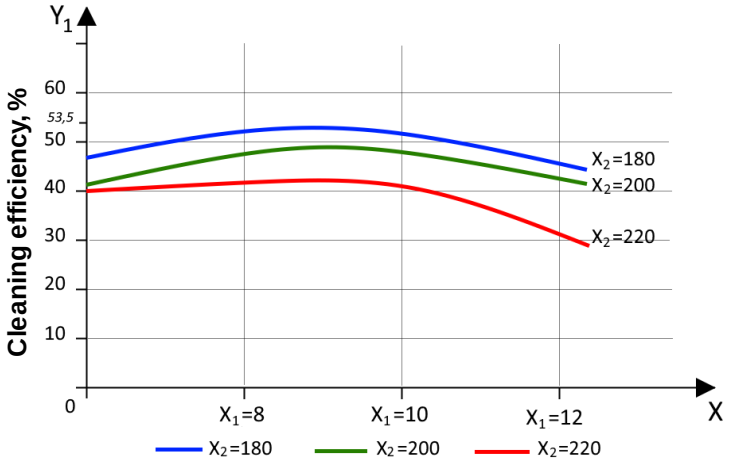

Figure 4. Dependence of cleaning efficiency on the distance between the mesh surface and the screw (X_1) and the screw rotation frequency (X_2).

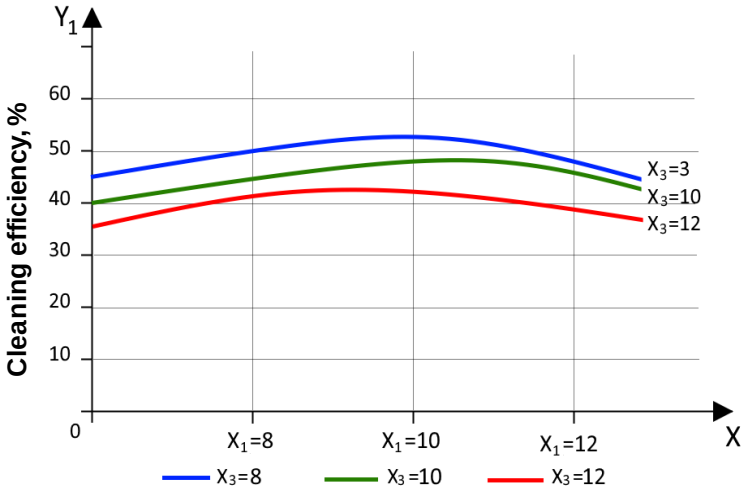

Figure 5. The dependence of the cleaning efficiency on the distance between the mesh surface and the screw (X_1) and the angle of deviation of the screw pile (X_3).

As can be seen from the graphs (Figure 4 and Figure 5), we can see that the cleaning efficiency of the device is improved when the distance between the mesh surface and the screw pile is 10 mm, the screw rotation frequency is 180 rpm, and the deviation angle of the screw pile is 80 degrees.

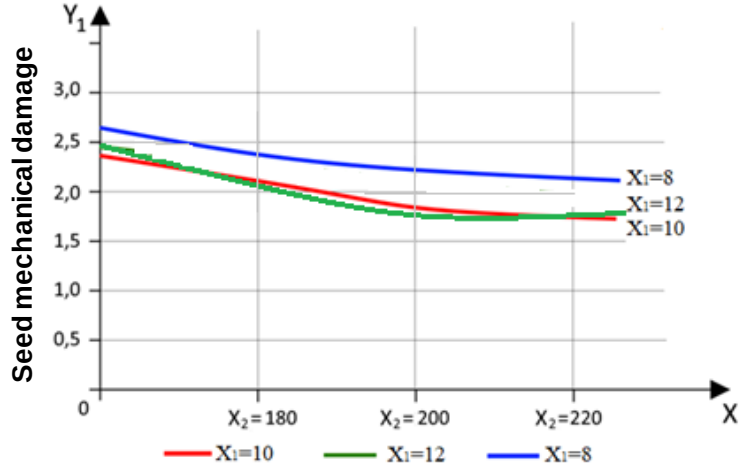

Figure 6. Dependence of mechanical damage to the seed on the distance between the mesh surface and the screw pile (X_1) and the screw rotation frequency (X_2).

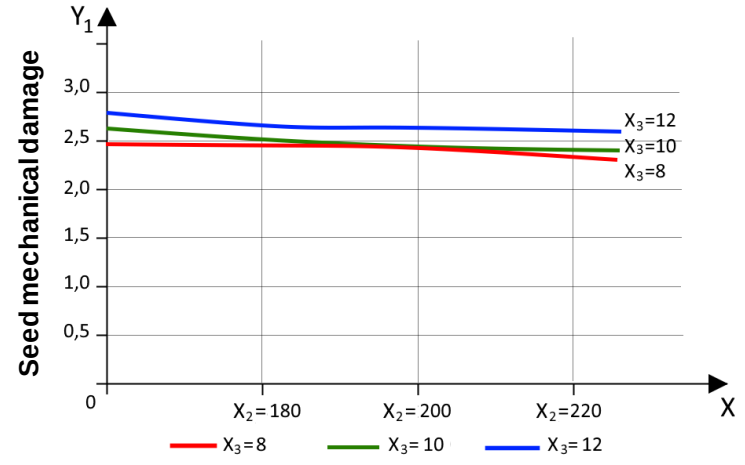

Figure 7. The dependence of mechanical damage to the seed on the screw rotation frequency (X_2) and the angle of deviation of the screw pile (X_3).

Analyzing the obtained results, we can observe that the mechanical damage of the seed in the device is low when the distance between the mesh surface and the screw pile is 10 mm, the screw rotation speed factor is 180-200 rpm, and the deviation angle of the screw pile is 100 and 80 degrees.

Based on the above, it can be concluded that the following are the optimal values that ensure maximum cleaning efficiency and minimum mechanical damage to the grain in the new cleaner:

Distance between the mesh surface and the screw shaft, X_1 = 10 mm

Speed of the screw, X_2 = 180 rpm

Screw The angle of inclination of the pile, X_3= 80 degrees

The indicators achieved at these values were as follows:

Cleaning efficiency: Y_1= 53.6%,

Mechanical damage to the grain: Y_2=1.7%.

Areas of application of the obtained results.

The analysis showed that the cleaning efficiency of the device was improved and the amount of mechanical damage to the seed was reduced at the values of the screw rotation speed of 180 -200 rpm, the distance between the mesh surface and the screw pile was 10 mm, and the pile inclination angle was α_1=8^0. An increase in the rotation speed and the screw pile inclination angle, as well as a decrease in the distance between the mesh surface and the screw pile, can lead to an increase in the impact impulse. This, in turn, leads to an increase in the amount of broken seeds in the cotton with seeds. The proposed screw cleaner solves the problems of improving the drying efficiency by increasing the intensity of the drying agent's impact on the cotton raw material during the cotton transportation process, as well as effectively moving the cotton in a plucked state. The issues of simultaneously cleaning cotton raw materials from small chaff and foreign impurities in an intensive temperature zone have been solved, and the results obtained are of great scientific and practical importance in the design of cleaning machines in the cotton industry.

Conclusions

1. At a working efficiency of 5 t/s at a hot air temperature of t=100 ℃, the moisture content in a 6 m long dryer decreased from 11.4% to 8.9%, at t=140 ℃ to 8.7% and at t=180 ℃ to 8.5%. It is observed that the working efficiency of the Q=8 t/s decreased when cotton drying temperatures were at 100 ℃, 140℃, and 180 ℃ decreased to 9.6 %, 9.2 %, and 8.9 %, respectively. The working efficiency was 0.70 %, 0.5 %, and 0.4 % less than at Q=5 t/s, corresponding to the decrease in cotton.

2. Based on the results of planned experimental studies, the improved cotton cleaning device from small impurities has the values that ensure the maximum cleaning efficiency and the minimum level of mechanical damage to the seed: the distance between the mesh surface and the screw pile is 10 mm, the rotation frequency of the screw is 180 rpm, the angle of deviation of the screw pile is 80 degrees.

In these optimal parameters, it was found that seed cotton contamination in ginning was less than 1.5%, and seed mechanical damage was reduced by 1.7%.

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CONCEPT OF DEVELOPMENT OF PASSENGER TECHNICAL STATIONS IN MODERN CONDITIONS

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Annotatsiya. Ushbu maqola O‘zbekistondagi yo‘lovchi texnik stansiyalarining bugungi holatini tahlil qilish va ularni kelgusida takomillashtirish konsepsiyasini ishlab chiqishga bag‘ishlangan. Tadqiqot stansiya faoliyatining asosiy jihatlarini, jumladan, infratuzilma, texnik jihozlar, yo‘lovchilarga xizmat ko‘rsatishni tashkil etish va xavfsizlikni o‘rganadi. Infratuzilmaning eskirganligi, zamonaviy texnologiyalarning yo‘qligi va yo‘lovchilar qulayligini oshirish zarurati kabi dolzarb muammolar va cheklovlar baholanadi. Ushbu tahlil asosida infratuzilmani modernizatsiya qilish, innovatsion raqamli yechimlarni joriy etish, xizmat ko‘rsatish sifatini oshirish va ish samaradorligini oshirishni o‘z ichiga olgan yo‘lovchi stansiyalarini rivojlantirish konsepsiyasi taklif etilmoqda. Taklif

etilayotgan konsepsiya temir yo‘l transportining raqobatbardoshligini oshirish va mamlakat aholisi uchun transport vositalaridan foydalanish imkoniyatlarini yaxshilashga qaratilgan.

Kalit so‘zlar: *yo‘lovchi texnik stansiyalari, temir yo‘l transporti, infratuzilma, modernizatsiya, rivojlantirish, raqamlashtirish, xavfsizlik, yo‘lovchilarga xizmat ko‘rsatish, innovatsion texnologiyalar, transportning qulayligi, rivojlanish konsepsiyasi, ekspluatatsiya samaradorligi, yo‘lovchilar qulayligi, transport tarmog‘ining barqarorligi, temir yo‘l uzellari.*

Аннотация. Данная статья посвящена анализу текущего состояния пассажирских технических станций в Узбекистане и разработке концепции их будущего совершенствования. В исследовании рассматриваются ключевые аспекты работы станций, включая инфраструктуру, техническое оснащение, организацию обслуживания пассажиров и безопасность. Оцениваются текущие проблемы и ограничения, такие как устаревшая инфраструктура, отсутствие современных технологий и необходимость повышения комфорта пассажиров. На основе этого анализа предлагается концепция развития пассажирских станций, которая включает модернизацию инфраструктуры, внедрение инновационных цифровых решений, повышение качества обслуживания и повышение эксплуатационной эффективности. Предлагаемая концепция направлена на повышение конкурентоспособности железнодорожного транспорта и улучшение доступности перевозок для населения страны.

Ключевые слова: *пассажирские технические станции, железнодорожный транспорт, инфраструктура, модернизация, развитие, цифровизация, безопасность, обслуживание пассажиров, инновационные технологии, транспортная доступность, концепция развития, эксплуатационная эффективность, комфорт пассажиров, устойчивость транспортной сети, железнодорожные узлы.*

Abstract. This paper is dedicated to the analysis of the current state of passenger technical stations in Uzbekistan and the development of a concept for their future improvement. The study examines key aspects of station operations, including infrastructure, technical equipment, passenger service organization, and safety. Current issues and limitations are assessed, such as outdated infrastructure, lack of modern technologies, and the need to enhance passenger comfort. Based on this analysis, a development concept for passenger stations is proposed, which includes infrastructure modernization, the implementation of innovative digital solutions, improvement of service quality, and enhancement of operational efficiency. The proposed concept aims to increase the competitiveness of railway transport and improve transportation accessibility for the country's population.

Keywords: *passenger technical stations, railway transport, infrastructure, modernization, development, digitalization, safety, passenger service, innovative technologies, transportation accessibility, development concept, operational*

efficiency, passenger comfort, transportation network sustainability, railway hubs.

Introduction

One of the key challenges of the transportation sector is ensuring timely and high-quality transportation for the population. Rail transport stands out for its high reliability, stability, and environmental sustainability. This mode of transportation has the highest capacity, which allows for the establishment of strong transport links between densely populated regions. To successfully address this challenge, an important element is the operation of passenger technical stations (PTS), which are responsible for preparing trains for departure.

Literature Review

Passenger transportation methods and passenger turnover vary depending on the type of transport, infrastructure, transportation goals, and traffic intensity [1]. Let us examine the main types of transport used for carrying passengers and the features of their passenger turnover. Trains of various types are used-ranging from suburban and long-distance trains to high-speed ones. This mode of transport is popular for intercity and international travel, as well as for long-distance trips. Rail transport plays a vital role in the transportation of large passenger flows, especially in countries with developed railway systems. Passenger turnover depends on network density, as well as seasonal fluctuations (for example, there is an increase in demand for travel during the summer season).

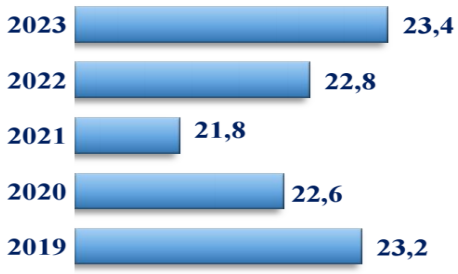

Figure 1. The average distance of transporting one passenger by all types of transport.

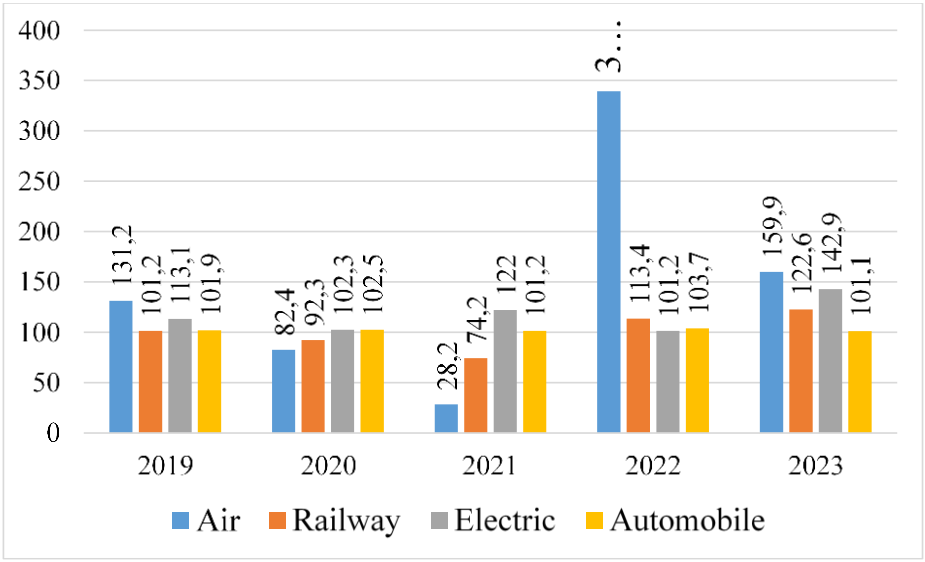

Figure 2. Growth Rates of Passenger Turnover Across All Modes of Transport (%).

Overall, as shown in Figure 2, the average distance traveled by one passenger across all modes of transport in 2023 was 23.4 km. In 2022, this figure was recorded at 22.8 km, in the same period of 2021 it was 21.8 km, in 2020 it was 22.6 km, and in 2019 it was 23.2 km [4]. The growth rate of passenger turnover for major modes of transport throughout 2020 was significantly influenced by restrictions related to the COVID-19 pandemic. The reduction, and in some cases, the complete cessation of passenger transport in 2020 led to a decline in growth rates across almost all modes of transport. The continuation of the pandemic in 2021 resulted in an even greater decline in the growth rates of air transport (growth rate of 28.2%) and rail transport (74.2%). The lifting of restrictions in 2022 led to an increase in passenger turnover, most notably in air transport (increasing by 3.3 times), as shown in Figure 3 [4].

From January to March 2023, the growth rates of passenger turnover were 159.9% for air transport, 142.9% for urban electric transport, 122.6% for rail transport, and 101.1% for road transport. The insufficient material and technical base, along with the lack of rolling stock in the passenger sector, leads to poor-quality train preparation, resulting in passenger complaints about the quality of transportation and services at stations and on trains. The quality of wagon preparation depends on the state of the preparation system itself, which requires the modernization of technical equipment and improvements in operational processes at passenger stations. The volume of work at passenger technical stations and in yards where long-distance trains are formed and managed varies significantly. Analysis shows that 47% of the work is carried out at large stations, which handle more than 20 trains per day.

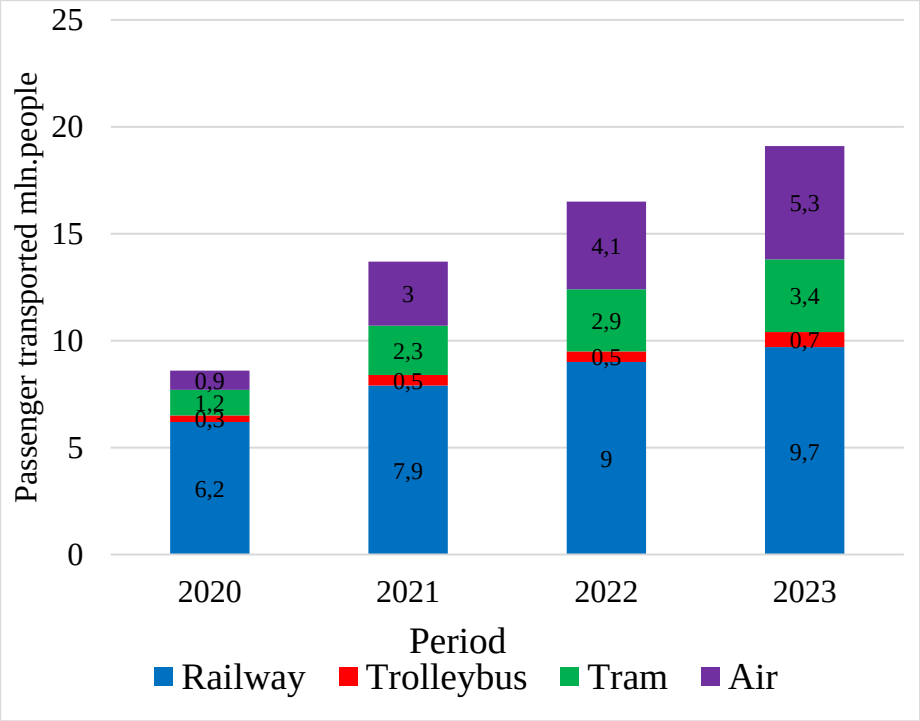

Figure 3. Passenger Transportation and Passenger Turnover by Mode of Transport.

Large stations involved in the handling of passenger trains include the branch of JSC "O'ZTEMIRYO'LO'LOVCHI" for technical and technological preparation and repair of passenger cars (VCHD-2), where about a third of all long-distance and local

passenger trains are formed and processed. The operation of passenger technical stations depends on the volume of passenger traffic. An analysis of changes in passenger traffic at “O‘zbekiston temir yo‘llari” shows that despite the temporary decline in transportation volumes from 2020 to 2022, there has been growth in both passenger turnover and the number of passenger departures in recent years (see Figure 4). Furthermore, with the growth in passenger transportation volumes, the load on passenger stations is increasing, requiring modernization and optimization of their operations. In particular, it is necessary to consider the need to expand the capacity of stations, improve interaction between different modes of transport, and ensure a high level of comfort for passengers. It is important to note that the growth in transportation volumes is not limited to interregional routes but also affects suburban and local routes, which further increases the importance of efficient operation of passenger stations. Thus, to ensure the stable and high-quality operation of passenger stations, it is necessary to continue investing in infrastructure renewal, the implementation of innovative technologies, and the improvement of staff qualifications. This will allow the adaptation to growing transportation volumes and passenger need [2].

One of the key tasks for railways is minimizing losses and non-productive costs while simultaneously improving the quality of passenger service. In the context of the country's worsening financial situation, this task becomes particularly crucial. Railways must not only meet passengers' transportation needs fully and on time but also ensure safety, comfort, and a high level of service throughout the journey. Passenger transportation holds significant social value, which makes investment in infrastructure development essential. Currently, within the framework of investment projects for the electrification of the Marokand-Karshi, Karshi-Termiz, and Bukhara-Miskin railway sections, these projects remain relevant even in conditions of financial difficulties.

Analysis and Results

To evaluate the efficiency of passenger technical stations (PTS), an analysis of their technical equipment and work processes was conducted. A modern PTS is a comprehensive transport enterprise responsible for servicing passenger train sets, including inspection, repair, and equipping of carriages. The current state of PTS presents a number of significant issues. One of them is the irrational placement of key devices at major PTS, which leads to an increase in the volume of maneuvers and additional time costs. There is also a shortage of equipped tracks and their insufficient length. During the summer, around 8% of train sets are stationed at intermediate stations, and the process of rearranging train sets is accompanied by time loss, as tracks are often occupied, and freeing up tracks is difficult. This also leads to the use of non-designated tracks, inefficient use of capacity, and additional costs for energy resources and labor.

As a result of the analysis of the layouts and technical equipment of the PTS, many shortcomings were identified, primarily due to the fact that the future needs and development of the stations were not adequately considered when the first stations were designed. This led to difficulties in the reconstruction and modernization of the PTS, especially due to the limited space for improving track development plans. An example

of this is the poor placement of facilities such as the VMM at JSC "O'ZTEMIRYO'LO'LOVCHI" branch for technical and technological preparation and repair of passenger cars (VCHD-2). Furthermore, the tracks for repairs, equipping, and parking train sets are scattered, making their effective use more difficult. In recent years, due to a decline in passenger traffic, many PTS have seen track closures or dismantling. As a result, train sets are often sent out in unsatisfactory technical and sanitary conditions. Overall, due to deficiencies in the planning and development of PTS, imbalances in the capacity of individual infrastructure elements have been observed, requiring significant efforts for the reconstruction and renewal of many train preparation points [3].

The analysis of the operations of large technical stations revealed several issues. Firstly, the volume of work required to prepare train sets for departure at many PTS is significantly lower than that specified by the Standard Technological Process and less than necessary to ensure high-quality preparation. During train delays, the stations experience significant congestion, and the sequence of technological operations is often inefficient due to the improper placement of yards and devices at the stations. Many PTS require reconstruction, but problems arise because most stations are located in large cities with dense urban development, such as at VCHD-2. This complicates reconstruction efforts, as it is necessary to resolve issues within limited space. Not all stations have a complete set of technical devices for the high-quality preparation of wagons. Yards at PTS are often conditionally specialized, with a few equipped tracks, while the others remain unequipped. Most stations lack parking yards.

Thus, the train washing machines, which have been in operation for a long time, do not provide the required quality of washing for the train sets. Moreover, due to the design features of certain stations, it is not possible to pass all incoming train sets through the washing machines. The construction of the RED (Rolling Stock Equipment Depot) helps improve the working conditions for employees involved in inspection, repair, and equipping of train sets, but unresolved issues still remain.

Conclusions

In conclusion, I would like to draw your attention to the fact that passenger technical stations in Uzbekistan play a key role in the development of the country's transport infrastructure, ensuring high-quality passenger service and the smooth operation of the railway transport system. Modern technical stations have become important hubs for the efficient organization of transportation, improving passenger comfort, and enhancing safety. It is important to continue improving existing facilities, implementing innovative technologies, and developing management systems to meet global standards and the demands of modern society. Only a comprehensive approach to the modernization of passenger stations will enable the creation of a sustainable and competitive railway network capable of meeting the growing demand for transport services at both the national and international levels.

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INFLUENCE ON CLEANING EFFICIENCY OF RECONSTRUCTED GRATE

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Annotatsiya. Maqolada yirik iflosliklardan tozalash jarayonda foydalaniladigan kolosnikli panjara takomillashtirilib, ishlab chiqarish sharoitida tajriba sinovlari olib borilgan tadqiqotlar natijalari keltirilgan. Kolosnikning diametri 15 mm, ularning o‘zaro oraliq masofasi 40 mm va arrachali baraban bilan oraliq masofasi 17 mm bo‘lganda, tozalash jarayonida ajralayotgan iflosliklar miqdorini oshishi aniqlandi. Aksincha ajralgan iflosliklar tarkibidagi paxta bo‘lakchalari miqdorini kamaytirishga erishildi.

Kalit so‘zlar: *paxta bo‘lakchasi, mayda va yirik iflosliklar, kolosnikli panjara, arrachali baraban, tozalagich.*

Аннотация. В стате представлены результаты экспериментальных испытаний по совершенствованию колосниковой решетки, используемой в процессе очистки крупных сорных примесей, а также результаты экспериментальных испытаний в производственных условиях. При диаметре колосника 15 мм, расстоянии между ними 40 мм, а расстоянии между пилчатом барабаном 17 мм установлено, что количество отделяемых при очистке сорных примесей увеличивается. Напротив, было достигнуто уменшении количества хлопковых летучек в отделяемых с сорными примесями.

Ключевые слова: *летучка хлопка, мелкая и крупная сор, колосниковая решетка, пилчатый барабан, очистител.*

Abstract. The article presents the results of experimental tests on improving the grate used in the process of cleaning large trash, as well as the results of experimental tests under production conditions. With a grate diameter of 15 mm, a distance between them of 40 mm, and a distance between the serrated drum of 17 mm, it was found that the amount of trash separated during cleaning increases. On the contrary, a decrease in the amount of cotton fly in the trash separated was achieved.

Keywords: *cotton fly, small and large trash, grate, saw drum, cleaner.*

Introduction

The development and improvement of cotton cleaning equipment are becoming increasingly relevant due to the growing volume of machine-harvested cotton [1]. Many researchers have focused on enhancing the working parts of the cleaners [2-4] and introducing energy- and resource-efficient technologies [5-7]. Additionally, improvements have been made to drying processes, devices that ensure uniform feeding of raw materials, and equipment for regenerating cotton fibers mixed with impurities during the cleaning process [8-10].

Numerous studies have been conducted to improve the grating bars, examining the impact of various diameters, shapes, and spacing of the grating bars, as well as the spacing between the grating bars and serrated cylinders, on the cleaning process. However, in the currently widely used UHK cleaning unit, grating bars with a uniform diameter of 20 mm and a spacing of 40 mm are utilized. This uniformity in forces acting on the cotton during the cleaning process leads to reduced impurity separation after a certain stage of cleaning.

Literature Review

Analysis of Foreign Cotton Cleaning Technologies. When analyzing the grating bars used in foreign cotton cleaning technologies, it is evident that they employ grating bars with various diameters and different spacing between them. This positive practice is also utilized in cotton cleaning technologies manufactured in the People's Republic of China. The variation in diameters and spacing between the grating bars helps change the forces acting on the cotton, which accelerates the separation of impurities.

It has been determined that reducing the diameter of the grating bars to less than 20 mm increases the amount of cotton fibers mixed with impurities. However, since no research has been conducted on varying the spacing between the serrated cylinders and grating bars, a diameter of 20 mm is recommended as the most optimal. It is known that when the grating bar diameter is 20 mm and the spacing between the serrated cylinder and the grating bar is 15-16 mm, the impact center of the cotton fiber hitting the grating bar after being engaged by the saw teeth is 25-26 mm.

If the diameter of the grating bar is reduced to 15 mm and the spacing between the serrated cylinder and the grating bar is set to 15-16 mm, the impact center of the cotton fiber will be located below the horizontal axis of the grating bar. Naturally, when the cotton fiber hits the lower part of the grating bar, it becomes more difficult for it to rise back up. This section describes the experimental method used to study the impact of reducing the grating bar diameter and increasing the spacing between the serrated drum and the grating bar to improve cleaning efficiency.

The engagement of the cotton fiber by the serrated drum's teeth depends on which part of the fiber is caught. To ensure that the impact center of a grating bar with a diameter of 15 mm is 25-26 mm, as it is in the existing 20 mm diameter grating bars, the spacing between the serrated drum and the grating bar must be set to 17-18 mm. Based on the above analysis, we will conduct experiments aimed at investigating how reducing the diameter of the grating bars and increasing the spacing between them and the serrated drum affects the cleaning efficiency.

Research Methodology

To conduct the research, a grating bar structure was prepared with a diameter of 15 mm, a spacing of 40 mm, and a spacing of 17 mm between the serrated drum and the grating bars (see in Figure 1).

Figure 1. General View of the Improved Grating Bar Structure in the Research Variant.

Figure 2. General View of the Section for Cleaning Large Impurities in the UHK Unit, Where the Improved Grating Bar Structure Is Installed, at the "Textile Finance Khorezm" LLC Shovot Cotton Cleaning Branch.

This grating bar structure was installed in the technological cotton cleaning process at the “Textile Finance Khorezm” LLC, Shovot Cotton Cleaning Branch (as given in Figure 2).

The cotton cleaning section of the factory consists of two parallel UHK cleaning lines, each containing four sections for cleaning large impurities. An improved grating bar structure was installed in the fourth section of one of the UHK cleaning lines during the large impurity removal process. The second cleaning line remained unchanged, with the existing grating bars installed, to serve as a comparison for the improved grating system.

Determination of Moisture and Impurities in Cotton. The moisture content and impurities in raw cotton were determined based on the methodologies specified in the Uzbekistan State Standard (UzDst). The weight of the samples and impurities was measured using an electronic scale with an accuracy of 0.01.

Analysis and Results

Results of Practical Research. In the research, raw cotton of Grade III, Class 1, from the work variety was used. The initial moisture content of the cotton was 10.9 %, and the impurity level was 5.9 %.

The amount of impurities discharged from the impurity auger in the fourth section of the cleaning flow was measured every 10 minutes, with samples taken in three replicates over a period of three hours. The productivity of the cleaning flow was 7 tons/hour, and the results of the conducted research are presented in the table below.

Table 1. Results of the study on the effect of cleaning using different types of lattice bars with various constructions.

№	Indicators	Types of Lattice Bars	
		Existing lattice bar	Improved lattice bar screen
1.	Initial moisture content of cotton, %	10, 9	
2.	Initial impurity content of cotton, %	5,9	
3.	Weight of waste collected in 10 minutes at the 4th section of the cleaning flow, kg	9,6	11,8
	– Fine impurities, %	31,25	40,15
	– Large impurities, %	188,94	201,7
	– Amount of cotton fragments in impurities, g	77,76	56,51

When analyzing the research results, the following observations were made:

- In the fourth section of the existing lattice bar screen in the cleaning flow, 9.6 kg of cotton particles mixed with impurities were separated in 10 minutes. Of this, 31.25 grams were fine impurities, 188.94 grams were large impurities, and 77.76 grams were cotton particles.

- In the fourth section of the cleaning flow with improved lattice bar screens, 11.8 kg of cotton particles mixed with impurities were separated in 10 minutes. Of this, 40.15 grams were fine impurities, 201.7 grams were large impurities, and 56.51 grams were cotton particles.

Analysis of the Cleaning Process Results: In the cleaning flows, during a 10-minute period, the amount of cotton particles mixed with impurities separated in the technology with improved lattice bars was 2.2 kg more than in the technology with existing lattice bars. Fine impurities were separated by 8.9 grams more, and large impurities by 12.76 grams more. Additionally, the amount of cotton particles in the impurity composition was 21.25 grams less.

Conclusions

It was determined that in the fourth section of the cleaning flow with improved lattice bars, the amount of cotton particles mixed with impurities separated from the impurity screw was 18.6% higher than the existing cleaning flow. Conversely, the amount of cotton particles in the impurity composition was 27.32% lower. This indicates that a 15 mm lattice diameter and a 17 mm gap between the lattice bar and the drum have a positive impact on the cleaning process. In our subsequent research, we aim to investigate the effect of changes in the gap between the lattice bar screen and the drum on the performance indicators of the cleaning process.

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INVESTIGATION OF THE RESISTANCE OF THE CUTTING TEETH OF A RUNNING-IN TOOL WHEN PROCESSING CYLINDRICAL GEARS

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Annotatsiya. Maqolada silindrik tishli g‘ildiraklarni ishlab chiqish holatini o‘rganish masalalari ko‘rib chiqilgan. Tadqiqotlar natijasida, tishlarni finishli operatsiyalarda ishlash aniqligini ta'minlashda muammo borligi aniqlandi. Aniqlik muammosi faqat tayyor konstruktsiyalarga emas, balki mashina detallari, jumladan tishli g‘ildiraklarga ham taalluqlidir. Ushbu muammoni hal etish uchun tishli g‘ildiraklarning tishlarini finishli ishlash usuli va maxsus keskichni ishlab chiqish taklif etilgan.

Kalit so‘zlar: *Silindrik tishli g‘ildiraklar, aniqlik, yakuniy ishlov berish, yeyilish, shaberlash, yuqori ishlab chiqarish quvvati, modellash, maxsus tokarlik keskichi, kesuvchi-deformatsiyalovchi asbob.*

Аннотация. В статье рассматриваются вопросы исследования состояния изготовления цилиндрических зубчатых колес. Исследования показали, что существует проблема обеспечения точности обработки зубьев на финишных операциях. Проблема точности касается не только готовых конструкций, но и детали машин, среди которых важнейшее место

принадлежит зубчатым колесам. Для решения данной проблемы разработан способ финишной обработки зубьев зубчатых колес и конструкция специального обкатного инструмента для его реализации.

Ключевые слова: *Цилиндрические зубчатые колеса, точность, финишная обработка, износ, шевер-прикатник, высокопроизводительные, моделирования, резец токарный специальный, режуще-деформирующий инструмент.*

Abstract. The article examines the issues of studying the state of manufacturing cylindrical gear wheels. Research has shown that there is a problem of ensuring the accuracy of tooth processing in finishing operations. The accuracy problem concerns not only finished structures, but also machine parts, among which the most important place belongs to gear wheels. To solve this problem, a method for finishing the teeth of gear wheels and a design of a special rolling tool for its implementation have been developed.

Keywords: *Cylindrical gears, precision, finishing, shaver-presser, high-performance, modeling, special turning cutter, cutting and deforming tool.*

Introduction

On a global scale, the development of new methods for design and technological support for the accuracy of processing cylindrical gears is one of the main ways to improve the accuracy and productivity of gear manufacturing.

Manufacturing gears of technological systems in mechanical engineering is one of the important factors, in the technological system, robotic capability and reliability depend on the accuracy of the manufactured gears of the units and equipment used.

Despite the many developed technologies, the formation of gear teeth in mechanical engineering remains one of the most important problems in obtaining gears with high accuracy.

Literature Review

Research object: The research object is a special rolling tool (hereinafter referred to as a shaver-roller) for finishing cylindrical gears.

Experimental research into the process under consideration involves processing batches of several out of several thousand CGs using specialized technological equipment, which seems to be hardly feasible in the current realities. Consequently, physical modeling of the shaving-rolling process of CG during turning, using the method of analogy in kinematics and cutting modes, allows us to study with a high degree of accuracy the course of the combined finishing gear machining process and the wear mechanism of the teeth of the cutting-deforming tool.

Using the methods of the course “Descriptive Geometry” [2] and the capabilities of the graphical modeling system, presented, for example, by the CAD “Compass Graph,” it is possible to draw up a diagram for determining the position and coordinates of the cross-section points of the front surfaces of the cutter in auxiliary planes - the lower (l.p.) and upper (u.p.) (Figure 1). For the convenience of further constructions, these

planes can be considered to be equidistant, respectively, from the main plane of the cutter and its clamping plane at a distance of ΔH (for the designed cutter ΔH is equal to 1 mm) and parallel to them [5, 6].

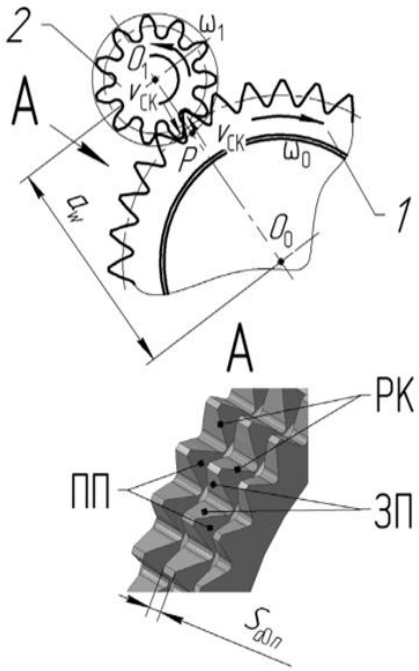


Figure 1. Scheme of CG gear processing by shaving and halftone fragment of axionometry of the combined tool.

The working section AB, profiling the rear surface (RS) is outlined by the lateral surface of the involute profile of the tool tooth (Figure 2). The non-working section BC RS, in turn, is outlined by another circle, smoothly conjugated with the involute AB. Thus, the rear surface AC is limited by the main plane of the cutter and the clamp parallel to it.

a) the height of the cutter H_p = 14 mm, the width of the cutter B_p = 14 mm;

b) the angle of rotation of the right (RFs) and left (LFs) front surfaces of the cutter φ = 120 ° 30′ (angle in plan);

c) the thickness of the tool tooth on the plane of the clamp, identical to the thickness of the shaver-pressor teeth on the circle of the vertices in the directions of the tooth line S_aθn = 1.2 mm which in turn depends on the pitch of the helical line of the chip groove P_{heli} = 8 mm, the angle of inclination of its side walls θ = 45°;

d) the angles of inclination of the right and left cutting edges θ/2=22°30′, which in their functionality are similar to the angle λ for a classic turning cutter.

In addition to the main design parameters considered above, there are also a number of auxiliary ones:

a) the angles of bevels between the front surfaces of the cutter and its side faces (in the horizontal plane), which are assigned for design reasons for this design 60°;

b) the angle of inclination of the bevel line between the front surfaces of the cutter and its side faces (in the vertical plane), which is assigned for design reasons is taken as 15°.

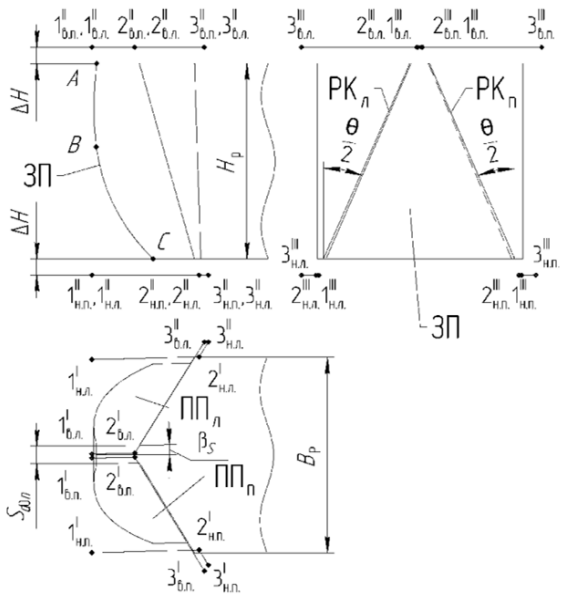


Figure 2. Scheme for determining the coordinates of the points of sections of the front surfaces of the cutter in the auxiliary planes l.p. and u.p.

As a result of graphic modeling in CAD, the coordinates of points defining the intersection lines of RFs and LFs.

The contour outlining the rear surface of the tool is drawn in the form of a sketch, along which it is subsequently cut from the volume of the cutter body.

The introduction of additional planes l.p. and u.p. allows us to place in them the intersection lines of the front surfaces and bevels of the tool. The lines are drawn in separate sketches for the right and left sides of the toolx [3].

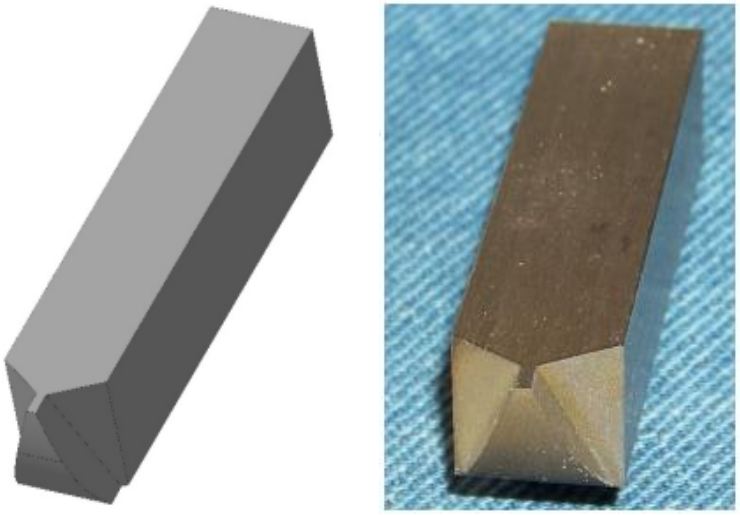
The result of the construction is a solid model of the tool, shown in Figure 3. Due to the fact that the cutter has small overall dimensions in the cross section, for conducting experimental studies it is enough to consider the overall dimensions of 14 × 14 mm, its cutting elements are obtained by the method of electrical discharge machining on a CNC machine. Allowing to achieve high accuracy of geometric parameters of cutting elements - ± 2 μm and their low roughness R_a = 0.32 μm.

Before electrical discharge machining, the cutter body - a rectangular parallelepiped, is pre-processed by cutting, hardened and ground on the base surfaces.

If necessary, a standard two-dimensional graphic document (Figure 3) can be built based on the solid model, allowing for technological preparation of the cutter manufacturing process in the conditions of tool production. The graphic document contains the necessary views, has an additional element - an enlarged profile of the involute rear surface of the tool [5]. In addition, the document presents a table of coordinates of the reference points of the working involute section of the rear surfaces. The specified coordinates allow for spline interpolation, which is convenient for preparing a control program for profile electrical discharge machining of the rear surface of the cutter.

Thus, as a result of applying the design procedure and manufacturing recommendations described above, a special tool was obtained (Figure 4), which allows for physical modeling of the process of combined finishing gear machining of CG by shaving-rolling with a high degree of similarity. At the same time, the shape

and nature of the location of the contact zone of the surfaces of the workpiece and the tool do not contradict the main aspects of the theory of gear engagement [1].



(a) (b)

Figure 3. Solid model (a), and digital camera image (b) of the obtained tool.

We have conducted an experimental study of the concept of physical modeling of the shaving-rolling process of cylindrical gears during turning and developed a design methodology and manufactured a special cutting-deforming tool that allows, with a high degree of accuracy, to study the course of the combined finishing gear processing process and the wear mechanism of the teeth of the tool involved in it.

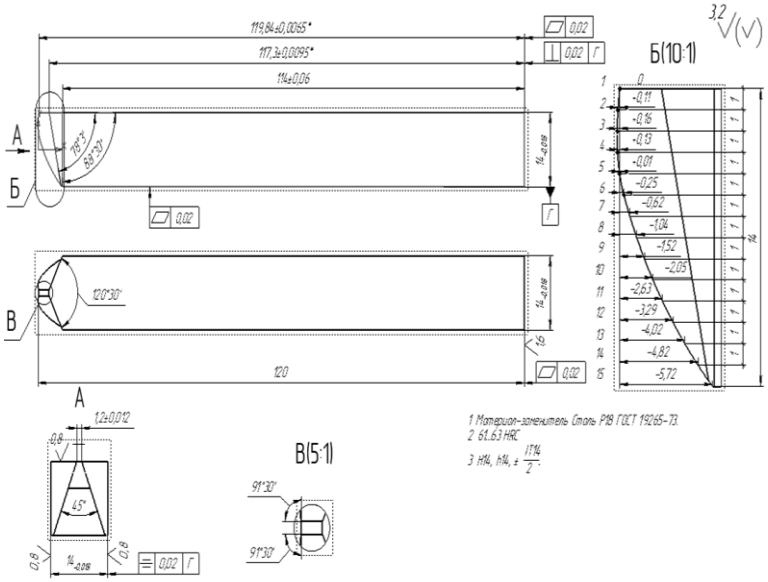


Figure 4. Tool sketch.

The modeling process was carried out in the production conditions of “OOO Gidrostankoservis” (hereinafter OOO GSS). Experimental studies were carried out on the basis of a V_{turn} 20 CNC lathe (Pic. 5, 6), which has high accuracy, sufficient rigidity and the necessary set of technological capabilities.

Figure 5. General view of the experimental setup based on a V_{turn} 20 CNC lathe.

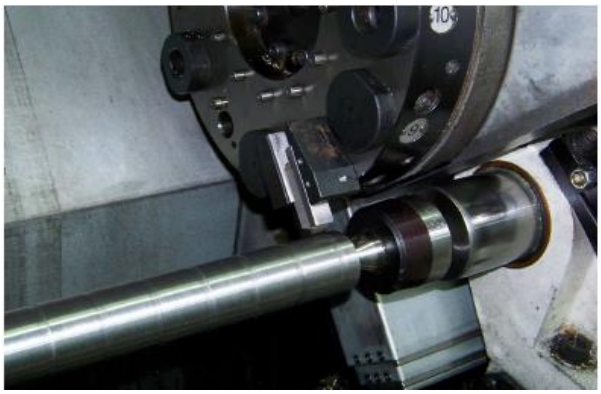


Figure 6. Photograph of the workpiece processing area on a V_{turn} 20 CNC lathe.

The workpiece has a diameter $D_{workpiece}$ = 40 mm and a length $L_{workpiece}$ = 390 mm, which ensures the ratio $L_{workpiece}$ / $D_{workpiece}$ < 10. Such a ratio, when installing the workpiece in a three-jaw self-centering chuck with a rear rotating center clamping, allows achieving high accuracy and quality of processing with sufficient rigidity of the technological system.

The design of the workpiece is shown in the sketch (Pic. 7). The workpiece has thirty working sections 1 ... 30, the length of each working section is 5 mm, these sections are separated by grooves, the width of $б_к$ = 5 mm, intended for the exit of a special cutting-deforming tool. The working areas of the workpiece, as well as the clamping area in the three-jaw chuck (65 mm long), are subject to fairly high requirements, both in terms of manufacturing accuracy - the seventh quality, and in terms of roughness - $R_a = 1.6\ \mu m$. The radial runout of the cylindrical surfaces of the workpiece should not exceed 0.03 mm, the tolerance of parallelism of the lines forming the cylinder is 0.03 mm.

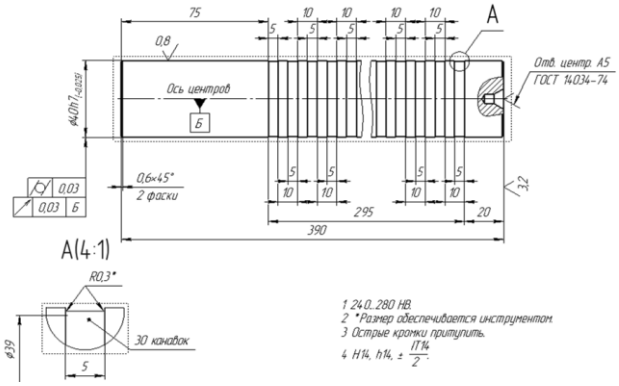


Figure 7. Blank sketch.

The length of the working sections $L_{w.s.}$ of the workpiece is selected so as to provide sufficiently indicative results of the study of the tool wear dynamics. Naturally, the minimum length of the working section $L_{w.s.min}$ allows more accurately determining the characteristics of the wear process h_w as a function of the number of machined cylindrical gears N_{cg} ($h_з = f\ N_{cg}$). However, $L_{w.s.min}$ is limited, in turn, by the minimum overall dimensions of the working bodies of the control and measuring tool, as well as the minimum lengths of the cylindrical surface sections measured by profilometers. Based on this, $L_{w.s.min}$ = 5 mm.

The maximum length of the working section $L_{w.s.max}$ allows more rational use of the workpiece length $L_{workpiece}$, since in this case the number of grooves for the tool exit is preserved, the total cutting path L_{cut} becomes the largest. In addition to the obvious benefit, this approach to assigning the length $L_{w.s,}$ close to $L_{w.s.max}$ has a significant drawback: the characteristics of the tool wear process will be set inaccurately, and the boundaries of the sections typical for the prevalence of effects of different physical nature (cutting and surface deformation) and the process of shaving-rolling of the CG will be blurred.

Due to the fact that the width $б_k$ is a fairly rigidly specified value and it cannot be varied in any significant limits, then the length of the working section $L_{w.s}$, for our case, is advisable to take equal to 5 mm. The length of the cutting path for each working section, $L_{cut.\ w.s}$ will be determined by the known relationship:

$$L_{cut.\ c.s.} = \frac{Lcut.w.s\cdot}{Sr}$$

where S_r is the feed per revolution of the workpiece.

Taking into account the reasoning, $S_r = \Delta S$ - the axial pitch of the cutting edges on the shaver-presser teeth. For the example we are considering, $\Delta S = 0.18$ mm, and the length of the working section feed per revolution of the workpiece $L_{cut.\ w.s} = 3489$ mm.

The total cutting path for the workpiece $L_{cut.path}$ is determined by the dependence $L_{cut.path.} = L_{cut.\ w.s}\ n$, where n is the number of working sections on the workpiece (for the section under consideration, n = 30). For the example under consideration - $L_{cut.path.} = 104670$ mm. Determination of the total cutting path, passed by one tooth of the shaver-press $L_{cut.path.}$ per processing cycle. If we consider a representative cylindrical gear wheel, having average statistical parameters: m = 3 mm, z = 24, x = 0.084, and the cutting path $L_{cut.path} = 20$ mm. Then, the work of a special cutting-deforming tool on one working section of the workpiece will be equivalent to processing the number of wheels n determined by the following relationship:

$$n_{CG.W.S} = \frac{Lcut.w.s}{L.w.s}$$

For the case under consideration, n=174, and the total number of equivalent processed for the entire workpiece is n = 5233. Thus, combined (cutting-deforming) processing of a group of working areas located on a single cylindrical workpiece during the movement of the tool - a cutting-deforming cutter with a longitudinal feed (per workpiece revolution) in the forward and reverse directions equal to the axial pitch of the cutting edges of a real shaver-roller allows, with its forward and reverse rotation, to simulate the process of shaving-rolling of the CZK with sufficient accuracy and to study the phenomena affecting its course, during the wear of the cutting teeth of the combined tool[4.5.6].

During the study of the experimental process of wear of the cutting edge of a special cutting tool at different cutting speeds, the following was observed;

1. The rotation frequency of the workpiece n = 700 rpm, the feed rate of the cutting tool for cutting S = 0.02 mm/rev per working cycle, for the reciprocating feed of the tool $S_{ft} = 0.03$ mm/rev (the process of mechanical processing of the workpiece with a special cutting tool performed the functions of a shaver-presser, therefore the processing mode was selected for finishing the teeth of cylindrical gears). Cutting

speed V = 88 m/min, allowance for the experiment 0.25 mm. After the mechanical treatment of the workpiece surfaces, as a result of the measurement of the diameter Ø40h7(-0.025) the dimensions in sections 1 to 15 are diameter from Ø40.00 to Ø39.975 mm, the roughness of the treated surface is R_a = 0.8 μm, from 16 to 22 sections of the workpiece diameter from Ø39.975 mm to Ø39.955 mm, the roughness of the treated surface is R_a = 0.8…1.6 μm, from 23 to 30 sections from Ø39.955 mm to Ø39.935 mm, the roughness of the treated surface is R_a = 1.6…3.2 μm. The wear time of the cutting part of the cutter is T=312 min.

2. The rotation frequency of the workpiece is n = 450 rev/min, the feed rate of the cutting tool for cutting S = 0.02 mm/rev per working cycle, for the reciprocating feed rate of the tool $S_{f.t.}$=0.03 mm/rev. The cutting speed is V = 56 m/min, the allowance for the experiment is 0.25 mm. After the mechanical treatment of the workpiece surfaces, the measurement results for the diameter Ø40h7(-0.025) were: dimensions in sections 1 to 20 from Ø40.00 mm to Ø39.975 mm, processed surface roughness R_a = 0.8 μm, from 20 to 26 of the workpiece diameter from Ø39.975 mm to Ø39.965 mm, processed surface roughness R_a = 0.8…1.6 μm, from 27 to 30 from Ø39.965 mm to Ø39.945 mm, processed surface roughness R_a = 1.6…3.2 μm. The wear time of the cutting part of the cutter is T=1100 min.

Table 1. Results of the study of wear of cutting teeth of the rolling tool during the processing of cylindrical gears.

№	Allowance, mm	Workpiece rotation frequency n, rev/min	Feed rate for tool penetration S, mm/rev	Reciprocating feed of the tool S, mm/rev	Cutting speed V, m/min	Wear time of the cutting part of the cutter. T, min
1	0.25	750	0.02	0.03	88	312
2	0.25	450	0.02	0.03	56	1100
3	0.25	200	0.03	0.03	25	2700

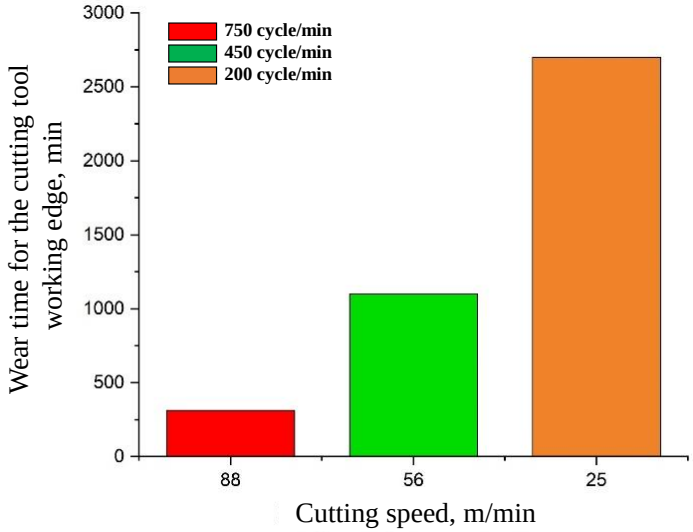


Figure 8. Graph of wear of the cutting edge of the rolling tool during the processing of cylindrical gears.

3. The rotation frequency of the workpiece n = 200 rev/min, the feed rate of the cutting tool for cutting S = 0.03 mm/rev per working cycle, the reciprocating feed rate of the tool $S_{f.t.}$ = 0.03 mm/rev. Cutting speed V = 25 m/min, the allowance for the experiment is 0.25 mm. After the mechanical treatment of the surfaces of the workpiece, as a result of the measurement of the diameter Ø 40h7(-0.025), the dimensions in sections 1 through 30 from Ø40.00 mm to Ø39.975 mm, the roughness of the treated surface R_a = 0.8 μm. The wear time of the cutting part of the tool T = 2700 min.

Conclusions

1. As a result of experimental studies of the wear of the rolling tool during mechanical processing of cylindrical gears made of heat-treated (improved to a hardness of HB 240 ... 280) structural steel 40X, it was found that an increase in the cutting speed at different feeds negatively affects the durability of the cutting tool, due to rapid wear of the cutting edges.

2. The optimal values of cutting modes for finishing the teeth of cylindrical gears with a shaver-roller V = 25 m / min, the rotation frequency of the workpiece n = 200 rpm, the feed for cutting $S = 0.03\ mm/rev$ per working cycle, for reciprocating feed of the tool $S_{f.t.}$ = 0.03 mm. The wear time of the cutting part of the cutter (rolling tool) was T=2700 min

3. It was established that during finishing of the teeth of cylindrical gears with a shaver-roller exceeding the cutting speed V = 25 m/min, a deterioration in the durability of the cutting part of the shaver-roller is observed.

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DETERMINATION OF PARAMETERS OF THE TECHNICAL CONDITION OF THE SPINDLE ASSEMBLY OF METAL-CUTTING MACHINES BASED ON MATHEMATICAL MODELING

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Annotatsiya. Maqolada metall kesish dastgohlari shpindel tugunining texnik holatini baholash va uning dinamik xususiyatlarini aniqlash uchun vibratsion diagnostika usullari ko‘rib chiqiladi. Shpindel tugunining texnik holati uning mexanik tizimida yuzaga kelgan nuqsonlarni aniqlashda muhim ahamiyatga ega. Ushbu maqolada, ayniqsa, radial-tayanch sharikli podshipniklarning bikrlik parametrlarini, qo‘zg‘atuvchi kuchlarning spektral taqsimotini tahlil qilish va Furye o‘zgarishini qo‘llash orqali tizim dinamikasini tahlil qilish metodikasi tavsiflanadi. Tizimning tebranishlarining chastota spektrini aniqlash va nuqsonlarni identifikatsiya qilishga asoslangan metodologiya taqdim etiladi.

Kalit so‘zlar: *Metall kesish dastgohlari, shpindel tuguni, vibratsion diagnostika, radial-tayanch sharikli podshipnik, Furye o‘zgarishi, dinamik tahlil, chastota spektri, tizim nuqsonlari.*

Аннотация. В статье рассмотрены методы вибродиагностики для оценки технического состояния шпиндельного узла металлорежущих станков и определения его динамических характеристик. Техническое состояние шпиндельного узла имеет важное значение при определении дефектов, возникших в его механической системе. В частности, в данной статье описан метод анализа параметров сингулярности радиальных шарикоподшипников, спектрального распределения движущих сил и анализа динамики системы с использованием преобразования Фурье. Представлена методика, основанная на определении частотного спектра колебаний системы и выявлении дефектов.

Ключевые слова: *Металлорежущие станки, шпиндельный узел, вибродиагностика, радиально-упорный шарикоподшипник, изменение Фурье, динамический анализ, частотный спектр, дефекты системы.*

Abstract. The article discusses vibration diagnostics methods for assessing the technical condition of the spindle assembly of metal-cutting machines and determining its dynamic characteristics. The technical condition of the spindle assembly is important in determining defects that have arisen in its mechanical system. In particular, this paper describes a method for analyzing the singularity parameters of deep groove ball bearings, the spectral distribution of driving forces, and analyzing the system dynamics using the Fourier transform. A technique based on determining the frequency spectrum of system oscillations and identifying defects is presented.

Keywords: *Metal-cutting machines, spindle assembly, vibration diagnostics, angular contact ball bearing, Fourier change, dynamic analysis, frequency spectrum, system defects.*

Introduction

Metal-cutting machines are one of the main elements of industry, and in the process of their highly efficient operation, the condition of the spindle assembly is of particular importance. The spindle assembly contains many sources of driving forces in a mechanical system, and its vibration state is an important factor in ensuring proper operation and reliability of the system. Defects in the spindle assembly can seriously affect the mechanical and dynamic properties of the system, so there is a need to develop appropriate methods for analyzing and determining its condition.

There are many studies on assessing the technical condition of spindle joints. Early research demonstrated that bearing defects could be detected using spectral analysis of system vibrations. The method of applying the Fourier transform and converting the signal into the frequency domain simplifies the dynamics of the system and allows accurate separation of defects. Such methods are especially effective in detecting small vibrations that occur in a system during operation. However, research aimed at deeper

analysis of the dynamic properties of bearings and other mechanical systems is still ongoing.

Research methodology

In this study, vibration analysis methods were used to determine the technical condition of the spindle assembly of metal-cutting machines. The oscillation spectrum was analyzed using the Fourier transform and convolution integrals. The dynamics and action of the system were studied by calculating the elastic and stiffness parameters of radial-axial ball bearings in the spindle assembly. Based on experimental measurements, the frequency spectrum of excitation forces, as well as the state and defects of the system, were determined.

Analysis and results

The results obtained during the study showed that based on the vibration analysis of the spindle assembly, the technical condition of the system can be determined. Defects and their consequences were identified using spectral analysis of system vibrations and excitation forces. It has been proven that using Fourier transforms it is possible to identify defects with high accuracy. The stability parameters of the system and the size of the defect vector are analyzed, and the effectiveness of these methods is proven.

The mathematical model of oscillations of the spindle assembly (1) includes the features and spectral characteristics of the driving forces of radial ball bearings. This model takes into account the dynamics of the spindle assembly, the main parameters that determine its movement and the influence of forces in the system. Fourier transforms of vibration signals are widely used in vibration diagnostics (Table 1) [3]:

$$X_{(f)} = \int_{-\infty}^{\infty} X(f) e^{-j2\pi f t} dt, \quad (1)$$

The Fourier transform, in general, is a mathematical transformation that allows us to transform a function from the time domain to the frequency domain. This transformation is denoted by the symbols ↔, that is, x(t)↔X(f), where x(t) is a given signal or function in time, and X(f) is its Fourier transform, i.e. represents a spectrum in the frequency domain [4].

$$\frac{d^n}{dt^n}(X(t)) <=> (j2\pi f)^n X(f). \quad (2)$$

That is, the nth order derivative of the function x(t) in the time domain is equal to the product of the spectrum X(f) in the frequency domain, multiplied by $(j2\pi f)^n$. It relates changes in a signal over time to the rate of change in frequency. In this way, a clear understanding of how the nth order derivative changes the waveform in the frequency domain can be obtained [5].

$$\sin 2\pi f_0 t <=> \frac{1}{2j}[\delta(f + f_0) - \delta(f - f_0)] \quad (3)$$

$$\cos 2\pi f_0 t <=> \frac{1}{2j}[\delta(f + f_0) - \delta(f - f_0)] \quad (4)$$

$$x(t) \sin 2\pi f_0 t <=> \frac{1}{2j}[X(f + f_0) - X(f - f_0)] \quad (5)$$

$$x(t) \cos 2\pi f_0 t <=> \frac{1}{2j}[X(f + f_0) - X(f - f_0)] \quad (6)$$

Where δ(f) is the generalized Dirac delta function, widely used in mathematical analysis and signal analysis. The Dirac delta function has an infinitely large value at a specific point, and its integral value is equal to one among all information.

Another important feature of the Fourier integral is its linearity. This property is related to the way the Fourier transform affects the addition or multiplication of two functions [4.5].

$$X_1(t)+X_2(t) <=> X_1(f)+X_2(f) \quad (7)$$

Now, using the above properties, we will apply the Fourier transform to the SHT oscillation model.

$$-(2\pi f)^2 MX(f) + j2\pi f PX(f) + KX(f) + \big(R(f) + C(f)\big) * X(f) = \\ = F_s(f) + F_T(f) + F_g(f) + F_n(f) + F_p(f), \quad (8)$$

Matrices *R(f)* and *C(f)* contain components corresponding to individual parameters of the spindle and supports, $F_s(f)$, $F_T(f)$, $F_g(f)$, $F_n(f)$, $F_p(f)$ are vectors of the complex amplitude spectrum of disturbing forces, reflecting the frequency distribution of each disturbing force. These forces can affect the operation of various mechanical systems, such as external forces, noise or unpleasant vibrations. Each vector $F_s(f)$, $F_T(f)$, $F_g(f)$, $F_n(f)$, $F_p(f)$ represents specific amplitude and phase characteristics of individual forces and an analysis of the mechanical factors affecting the vibration response of the system used in [3].

Expression (8) is equivalent to (1).

The convolution is an integral of the following type:

$$X_1(f) * X_2(f) = \int_{-\infty}^{\infty} X_1(\varepsilon) X_2(f-\varepsilon) d\varepsilon. \quad (9)$$

The Laplace transform requires consideration of initial conditions (such as initial velocity or initial displacement) in the time domain, since these conditions influence the future behavior of the system. If these initial conditions are neglected, the application of the Laplace transform will not provide a complete response of the system. The second reason is to show the effect of the Laplace transform on trigonometric functions. After substituting the argument of the Laplace transform, the transformation of trigonometric functions is expressed as follows:

$$\cos 2\pi f_0 t \overset{<=>}{\underset{TL}{}} \frac{P}{p^2+(2pf_0)^2}, \quad (10)$$

$$\sin 2\pi f_0 t \overset{<=>}{\underset{TL}{}} \frac{P}{p^2+(2pf_0)^2},$$

here $\overset{<=>}{\underset{TL}{}}$ represents the Laplace transform.

As we see, expression (10) differs from (3) and (4). Therefore, the application of the Laplace transform with replacement of arguments is used to determine transfer functions.

The expressions for the main and intersecting angles of an angular contact ball bearing presented in Table 1 are expressions broken down into trigonometric series. Discrete amplitudes of the matrices of features and vectors of disturbing forces include defects in the spindle assembly [7.8].

In this case, we will consider the rotation of the spindle with the same angular speed as ω_p, that is, $\omega p = 2\pi r f_m n$, where r is the radius of the spindle, f_m is the mechanical

frequency (this frequency indicates the specific frequency of the mechanical vibration of the system), *n* is the rotation speed (the number spindle revolutions per minute).

The angular velocity of the spindle is important for determining the rotational characteristics of the system and analyzing the dynamic response of the system. The value of ω_p reflects the speed of mechanical movement and the dynamic response of the system. "r_{ik}" is a parameter reflecting the elastic or flexible properties of the system. The elasticity or rigidity of the system is especially reflected in its bending vibrations. In this case, the elastic material or structure is subject to deformation under the influence of external forces, and this deformation is transmitted in the opposite way. These properties are mainly reflected in the control of the oscillatory and resonant behavior of the system. In addition, such quantities are of great importance when analyzing the mechanical states of a system, especially its response to forces [5].

$$r_{ik}=k_{ik}\cdot I_{x(y)} \tag{11}$$

for example, *i,k=2* if, $k_{22}=12E/l^3$ [54;160-188b.].

Thus, we form the following expression:

$$r_{ik} * X_k = \frac{k_{ik}}{2}\{(l_x + l_y)X_k(t) + (I_x - I_y + j2I_{xy})X_k(f + 2f_{\text{ш}})\}. \tag{12}$$

Let's consider C_{ik}, and for accuracy we take *i,k=l*. The elements of the feature matrix are parameters representing the mechanical properties of the system, among which the constituent features at each bearing connection point are indicated. The C_{ik} element reflects the uniformity or elasticity of the mechanical connection of the matrix elements. These elements, such as C_{11}, represent the relationship between multidimensional forces and displacements in a system.

Thus, considering the matrix element C_{ik} and extending the convolution operation C_{11} helps to better understand the mechanical dynamics of the system. Thanks to this approach, it is possible to analyze in detail the influence of each element of the bearing feature matrix on the system [3, 4]:

$$C_{11} * X_1 = K_2 K_\text{э} Z \left\{ \sin^2\beta_0 \sum \gamma_{zp} X_1 \left(f + \frac{zp\theta_q}{2\pi} \right) + \frac{\beta_m}{2} \sin\beta_0 \sum_{p=0}^{\infty} \gamma_{zp\pm1} X_1 (f + \frac{(zp \pm 1)\theta_q}{2\pi}) \cdot (\cos\Psi_c \mp j sin\Psi_c) \right\}$$

Since the streamer feature matrix - *K* contains only constant singularity elements, the convolution operation turns into a multiplication operation. The convolution of the spindle and bearing feature matrices - *S*, expanded as (13) and (14), is presented in Table 1.

Table 1. Calculated values of the spindle feature matrix and vibration vector convolution.

$r_{11} * Z(t)$	$\frac{E \cdot F}{l} \cdot Z(f)$
$r_{22} * X(t)$	$\frac{12 \cdot E}{l^3} \cdot \{(I_x + I_y) \cdot X(f) + (I_x - I_y + j \cdot 2 \cdot I_{xy}) \cdot X(f + 2f_{\text{ш}})\}$

$r_{44} * Y(t)$	$\frac{12 \cdot E}{l^3} \cdot \{(I_x + I_y) \cdot Y(f) + (I_x - I_y - j \cdot 2 \cdot I_{xy}) \cdot Y(f + 2f_{шп})\}$

Now let's turn to the process of calculating Fourier transforms for driving forces. Using the Fourier transform, we can calculate the influence of excitation forces in the frequency domain, which simplifies the temporal behavior of the system and makes it easier to analyze. For the forces created by imbalances (8) and (9), we obtain:

$$\mathrm{F}(f)\frac{g}{x_i} = \omega^2 m^i l^i_{cm} \delta(f \pm f_{шп}) \cdot (\cos\alpha_i \pm j sin\alpha_i). \quad (13)$$

$$\mathrm{F}(f)\frac{g}{y_i} = \omega^2 m^i l^i_{cm} \delta(f \pm f_{шп}) \cdot (sin\,\alpha_i \pm j sin\alpha_i). \quad (14)$$

For centrifugal forces acting on rotating elements, the Fourier transform gives:

$$\mathrm{F}(f)^{ц}_i = \sum_{p=0}^{\infty} \sum_{t'=0}^{\infty} A_i^{ц}\,(zp \pm t')\delta(f - \frac{[zp \pm t']\theta_q}{2\pi} \cdot (cost'\Psi_c \mp jsint\Psi_c). \quad (15)$$

After applying the Fourier transform for the driving forces associated with technological defects in bearings, we obtain [4.5.6]:

$$\mathrm{F}(f)^{T}_i = \sum_{p=0}^{\infty} \sum_{t'=0}^{\infty} \sum_{t=0}^{\infty} A_j^{T_1}\,(zp \pm t' \pm l)\delta\left(f - \frac{[zp \pm t' \pm l]\theta_q}{2\pi}\right) \cdot (cost'\Psi_c + l\Psi_1) \mp jsin(t'\Psi_c + l\Psi_1) + \sum_{p=0}^{\infty} \sum_{t'=0}^{\infty} \sum_{s=0}^{\infty} A_j^{T_2}\,(zp \pm t' \pm s) \cdot \delta\left(f - \frac{[zp \pm t' \pm l]\theta_q}{2\pi}\right)(cost'\Psi_c + s\Psi_2) \mp j \cdot sin(t'\Psi_c + s\Psi_2) + \sum_{i=0}^{z} \sum_{p=0}^{\infty} \sum_{t'=0}^{\infty} A_j^{d}\,(zp \pm t') \cdot \delta\left(f - \frac{[zp \pm t']\theta_q}{2\pi}\right) \cdot (cost'\Psi_c \mp jsint'\Psi_c). \quad (16)$$

In the model based on equations (1) and (11-16), defects (for example, changes in bearing integrity or other mechanical parameters) are considered as parameters that determine the output characteristic of the system. Low frequency - f*min*, high frequency - f*max* and the number of steps along the frequency axis - *k* is equal to:

$$k = \frac{f_{max} - f_{min}}{\Delta f} \quad (17)$$

The *k* value obtained from formula (17) is considered as a system stability parameter and is measured depending on the size of the defect vector. If the value of *k* is less than the size of the defect vector, this reflects a linear relationship between system defects and their consequences. In other words, the relationship between system stability and defects is improved.

Conclusions

The results of the study show that it is possible to effectively identify system defects using vibration diagnostics methods, in particular the Fourier transform, to determine the technical condition of the spindle assembly of metal-cutting machines. This approach can improve the dynamic state and performance of the system.

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NATURAL GEOGRAPHICAL DESCRIPTION OF THE AREA WHERE ALMALIK MINE METALLURGY COMBINATION IS LOCATED

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Annotatsiya. Ushbu maqolada Olmaliq kon metallurgiya kombinati joylashgan hududga tabiiy geografik tavsifga bag‘ishlangan bo‘lib, unda kombinat tarmoqlari joylashgan hududning tabiiy geografik o‘rni, geologik tuzilishi, relyefi hamda iqlimiga oid ma’lumotlar keltirilgan.

Kalit so‘zlari: *sanoat, vodiy, iqlim, yog‘in, relyef, terrikon, landshaft.*

Аннотация. Данная статья посвящена эстественно-географическому описанию местности, где расположен Алмаликский горно-металлургический комбинат, и содержит сведения о природно-географическом положении, геологическом строении, релефе и климате местности, где расположены филиалы комбината.

Ключевые слова: *промышленност, долина, климат, осадки, релеф, ландшафт.*

Abstract. This article is dedicated to the natural geographical description of the area where the Almalik mining and metallurgical combine is located, and it contains information about the natural geographical location, geological structure, relief and climate of the area where the combine’s branches are located.

Keywords: *industry, valley, climate, precipitation, relief, terrain, landscape.*

Introduction

It is known that the mining industry plays an important role in the country’s economy. Also, the impact of this sector on the environment is stronger compared to many other sectors of the economy. The impact on the environment takes place first on the scale of geocomponents (air, water, soil, flora and fauna) and then on the scale of geosystems. Several regulatory and legal documents on the prevention and reduction of negative impact, including the Decree of the President of the Republic of Uzbekistan № PF-5863 of October 30, 2019. In the period until 2030 “On the approval of the concept of environmental protection” and others, several tasks have been set, including conducting large-scale studies in each industrial zone requires.

Research Methodology

In this research work, the area where the Almalyk Mining and Metallurgical Combine is located was taken as an object. The territory of AMMC mainly includes ore deposits, ore processing enterprises and factories located in the middle part of the Ohangaron basin. Ohangaron basin is located between Chotkal and Kurama ridges, in the southeast of Chirchik-Ohangaron natural geographical district. From the north, the Ohangaron river basin borders the Chirchik river basin with the Chotkal, Aksaqotasay river basins. The border between these river basins passes through the watershed of Kyzylnura mountain. In the north-west, it borders with the Bashkizilsoy basin belonging to the Chirchik river basin. The border between them passes through the southwestern branches of the Qizilnura mountain. The western border of the Belyovutsoy and Toshsoy streams passes through the pre-mountain erosion-denudation surfaces, then passes through the watersheds of IV, V erosion-accumulative terraces of the Chirchik river basin belonging to the Tashkent complex, and connects to the Karasuv channel. Then the border passes through the bottom of the Karasuv channel. The channel continues to the southwest and joins the Ohangaron riverbed near the city of Alimkent. From this place, the border to Syrdarya passes conditionally along the right bank of the Ohangaron river. Because these areas have been completely exploited, natural relief forms and soil, vegetation cover have changed and natural boundaries are not visible. The north-eastern, eastern, south-eastern border passes through the watersheds of the Kurama ridge. The southern border of the Ohangaron basin passes through the junction of the IV, V erosion-accumulative terraces of the Tashkent complex, located in front of the mountain, and the II terraces of the Sirdarya river (see in Figure 1).

Figure 1. The location of the mines included in the Almalyk Mining and Metallurgical Combine. *Source: Google Earth software [1].*

Analysis and Results

The composition of the rock layers scattered in the area consists mainly of carbonate rocks belonging to the Upper Devonian period, quartz porphyries belonging to the Lower and Middle Devonian periods, and only in the layers of small land areas belonging to the Mesozoic and Cenozoic periods. layers are recorded. In the strata,

carbonate rocks intersect with intrusive diorite bodies of Middle Carboniferous age, especially in the strata of the eastern plains. In the layers of the region, the oldest rocks are considered to be metamorphic shale, and in the areas of the western and southern regions of the described regions, it is observed that they are exposed.

The climate of the Ohangaron valley, where the mines are located, is sharply continental, like the Chirchik-Ohangaron district. Its geographical position, relief and orography are important factors in the climate of the valley. In the south-western plain part of the valley, the influence of cold, warm and humid air masses coming from the north and from the west is great, and the influence of these air masses is also felt in the mountainous part.

In the Ohangaron valley, especially in the south-western foothills, the summer heat lasts for a long time. The average air temperature in July is 26-27 in the plain temperature is around 20-24 ºC in the mountainous part. In summer, the maximum air temperature can rise to 42-44 ºC in the plains. Winter is not very severe in the valley.

Rainfall is very unevenly distributed in the valley area. The amount of precipitation increases from the plains to the mountains. Precipitation falls most heavily on the western and southwestern slopes facing the moist air flow. The amount of precipitation in the foothills is less than in the mountains. Winter snowy areas in the valley are 65-125 days. Snow thickness reaches 1 m in mountainous areas. In general, in the valley, especially in its flat part, the possible evaporation is large compared to the amount of precipitation, the humidity coefficient is equal to 0,4. Harmen wind blows in the valley, mountain-valley, fyon and plains. Unfavorable weather phenomena - spring evening, autumn morning frosts, hail, strong winds are also observed. Mountain-valley wind is mainly observed during the summer when the weather remains the same. During the day, the wind blows from the valley up the slope, and at night from the mountain to the valley.

Ohangaron river starts from Chotkal ridge near Kengsoz pass. The river receives water from the Ohangaron plateau from the southern slopes of the Chotkal range and the northern slopes of the Kurama mountains. The river is saturated with rainwater. Therefore, its water increases in April-May, and 51% of the annual flow falls on these months. The long-term average water consumption of the Ohangaron River near Turk village is 22,8 m^3/s. with all its tributaries and 43 m^3/s.

The main tributaries of the river: Arashan, Ertash, Goshsoy, Soldabulok, Nakboy, Almalik, Karaqiya and others join the river after Turk village.

Yertashsoy - Stream in Ohangaron District, Tashkent Region, right tributary of Ohangaron River. It starts from the southern slope of the Adamtash pass in the Chotkal ridge. Its length is 17 km. Yertashsoy is mainly fed by snow, rain and spring water. The village of Yertoshsoy is located on the bank of Yertoshsoy.

Table 1. Description of the rivers and streams of the Ohangaron basin.

The river is a post	**F**	**H**	**T**	**N**	**Q**	***δ***	**CV**	**M**
Ohangaron - Single d. guy.	638	2,760	1949-1968	18	14,0	0,140	0,284	21,9
Ohangaron - Yertosh d.	1110	2,500	1971-2002	29	20,2	0,140	0,317	18,2

Ohangaron - Turkish winter. thick. high.	1290	2,370	1927-1974	42	23,9	0,170	0,339	18,5
Ohangaron - Ohangaron right. low.	1490	2,310	1951-2002	54	23,6	0,410	0,371	15,8
Kizilcha - Yertash winter.	51,6	2,340	1951-1999	49	1,00	0,460	0,377	19,4
Golovnaya is pouring	10,3	2,370	1959-1970	12	0,235	0,320	0,359	22,8
Dovonsoy - pouring	10,6	2,930	1959-1970	11	0,309	0,450	0,387	29,2
An unnamed stream	3,3	2,410	1959-1970	11	0,070	0,200	0,452	21,2
Chetiksoy - pouring	8,7	1,880	1959-1969	10	0,095	0,070	0,714	10,9
Jiblon - Jiblon winter.	19,0	-	1981-1999	19	0,475	-	0,404	25,0
Nishbosh - winter. Nishbosh	141	2,050	1951-1996	45	2,58	0,140	0,460	18,3
Dukantsoi - Dukant pos.	201	2,210	1971-1999	29	4,14	0,140	0,379	20,6
Karabakh - Samarchuk winter.	166	2,030	1948-1999	50	3,06	0,140	0,362	18,4
Abjazsoy - Abjaz winter.	70,5	2,030	1979-1999	21	0,621	0,140	0,412	8,8
Shovgaz - Karatash uroch.	65,8	1,660	1951-1999	46	0,441	0,190	0,457	6,7
Shovozsoy - Zhuvazkhana winter.	161	1,620	1954-1965	10	1,72	0,130	0,433	10,7

Note: F - basin area (km^2), H - average height of the basin (km), T - accounting period, N - accounting year, Q - water consumption, δ – coefficient of evaluation of saturation sources, M – current module.

Dukentsoi, the right tributary of Ohangaron River, is formed by the confluence of more than 60 tributaries flowing from the southern slopes of the Muzbel pass in the Chotkal ridge, and is 33 km long. Dukentsoi is fed by snow, rain and spring water. Nishboshsoy - starting from the northern slope of the Kurama ridge, from a small snowfield at an altitude of 3550 m, it is 30 km long and is fed by snow and rainwater. There are 75 tributaries, their total length is 141 km.

According to hydrometeorological data, water consumption is more in May and less in September. In order to collect the flood waters of the river, the Ohangaron (Turkey) reservoir with a water capacity of 80 million m^3, and the Tuyabo'giz reservoir (Tashkent Sea) were built in the lower part in 1964.

The Tuyabogiz Reservoir is considered a hydrotechnical facility built in the middle reaches of the Tashkent Sea - Ohangaron River. It was built in 1962 and regulates the river water seasonally. The total volume is 250 million m^3. useful volume is 224 million m^3. The surface area of the water is 20 sq. km, the average depth is 12,5 m.

Ohangaron Reservoir is a hydrotechnical facility built in the Ohangaron riverbed. It was put into operation in 1989, with a total area of 260 million sq. m^3, the maximum height of the dam is 100 m, the water transfer capacity is 480 m^3/s. Seasonally regulates

the water of the Ohangaron River. It is used to irrigate lands in Ohangaron, Orta Chirchik, Piskent and Boka districts of Tashkent region. The surface waters of the region consist of the Ohangaron river and its tributaries, and lakes. Ohangaron river starts from Chotkal ridge near Kengsoz pass. The river receives water from the Ohangaron plateau from the southern slopes of the Chotkal range and the northern slopes of the Kurama mountains. The river is saturated with rainwater. Therefore, its water increases in April-May.

The described area is characterized by the presence of non-pressurized aquifers in the strata, and the regional distribution of fissures creates large ground water flow through the valley.

The underground water contained in the circulating alluvial quaternary layers in the region is composed of fresh water in the areas of the Karakiya River and its basin. The value of solid residue in the water is up to 0,3-1 g/l, according to the anion content, the waters are sulfate-hydrocarbonate, and according to the cation content, they are calcium.

Groundwater is formed due to the filtration of atmospheric precipitation, and surface streams are formed as a result of seepage of water flows, as a result of the release of water from the layers belonging to the Paleozoic period through cracks. The direction of movement of underground water takes place along the course of rivers.

In this object, the soils have a large difference from each other both horizontally and vertically. Researchers have proven that the main reason for this is related to the orographic structure and relief. The soils of the Ohangaron basin vary from the plains to the mountains. Gray soils are scattered in the lower part of the area. In places up to 300-500 m high, light gray soils are distributed, the amount of humus in them is 1-1,05 %.

Typical and gray soils are scattered at altitudes of 500-1200 m, the amount of humus reaches 4-6%.

At 1,200-2,500 m altitude, brown mountain-forest and brown mountain-forest soils are common, while in the high mountain pasture region, light brown soils are abundant.

Vegetation of Ohangaron basin also changes from plains to mountains according to its topography, climate and soil. At altitudes of 300-500 m, mainly ephemerals and ephemeroids grow, i.e. tulips, tulips, sedges, wheatgrass, and kavark.

Conclusions

In conclusion, it can be said that by studying the environmental impact of the activities of the Almalyk Mining and Metallurgical Combine, environmental measures suitable for the area, including the selection of suitable plant species, the elimination of substances that have a negative effect on public health can reduce the spread in the external environment. For this, it is necessary to study the natural conditions of the area in depth. In particular, studying the factors that cause the migration of dangerous chemical compounds, the topography of the area, climatic indicators, and the physical and chemical properties of running water will give good results.

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ANTHROPOGENIC FACTORS AFFECTING THE AIR POLLUTION OF TASHKENT CITY

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Annotatsiya. Ushbu maqolada Toshkent shahri sanoati va uning tarkibi hamda sanoat mahsulotlari ishlab chiqarishning atmosfera havosi ifloslanishiga ta’siri o‘rganilgan bo‘lib, bunda Gidrometeorologiya xizmati agentligining havoga ifloslovchi moddalar chiqarilishi bo‘yicha ma’lumotlari va statistika qo‘mitasining Toshkent shahri sanoat mahsulotlari ishlab chiqarilishi, chiqariladigan chiqindilar bo‘yicha ma’lumotlari chuqur tahlil qilindi. Shuningdek, olingan ma’lumotlar asosida GAT texnologiyasidan foydalanib sxematik karta yaratildi.

Kalit so‘zlari: *sanoat, havo sifati, transport, chiqindi gazlar va h.k.*

Аннотация. В данной статье рассмотрено влияние промышленности города Ташкента и её состав и производство промышленной продукции на загрязнение атмосферного воздуха, в котором использованы данные Агентства гидрометеорологической службы о выбросах загрязняющих

веществ в атмосферный воздух и Комитета статистики города Ташкента. Промышленность города Ташкента Подробно проанализированы данные о производстве продукции и образующихся отходах. Также на основе полученной информации была создана карта по технологии GAT.

Ключевые слова: промышленность, качество воздуха, транспорт, выхлопные Газы и др.

Abstract. This article examines the impact of the industry of Tashkent city and its composition and the production of industrial products on atmospheric air pollution, in which the data of the Agency of Hydrometeorological Service on the release of pollutants into the air and the statistics committee of Tashkent city industry The data on the production of products and the waste produced were analyzed in depth. Also, based on the received information, a card was created using GAT technology.

Keywords: *industry, air quality, transport, exhaust gases, etc.*

Introduction

Cities are large population settlements, which have been created and developed since ancient times with the emergence of science, crafts, and production. Today, cities are cultural, socio-economic, political and financial centers that gather millions of people in small areas. According to scientists' estimates, more than 50 % of global energy consumption, in some cases up to 2/3, and up to 80 % of global greenhouse gas emissions are responsible for large and medium-sized cities. is coming [2-3]. In the 1980s, 39 % of the world's population lived in cities, and in 2015, this figure was 54 %. By 2050, this indicator is predicted to reach 66 % [8]. However, cities are areas where indicators such as "Earth capacity" and "Anthropogenic load" are several hundred or even thousands of times more than the norm. The ecological problems faced by humanity today are closely related to complex urbanization processes [4].

Research methodology

The city of Tashkent is the only millionaire city of our Republic, as of January 1, 2024, the permanent population of the city is 3040786 people. This figure was 2,234,300 people as of January 1, 2010 [10]. During 14 years, the population of Tashkent city increased by almost 1 million people. One of the biggest sources of air pollution in the city of Tashkent is industry, after transport. This branch of the economy that produces material goods, which has the characteristic of point and complex distribution, is one of the largest anthropogenic factors affecting atmospheric air pollution not only in Tashkent, but anywhere in the world. Of course, we cannot say that all industrial sectors are strongly affected by atmospheric air pollution. However, industries such as chemical and petrochemical, electric power, automotive industry, and metallurgy emit a huge amount of waste into the environment. The world produces 2,1 billion tons of solid waste each year, which is expected to increase by 80 percent to 3.8 billion metric tons by 2050 [1]. The world population is currently around 8 billion and growing. According to the United Nations, the population will approach 10 billion in 2050. This has a significant impact on the amount of waste produced globally

(Global Waste Statistics). In the research work, the data of the Hydrometeorological Service Agency on the release of pollutants into the air and the data of the Statistics Committee on the production of industrial products of Tashkent city and the released waste were analyzed in depth. Also, based on the received data, a card was created using GAT technology.

Analysis and Results

Today, there are the following branches of industry in the city of Tashkent, and their share in the volume of manufactured industrial products is as follows [10]:

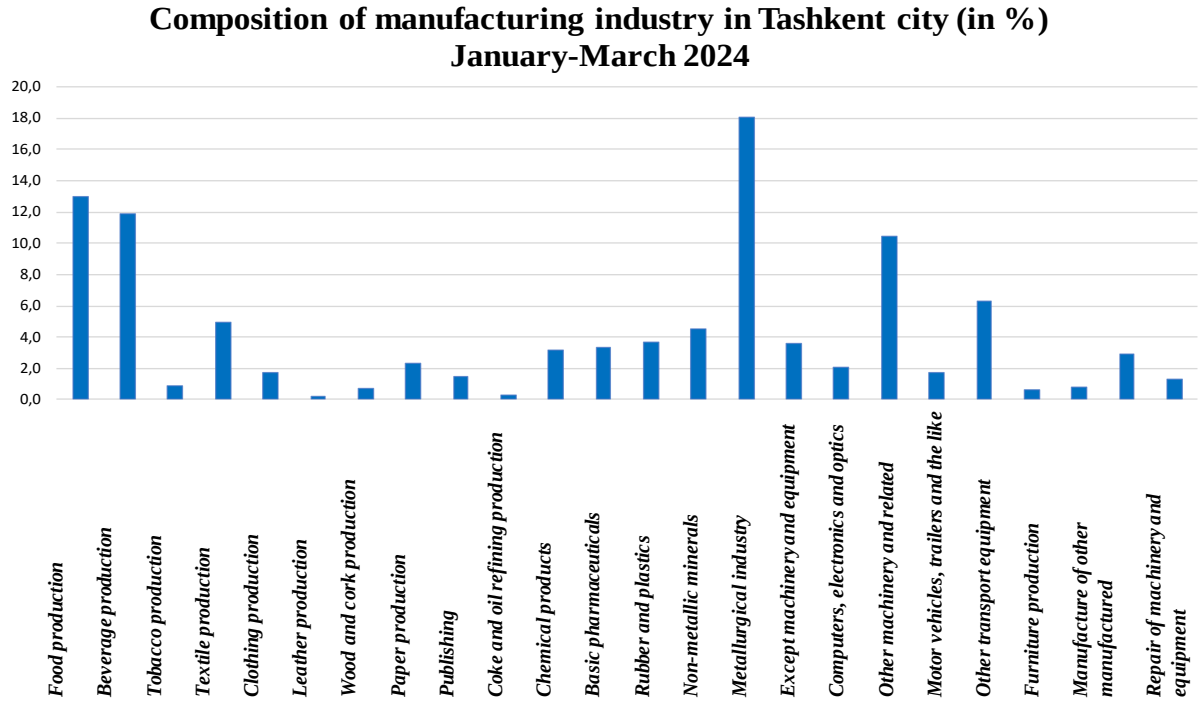

Figure 1. Structure of manufacturing industry in Tashkent city.

It can also be seen from this diagram (Figure 1) that if we take the volume of total industrial products in Tashkent as 100 %, the largest share is the metallurgical industry with 18 %, electrical equipment production with 10,5 %, food with 12,9 % production of food and 11,9 % of the production of beverages. The fact that the largest indicator belongs to the metallurgical industry also determines the amount and composition of emissions released into the atmosphere. Metallurgy is one of the most polluting industrial enterprises that pollute the atmosphere. They occupy large areas, and in the process of melting, processing, manufacturing, and mining various metals, a large amount of dust is released into the atmosphere. In large metallurgical enterprises, depending on the volume of work, from 350-600 tons to 2500 tons of dust are generated in one night and day [6]. According to the indicators of 2020, 1,001.7 million in January-October export of metallurgical industry products was carried out, and this indicator made up 7,5 % of the total export volume of the republic. As of November 1, 2020, there are 974 metallurgical enterprises in the Republic of Uzbekistan, which generated 63,3 trillion rubles in January-October, products worth soums were produced [10].

Table 1. Pollutants released into the atmosphere (Tashkent city in the district section).

Years	2014	2015	2016	2017	2018	2019	2020	2021	2022
					City:				tons
Tashkent city	31,127.2	28,448.5	27,085.6	33,106.0	15,333.6	74,472.8	33,734.0	28,602.6	20,859.0
					Districts:				
Up to three	429.9	367.3	573.4	356.7	231.8	344.7	406.3	323.6	441.6
Bektemir	433.5	602.8	575.4	3,296.2	682.6	1,123.7	745.2	938	762.5
Yunusabad	592.7	1,622.0	460.0	395.8	2,110.3	43,005.5	652.8	728.9	967.8
Mirzo Ulugbek	2381.4	1,966.7	1,791.9	1,802.7	2,719.7	1,851.5	2,107.1	2,312.20	1,705.5
Mirabad	467.0	911.7	1,117.2	617.6	697.4	649.7	620.2	898.2	1,202.3
Shaikhontakhur	1,248.2	1,372.3	1,571.6	1,237.6	1,433.1	1,987.3	2,824.6	2,304.00	2,114.1
Diamond	579.1	738.6	797.7	893.3	3,109.2	587.7	411.8	433.9	677.0
Sergely	616.6	689.2	579.3	2,084.0	645.2	795.5	1,000.4	707.5	864.1
Single house	19,206.9	18,197.7	18,046.8	20,745.9	759.8	22,916.8	23,841.1	18,089.1	9,806.2
Yashnabad	1,339.3	1,343.3	1,453.3	1,525.5	1,918.9	1,006.8	795.0	1,052.50	1,028.1
New life	0.0	0.0	0.0	0.0	0.0	0.0	15.5	357.6	478.3
Plumber	3,832.6	636.9	119.0	150.7	1,025.6	203.6	313.8	457.1	811.3

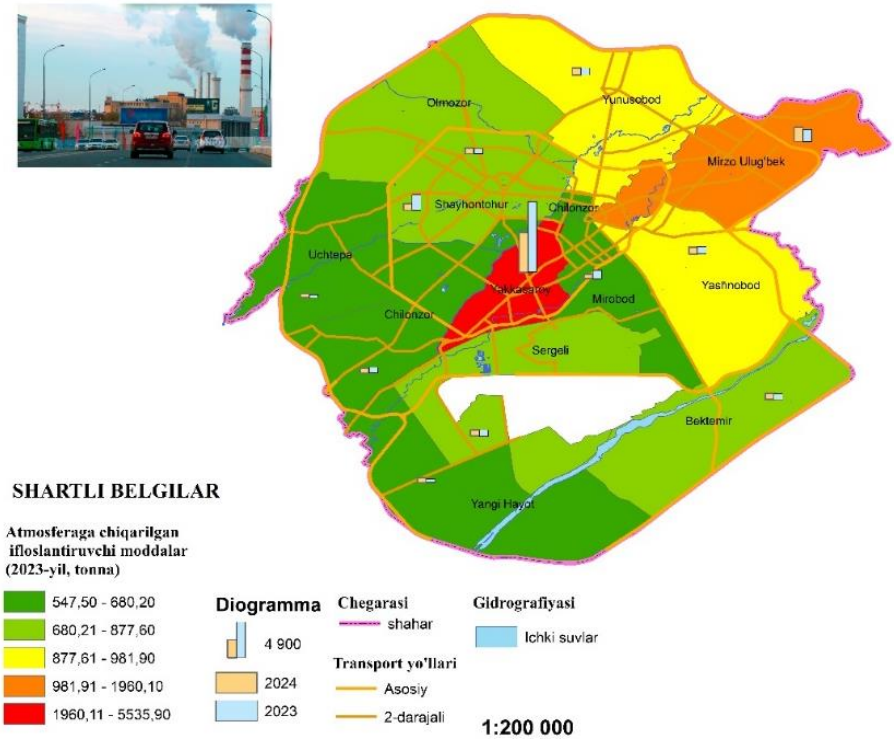

Figure 2. Map of air polluting gases of Tashkent city.

Conclusions

In conclusion, it can be said that industry is another major source of air pollution in Tashkent. According to the amount of polluting gases emitted into the atmosphere, Yakkasaray district has the highest index in the district section, followed by Mirzo Ulug'bek district. In Yunusabad, Almazor and Bektemir districts, this indicator is 680,21-877,60 tons. The lowest indicator belongs to Yangihayat and Uchtepa districts.

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UDC: 308, 316, 316.2, 17

METHODOLOGICAL POSSIBILITIES FOR FORMING STUDENTS' SOCIAL ACTIVITY THROUGH MORAL VALUES

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Annotatsiya. Mazkur maqolada axloqiy qadriyatlarning o‘quvchilarning ijtimoiy faolligini shakllantirishdagi ahamiyati atroflicha tahlil qilinadi. Axloqiy qadriyatlar jamiyatning ma’naviy poydevorini tashkil etib, o‘quvchilar ongida ijtimoiy mas’uliyat, vatanparvarlik, o‘zaro hurmat va madaniy me’yorlarga amal qilish ko‘nikmalarini rivojlantirishga xizmat qiladi. Maqolada o‘quvchilarning ijtimoiy faolligini shakllantirishda axloqiy qadriyatlarning roli nazariy va amaliy nuqtai nazardan yoritiladi.

Axloqiy qadriyatlarni ta’lim-tarbiya jarayoniga samarali tatbiq etish usullari va bu jarayonning pedagogik imkoniyatlari tahlil qilingan. Shuningdek, maqolada innovatsion yondashuvlar va zamonaviy ta’lim metodikasi asosida axloqiy qadriyatlarni shakllantirishga qaratilgan samarali strategiyalar taklif etiladi. Axloqiy tarbiya orqali o‘quvchilarda jamoa bilan ishlash ko‘nikmalari, ijtimoiy masalalarga e’tibor qaratish qobiliyati va ijtimoiy javobgarlikni his qilish malakalarini shakllantirish imkoniyatlari ko‘rib chiqilgan. Tadqiqot jarayonida axloqiy qadriyatlarni shakllantirishning didaktik va tarbiyaviy vositalarini aniqlash, ularning o‘quvchilarning ijtimoiy faolligiga ijobiy ta’sir ko‘rsatish imkoniyatlari o‘rganilgan. Maqola natijalari o‘quvchilarning shaxsiy va ijtimoiy rivojlanishiga yo‘naltirilgan ta’lim tizimini takomillashtirishda amaliy qo‘llanma bo‘lib xizmat qilishi mumkin.

Kalit so‘zlar: *axloqiy qadriyatlar, ijtimoiy faollik, ta’lim metodikasi, tarbiyaviy jarayon, innovatsion yondashuvlar, ma’naviy tarbiya, vatanparvarlik, didaktik imkoniyatlar.*

Аннотация. В данной статье подробно анализируется значение нравственных ценностей в формировании социальной активности студентов. Моральные ценности образуют нравственный фундамент общества и служат развитию в сознании студентов навыков социальной ответственности, патриотизма, взаимного уважения и следования культурным нормам. В статье с теоретической и практической точки зрения освещена рол нравственных ценностей в формировании социальной активности студентов.

Анализируются методы эффективной реализации нравственных ценностей в образовательном процессе и педагогические возможности этого процесса. Также в статье предлагаются эффективные стратегии, направленные на формирование моральных ценностей на основе инновационных подходов и современной образовательной методики. Через

нравственное воспитание рассматривались возможности формирования навыков работы в коллективе, умения обращать внимание на социальные вопросы, умения чувствовать социальную ответственность. В ходе исследования были определены дидактические и воспитательные средства формирования нравственных ценностей, изучен их потенциал положительного влияния на социальную активность студентов. Результаты стати могут служит практическим руководством по совершенствованию системы образования, направленной на личностное и социальное развитие обучающихся.

Ключевые слова: *нравственные ценности, социальная активность, образовательная методика, образовательный процесс, инновационные подходы, духовное воспитание, патриотизм, дидактические возможности.*

Abstract. This article provides a comprehensive analysis of the importance of moral values in the formation of students' social activity. Moral values form the spiritual foundation of society and serve to develop social responsibility, patriotism, mutual respect and the ability to follow cultural norms in the minds of students. The article discusses the role of moral values in the formation of students' social activity from a theoretical and practical perspective.

Methods for the effective implementation of moral values in the educational process and the pedagogical possibilities of this process are analyzed. The article also proposes effective strategies aimed at the formation of moral values based on innovative approaches and modern educational methodologies. The possibilities of forming teamwork skills, the ability to pay attention to social issues and the ability to feel social responsibility in students through moral education are considered. In the process of research, didactic and educational means of forming moral values were identified, and their possibilities of having a positive impact on students' social activity were studied. The results of the article can serve as a practical guide in improving the education system aimed at the personal and social development of students.

Keywords: *moral values, social activism, educational methodology, educational process, innovative approaches, spiritual education, patriotism, didactic opportunities.*

Introduction

One of the main factors that shape society and ensure its continuous development is moral values. Since ancient times, humanity has organized its social life on the basis of moral norms. Moral values are one of the important factors that shape a person not only at the personal level, but also as an active member of society. In today's globalization process, the importance of these values is increasing. Because globalization brings not only innovations, but also the interaction of cultures and moral norms with each other.

The social activity of students is not only a reflection of their role in their own society, but also a reflection of their spiritual world associated with moral values. Social activity formed through moral values serves not only the development of a

particular individual, but also the prospects of the nation. Therefore, the formation of social activity in students is not only an urgent task of the educational process, but also the basis of spiritual growth.

How are moral values formed in the minds of students? How can they be effectively implemented in the educational process? This article is devoted to the study of methodological foundations of developing students' social activity through moral values, seeking answers to these questions. Our goal is to contribute to the formation of the younger generation as not only knowledgeable, but also morally mature and socially responsible individuals.

Literature Review

The issues of the formation of moral values and social activity are one of the most widely discussed topics in scientific and pedagogical literature. Theoretical views on this issue are mainly based on the interrelated principles of philosophy, pedagogy, psychology and sociology. Literature analysis shows that most scientists see moral values as the spiritual basis of the development of society and consider them an important tool in the formation of social activity of students.

Philosophical literature reveals the ontological and epistemological essence of moral values. For example, in the works of Eastern and Western thinkers, morality and values are described as the main norms regulating human life and society. The works of great scholars such as Alisher Navoi [1], Farooqi [2], and Ibn Sina [3] have detailed the issues of moral maturity and its upbringing. Modern pedagogical research shows how these values can be effectively integrated into the educational process.

The role of moral values in the educational process has been thoroughly studied in pedagogical literature. For example, in the works of Russian and foreign researchers, special emphasis is placed on the role of moral norms in the formation of social activity. The pedagogical views of Lev Vygotsky [4] and John Dewey [5] are based on interactive and experience-based approaches to moral education. According to them, moral values are a key factor in the development of children's social activity.

Psychological literature, on the other hand, links the processes of formation of moral values with the stages of personality development. For example, the works of Erik Erikson [6] and Jean Piaget [7] describe moral values as an important stage in the development of the personality of children and adolescents. From a psychological point of view, the formation of social activity and moral values is of great importance in the interaction of students with society.

Modern literature also widely covers the issues of using innovative methods and technologies to introduce moral values in the educational process. For example, the effectiveness of forming moral values through project-based learning, role-playing games, and interactive training has been confirmed in practical experiments.

Based on the analysis of the literature, it can be noted that the role and significance of moral values in the formation of students' social activity is relevant not only theoretically, but also practically. This indicates the need to further improve moral education in the education system and widely introduce innovative approaches.

Research Methodology

The formation of students' social activity through moral values is a complex and multifaceted process that affects all stages of the education system. An integrated approach is required to effectively organize this process. In this sense, the research methodology includes theoretical and practical approaches.

As a theoretical basis, advanced research in the disciplines of pedagogy, psychology and philosophy is used to study the impact of moral values on social activity. In particular, the theory of values is important in the personal and social development of students. Scientific views on spiritual education, the role of the individual in society, and the formation of a socially active person form the scientific foundation of this study.

In practice, various methods of integrating moral values into the educational process were used. These methods were developed taking into account the age characteristics, interests and needs of students. In particular, special attention was paid to strengthening moral values in students through educational lessons, role-playing games, group discussions and analysis of life situations. At the same time, innovative pedagogical technologies, such as project-based learning and interactive training, were used to develop students' independent thinking and social responsibility skills.

The experimental approach was of great importance in the study. During practical work, the level of acceptance of moral values and changes in social activity of students were observed and analyzed. In this process, data were collected on the basis of diagnostic tests, interviews, questionnaires and observation methods. The results obtained served as an important basis for assessing the effectiveness of methodological approaches aimed at the formation of moral values.

Thus, the research methodology is aimed at in-depth study of the moral and social development of students, combining theoretical knowledge and practical experience. This approach allows you to increase the effectiveness of the pedagogical process in linking moral values with the social activity of students.

Analysis and Results

Moral values are an important foundation for shaping the human personality, and their role in the educational process is incomparable. These values not only develop spiritual awareness in students, but also play a decisive role in the formation of social activity. During the discussion, it can be understood that the preservation and strengthening of moral values in today's era of globalization is a necessary factor for the sustainable development of society.

When assessing the impact of moral values in the formation of students' social activity, it is necessary to consider several aspects. First, moral values help a person understand his responsibility in society. For example, values such as patriotism, mutual respect, and solidarity make students feel responsible not only for themselves, but also for the interests of society.

Secondly, moral values increase students’ adaptability to the social environment. In today’s changing conditions, it is not enough to limit students to theoretical knowledge alone; they need to develop the moral skills necessary for active participation in social processes. In this regard, enriching education through interactive lessons, role-playing games, and project activities is of great importance.

Thirdly, moral values enrich the inner world of children and form them as culturally and socially competent individuals. Through moral values, children not only understand their rights and obligations, but also coordinate their relationships with others. This is a key factor in increasing their social activity.

During the discussions, it was found that the use of modern approaches and methods in the formation of moral values is one of the effective ways to develop social activity. In particular, digital technologies and innovative teaching methods can make this process more effective. For example, giving students the opportunity to participate in social projects helps them feel responsible for real-life social issues.

The cooperation of parents, teachers and other members of society is important in instilling moral values in the educational process. Because moral values are formed in students not only within the walls of the school; this process is part of the general cultural environment in society.

In conclusion, moral values are of decisive importance in shaping the social activity of students. Their effective implementation in the educational process is an important stage in shaping students not only as knowledgeable, but also as active and responsible individuals in society. This is a key step in ensuring the moral maturity of the future generation.

Conclusions

Moral values are the spiritual foundation of every society, ensuring its future stability and development. The impact of these values on the personal and social development of students in the educational process is very great. During the study, it was realized that moral values are not just a set of spiritual concepts; they also have their place as a means of forming practical skills such as active participation in social life, a sense of responsibility, and cooperation with others.

In today's globalization process, the issue of forming students' social activity is relevant, and the restoration and strengthening of moral values is an important direction for the successful implementation of this task. Moral values teach students not only to be good people, but also to find their place as active members of society. In this regard, the use of modern and innovative approaches by teachers and the creative and practical enrichment of the educational process are of particular importance.

By promoting moral values in the formation of students' social activity, they can be educated as spiritually mature, patriotic, and responsible individuals. This is an important factor not only for the future success of students, but also for the social stability of society as a whole.

At the same time, the cooperation of parents, schools, and the general public is important in the development of moral values. Not only educational institutions, but all members of society should participate in this process. Through the widespread promotion of moral values and their application in everyday life, it is possible to increase the social activity of students. In short, moral values enrich the personal development of students with deep content and create a solid foundation for social activity in them. By integrating these values in the educational process, we create the basis for the formation of not only a spiritual, but also a socially stable society. This fully meets the long-term strategic goals of the educational process.

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INTERCONNECTIONS BETWEEN THE CIVILIZATIONS OF CENTRAL ASIA AND THE CULTURES OF THE ARAL SEA REGION

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Annotasiya. Ushbu maqolada Markaziy Osiyo sivilizasiyalari va Orolbo‘yi madaniyatlarining o‘zaro aloqalari hamda madaniy ta'sir masalalari tadqiq qilingan. Miloddan avvalgi III ming yillik oxirlaridan boshlab, Marg‘iyona va Baqtriya kabi janubiy mintaqalarda shakllangan shaharsozlik madaniyati va davlatchilik an'analari shimoliy dasht hududlari bilan aloqada bo‘lgan.

Kalit so‘zlar: *Markaziy Osiyo, Orolbo‘yi madaniyati, Shimoliy Tagisken, arxeologiya, madaniy aloqalar, Marg‘iyona, Baqtriya, migrasiya, bronza davri, hunarmandchilik, shaharsozlik, Ko‘zaliqir madaniyati.*

Аннотация. В данной стате исследуются взаимосвязи и культурные влияния цивилизаций Централной Азии и культуры Приараля. Начиная с конца III-тысячелетия до нашей эры, сформировавшаяся в южных регионах культура градостроителства и государственности, таких как Маргиана и Бактрия, взаимодействовала с северными степными территориями.

Ключевые слова: *Централная Азия, культура Приараля, Северный Тагискен, археология, культурные связи, Маргиана, Бактрия, миграция, бронзовый век, ремесленничество, градостроителство, культура Кузалыкыр.*

Abstract. This article explores the interconnections and cultural influences between the civilizations of Central Asia and the Aral Sea region. Starting from the late 3rd millennium BCE, the urban culture and statehood traditions formed in southern regions such as Margiana and Bactria interacted with the northern steppe territories.

Keywords: *Central Asia, Aral Sea culture, Northern Tagisken, archaeology, cultural connections, Margiana, Bactria, migration, Bronze Age, craftsmanship, urban development, Kuzalykyr culture.*

Introduction

The history of Central Asia holds a significant place in the cultural, economic, and social development of humanity. The region's natural-geographic conditions, proximity to major centers of civilization, participation in trade routes, and involvement in cultural exchange processes have profoundly influenced the development of its culture. The Aral Sea civilizations, as one of the ancient cultural centers of Central Asia, served as a bridge between the southern civilizations and the nomadic peoples of the northern steppes.

Literature Review

The issue of interaction between the civilizations of the Aral Sea region and Central Asia has drawn considerable attention from many researchers. Studies dedicated to the archaeology of the Aral Sea region, Bactria, Sogdiana, and Khorezm by scholars such as Ranov V.A., Zadneprovskiy Yu.A., and Tolstov L.S. have been pivotal in revealing the cultural connections of the Aral Sea civilizations with Central Asia [1-24].

Interactions between Central Asian Civilizations and the Aral Sea Cultures.

By the end of the 3rd millennium BCE, the historical-cultural regions in the southern parts of Central Asia, known in early written sources as Margiana and Bactria, had reached significant levels of urban development, statehood, and civilization. These areas were bordered to the north by the desert zones of the Karakum and Kyzylkum, through which the Amu Darya River flowed.

During the Late Bronze Age, when the pastoralist culture in the Khorezm oasis was flourishing, interactions with the southern regions can be observed through distinct archaeological findings. These include pottery produced on potter's wheels and bronze artifacts discovered at oasis settlements.

Notably, high-quality pottery and ornaments made from minerals such as lapis lazuli and turquoise produced in Bactria and Margiana have been identified in the settlements of herders in the Ural steppes, Central, and Eastern Kazakhstan [2]. Conversely, copper and tin ores extracted from mines in the Ural Mountains and finished bronze products—such as weapons and ornaments made in the pastoralist workshops—were transported southward [1].

The transition from the Late Bronze Age to the Early Iron Age, particularly in the 9th –8th centuries BCE, saw the construction of mausoleums made of unbaked bricks, characterized by rectangular and circular designs. These burial structures were absent in the regions occupied by steppe pastoral tribes, making the architecture of Northern Tagisken a reflection of unknown construction traditions in the Central Asian steppes.

Initially, Tolstov S.P. identified ceramic vessels and bronze arrowheads found within the Northern Tagisken mausoleums as culturally connected to the Late Andronovo culture and similar to archaeological materials from the Begazy and Dandybay burial mounds in Central Kazakhstan, dated to the 9th–8th centuries BCE [23]. Additionally, the use of unbaked bricks in construction and the presence of pottery made on potter's wheels in burial inventories were interpreted as evidence of a strong cultural influence from southern civilizations.

Steppe cultural markers were evident only in hand-made pottery and certain bronze items. Conversely, southern traditions were expressed through sophisticated architectural styles, construction materials (unbaked bricks and clay plaster), specific bronze decorations, and pottery produced on potter's wheels—all elements unfamiliar to the pastoralist cultures of the steppe.

Gryaznov M.P., considering this evidence, argued that the builders of the Northern Tagisken mausoleums adopted the techniques of brick production and construction knowledge from the agricultural oases in the south as a result of cultural interactions [8]. Similarly, M.A. Itina linked the construction of the Northern Tagisken mausoleums along the Lower Syr Darya to the mutual interactions between the southern civilizations and the Aral Sea cultures, associating them with the cultural influence of Bactria in the steppe regions [10].

In our view, the imitation of certain tools, pottery, and ornaments by local craftsmen is also plausible. For instance, pottery resembling the characteristic vase-like vessels of Bactrian ceramics has been discovered in Bronze Age burial mounds in the Kazakh steppes. However, the steppe potters' handmade pottery, crafted using the coil method, appears significantly cruder and less refined than the products of Bactrian ceramics.

Therefore, the immediate adoption of advanced construction techniques and the proportional geometry of architecture by pastoralist builders was undoubtedly a challenging endeavor.

Firstly, the Northern Tagisken mausoleums are unique and unparalleled architectural structures in the steppes. Secondly, among them are large circular buildings with diameters reaching 25 meters, while the walls of rectangular mausoleums were 18 meters long and 4 meters thick. This suggests that their height in ancient times might have reached approximately 6–8 meters.

Inside some mausoleums, remnants of columns made from mud bricks were discovered, while in others, recesses for installing wooden columns were found [11]. The reason for such intricate descriptions of Northern Tagisken's architectural monuments lies in the fact that constructing these complex funerary structures required builders to possess specialized practical knowledge, experience, and skills in architectural techniques.

In examining this issue, it is important to note that during the 9th –8th centuries BCE, the tribal communities of the Amirobod culture in the Aral Sea region lived in simple dwellings—semi-subterranean huts built with wooden posts and reed-covered walls and roofs. The construction of such huts was based on straightforward methods, requiring neither significant labor nor extended periods. However, building with mud bricks required pre-planning the structure's height, determining the wall thickness

accordingly, laying bricks properly, specifying room sizes, linking them through doorways, roofing the structure, and meeting other architectural demands—all of which necessitated knowledge of architectural systems.

Research Methodology

A comparative analysis of various sources is conducted to identify the shared and distinctive aspects of the civilizations of the Aral Sea region and Central Asia.

The integration of historical, archaeological, and ethnographic data is employed to study intercultural interactions and trade-economic relations.

Analysis and Results

As a continuation of this topic, it should be noted that the dissemination of cultural interactions and achievements in various fields led to the adoption and imitation of different crafts—ornaments, jewelry, weapons, and other unique items. However, the emergence of large architectural structures such as palaces, temples, mausoleums, and defensive walls in previously unfamiliar territories often occurred due to the migration or forced relocation of skilled architects and builders from established centers of architectural innovation. For instance, in the regions of Margiana and Bactria, the establishment of early state systems and urban culture during the Bronze Age was accompanied by the construction of homes, workshops, defensive walls, palaces, and temples using mud bricks [21]. Architectural structures discovered at sites such as Gonur, Dashly, Sapalli, and Jarkutan demonstrate that migrating builders utilized construction techniques previously employed in their native regions [18]. Thus, it is highly probable that the Northern Tagisken mausoleums were constructed by builders from Bactria. During the 10^{th} –8^{th} centuries BCE, along the left bank of the Amu Darya, in the middle reaches of the river, the Odaytepa fortress was built with a circular layout. This stronghold, likely established by representatives of the Bactrian-Margiana population, facilitated further migrations toward the lower Syr Darya basin, potentially leading to the construction of the Tagisken mausoleums.

The “cultural influence” hypothesis regarding this topic has not yet encountered significant alternative interpretations. This underscores the importance of substantiating the migration model, as the continuation of this issue relates to the emergence of Kozaliqir culture in the Khorezm oasis during the late 7^{th} century BCE.

Kozaliqir comprised an inner citadel and a “lower city” surrounded by shared defensive walls. These walls, made of mud bricks and pakhsa (compacted clay), were fortified every 30 meters with semi-circular towers, equipped with three rectangular embrasures for shooting.

Kozaliqir culture stands in stark contrast to preceding Amirobod culture and contemporaneous early Saka cultures, representing entirely new cultural traditions within the Khorezm oasis.

Masson V.M. attributed the introduction of the potter’s wheel and the production of cylindrical-conical pottery similar to Margiana vessels, along with the use of rectangular mud bricks in construction, directly to the cultural influence of Margiana [12].

Vainberg B.I. also linked these processes to interactions between southern civilizations and Kozaliqir culture [5].

Sagdullayev A.S., expanding on these views, identified Bactria and Margiana as centers of civilization and discussed the spread of their advanced cultural traditions, technological, architectural, and economic achievements to neighboring regions. According to him, from the early 1st millennium BCE, representatives of the Bactrian-Margianian population settled the middle Amu Darya and Kashkadarya oases, later advancing along the left bank of the Amu Darya into southern and western Khorezm. The assimilation of these migrants with local tribes eventually led to the formation of the "Chorasmian" ethnos mentioned in written sources [19].

The discovery of material artifacts of early Bactrian culture at sites such as Kerki, Choptitepa, and Odaytepa lends significant support to this migration hypothesis [15]. The Odaytepa fortress on the middle Amu Darya is characterized as a key stronghold for migrations from the south.

Yagodin V.N., Mambetullaev M.M., and Bolelov S.B. also discussed the arrival of groups of builders and craftsmen from the south into southern Khorezm, noting the establishment of Xumbuztepa workshops and the emergence of Hazorasp fortress [4].

Here is the text translated into English, retaining the scientific tone and preserving all signs and formatting:

Furthermore, the emergence of the earliest artificial irrigation systems in the left-bank Khorezm region was discussed. Overall, significant attention was given to the ethnic processes contributing to the formation of a new culture in the Khorezm oasis. In his article on the interactions between ancient civilizations and steppe cultures, Sagdullayev A.S. noted that during the 7th century BCE, new ethno-cultural processes in the Khorezm oasis not only brought changes in agriculture, crafts, and architectural-construction fields but also witnessed the spread of a new religion associated with Zoroastrian burial rituals.

Burial mounds related to the Kozaliqir culture have not been discovered. Instead, individual skeletal remains were found around the Kozaliqir fortress, Khumbuztepa, and Dingilja settlements, providing evidence of Zoroastrian burial customs.

Compared to the southern regions of Central Asia, the use of rammed earth and mud bricks in construction began relatively later in the Khorezm oasis. It is known that such a delay was caused by the uneven development of socio-economic and material cultural aspects among tribes in varying natural-geographical conditions. The earliest structures built from rammed earth and mud bricks in the oasis date back to the late 7th century to early 6th century BCE. The emergence of these constructions, along with other cultural innovations, likely resulted from the gradual diffusion of technological, economic, and cultural advancements from the centers of early civilizations. These advancements subsequently transformed these areas into new hubs of civilization. For instance, the cultural innovations introduced during the Early Iron Age laid the foundation for the development of the ancient civilization in Khorezm during the Hellenistic period. However, before this civilization acquired local characteristics, the Khorezm oasis experienced complex ethno-cultural processes. The Kozaliqir fortress, located on the banks of the Dovdon channel near Sarykamish, was surrounded by vast steppes

inhabited by sedentary and semi-sedentary pastoralists. These communities began settling in the region in the late 8th and early 7th centuries BCE [17], but they lacked knowledge of building homes, defensive structures, and large edifices from rammed earth and mud bricks. Such skills were unnecessary in the steppe environment.

The peaceful migration of southern population groups into Khorezm initiated direct interactions with local communities. As socio-economic relations developed, the pastoralists gradually adapted to and assimilated advanced cultural innovations in construction, crafts, and agriculture. The Kozaliqir fortress became the administrative, military, economic, and religious center of these tribes. This process reflected the effective interaction between the civilizations of southern Central Asia and the Aral region's cultures.

It is noteworthy that during the 7th–6th centuries BCE, economic exchange relations existed between the Aral region's Saka tribes and the southern agricultural provinces of Central Asia. High-quality ceramic vessels typical of Margiana and Bactria's pottery production, as well as blue lapis lazuli beads from the Badakhshan mines in Bactria, were discovered in the Uygarak burial mounds [6]. Similar artifacts were also found in the Quyisoy 2 settlement and the Sakarchaga burial mounds [24].

Vishnevskaya O.A. suggested that these items may have spread through trade relations or were acquired during Saka military campaigns in the southern regions, favoring the latter hypothesis.

In the Early Iron Age, the development of semi-nomadic and sedentary forms of pastoralism alongside nomadic herding, the significant increase in livestock populations, advances in horse breeding and transportation methods, and the rise in surplus production necessitated trade exchanges [13]. Ancient trade routes along the Amu Darya's banks played a crucial role in facilitating economic relations in the Aral region. Another ancient route from the Khorezm oasis led to the Iranian borders via the Uzboy channel and the eastern Caspian shores. Simultaneously, the Aral region connected southern Central Asia with the Eurasian steppes, allowing extensive use of transit routes for goods transportation and economic exchanges.

When examining this issue, it is important to note that during the Achaemenid era, some representatives of the Sakas and Khorezmians were incorporated into state construction projects and military garrisons under Persian rule [9]. This exposure provided them with opportunities to familiarize themselves with the achievements of civilizations in Iran, Babylon, and Egypt. However, by the late 5th century BCE, scholars suggest that Khorezm and the Aral Sakas had gained independence from the Achaemenids [3]. This conclusion is supported by the construction of fortresses like Chirikrabot in the eastern Aral region, indicating a departure from the administrative policies of the Persian rulers. This phenomenon can be regarded as the diffusion of cultural innovations from early centers of civilization to remote regions and their incorporation into local construction, craftsmanship, and agricultural practices.

For example, in the second half of the 3rd century BCE, as water supplies ceased in the Inkordarya and Jonidarya basins, where the Chirikrabot culture had flourished, tribes known as the "Dahae" in written sources migrated along the Syr Darya to southern Kazakhstan and the Tashkent oasis. According to Suleymanov R.Kh., these

tribes established previously unknown military fortifications and early cities in the conquered territories [22], applying the skills, experience, and knowledge acquired in their former habitats.

From a political perspective, the Avesta provides noteworthy accounts of King Kavi Haosrav, who unified the "Aryan" lands of Sogdiana, Margiana, and Bactria and launched campaigns against the "Tur" tribes, ancestors of the Sakas in Qangha (Qang). He burned and plundered their capital. Pyankov I.V. located Qangha in the lower Syr Darya basin and interpreted the traces of plunder and fire discovered in the Northern Tagisken burial sites as evidence of Kavi Haosrav's campaigns [16].

Conclusions

It can be stated that the interactions between the civilizations of Central Asia and the cultures of the Aral Sea region intensified and advanced significantly since the Late Bronze Age. Over long historical periods, the lifestyle and culture of tribal communities in the Lower Amu Darya Khorezm oasis (Southern Aral region) and the Lower Syr Darya basin (Eastern Aral region) evolved in significant adaptation to natural and geographical conditions. Initial cultural changes in construction and architecture were recorded in the 9^{th}–8^{th} centuries BCE, as exemplified by Northern Tagisken. The reasons for the adoption of these innovations in the Khorezm oasis have been interpreted differently by researchers. These interpretations include the spread of southern civilizations' traditions through cultural and economic exchanges, the settlement of captives brought to the region due to Saka campaigns, or the peaceful migration of Bactrians and Margians into Khorezm.

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FORMING AN ECOLOGICAL CULTURE IS A GLOBAL NECESSITY

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Annotatsiya. Ushbu maqolada inson va tabiat o‘rtasidagi munosabatlarining o‘ziga xos xarakteri, ularning uyg‘unligi masalalari tahlil qilingan. Tadqiqot jarayonida insoniyat tarixiy taraqqiyotining turli bosqichlarida insonning tabiatga bo‘lgan munosabatlari keskin o‘zgarib borganligi, tabiat qonunlarining buzilishi inson hayoti va faoliyatining barcha sohalarida moddiy, ma’naviy va ijtimoiy inqirozlarni yuzaga keltirganligini guvohi bo‘lamiz. Shu sababli tadqiqotimiz xulosalari shuni taqozo qiladiki, kelajak avlod oldidagi insoniy burchimizni anglab yetish, jamiyatning faol a’zosi sifatidagi pozitsiyamizni egallashimizda eng avvalo, ekologik ong, bilim va madaniyatni shaklllantirishni yuqori bosqichga olib chiqish dolzarb ahamiyatga egadir.

Maqolada ekologik bilim va madaniyatni yuksaltirishga qaratilgan bir qancha bosqichli chora-tadbirlar o’rin olgan. Bu tadbirlar kechiktirib bo’lmas say-harakatlarni talab qilishi bilan xarakterlidir.

Kalit so‘zlar: *tabiat, inson, jamiyat, antroposentrizm, tabiiy resurslar, ekologik bilim, ekologik faoliyat, begonalashuv, axloq, ma’naviyat, ekologik madaniyat.*

Аннотация. В данной статье анализируется специфика взаимоотношений человека и природы, вопросы их гармонии. В ходе исследования мы станем свидетелями того, что на различных этапах исторического развития человечества отношение человека к природе резко менялось, нарушение законов природы вызывало материальные, духовные и социальные кризисы во всех сферах человеческой жизни и деятельности. Поэтому выводы нашего исследования требуют первостепенной важности осознать свой человеческий долг перед будущим поколением, занять позицию активного члена общества и, прежде всего, вывести на более высокий уровень формирование экологического сознания, знаний и культуры.

В статье содержится ряд поэтапных мер, направленных на повышение экологических знаний и культуры. Эти события характеризуются тем, что требуют усилий, которые нельзя откладывать.

Ключевые слова*: природа, человек, общество, антропоцентризм, природные ресурсы, экологическое знание, экологическая деятельность, отчуждение, мораль, духовность, экологическая культура.*

Abstract. The article analyzes the specific nature of the relationship between man and nature, the issues of their harmony. In the process of research, we witness that at different stages of the historical development of mankind, man's

relationship with nature has changed dramatically, and the violation of the laws of nature has led to material, spiritual and social crises in all spheres of human life and activity. Therefore, the conclusions of our research suggest that in order to understand our human duty to future generations and to take our position as active members of society, it is of paramount importance to raise the formation of ecological awareness, knowledge and culture to a higher level. The article includes a number of step-by-step measures aimed at improving environmental knowledge and culture. These measures are characterized by the fact that they require urgent action.

Keywords: *nature, man, society, anthropocentrism, natural resources, ecological knowledge, ecological activity, alienation, morality, spirituality, ecological culture.*

Introduction

Despite the diversity of the nature surrounding us, they all come together and form a single living organism. Human inattention, his misunderstanding of dialectical unity and integrity have a negative impact on both nature and society. The means of labor created by man in the process of his development, the level of formation of material culture and the level of spiritual life of ethno-social groups and individuals in society, including the forms of social relations of people to each other and to the surrounding nature, are indicators of spiritual culture. These factors indicate that ecological culture is not only the relationship of society with nature, but also with the historical and social environment.

Literature Review

The concept of “ecological culture” was first used by Likhachev D.S., who believed that the basis of human life is connected with morality, and its purpose is to protect and preserve the future, therefore, ecological culture should be viewed as a moral culture [4]. It is emphasized that failure to comply with the simple rules of ecological culture leads to the moral and spiritual decline of society. The author concludes that the relationship between nature and man is a relationship between two cultures, each of which has its own unique “behavior” and “social rules.” Both cultures are the result of historical evolutionary development, including the fact that since ancient times, human culture has developed under the influence of nature, and the development of nature over several million years has been carried out under the influence of human culture. Nature does not depend on human culture and can continue to exist without it, but human culture cannot exist without nature. In the studies of scientists on the concept of ecological culture, its content and scope are interpreted differently, but it is known that it is explained based on the attitude of man to the natural environment that surrounds him and in which he lives.

The spiritual form of ecological culture is ecological consciousness, which reflects the cultural state of man in relation to nature and people. Various aspects of ecological culture are expressed by the following terms: ecological knowledge and skills, ecological thinking, value orientation, ecologically justified (rational) behavior. Therefore, Yazdonov Z.Sh. defines “Ecological culture is a philosophical and moral

category that coordinates the mutual relations of parts in the "nature-society-man" system, conveys to humanity the dialectical connection of all beings in existence, encourages to preserve the purity of the environment and thereby serves to save the entire universe from degradation" [9].

In the education of ecological culture, the formation of ecological awareness in students is of great importance. Ecological awareness represents the sum of knowledge, beliefs, and skills about the interaction of man with nature.

Discussing the factors that form the basis of ecological consciousness [2], Sewall emphasizes the role of mindfulness (attention to nature, attention to beauty, and aesthetic appreciation), relationship awareness (attention to interactions and relationships); developing conscious flexibility (being able to accept nature); deep perception of nature (seeking meaning in nature, learning from other beings), expanding perception, empathizing with other beings, and creating new opportunities.

The source of ecological culture is the life experience of the people accumulated over the centuries - to preserve nature, to treat it with care, to protect it and live in harmony with it, to treat its wealth responsibly. In the early days, our ancestors knew nature well, the relationship between living beings and the environment, and were able to use it effectively. They knew their dependence on natural resources, the mysterious state of nature, that they were a part of nature, inextricably linked with nature, and even if they did not know how to write or draw, they deeply understood the importance of passing on the knowledge they had learned and accumulated from nature to their descendants. Folk pedagogy has long been based on such solid foundations as a careful attitude to nature, a high moral attitude towards it, and a respectful attitude towards man as a bearer and giver of folk wisdom. Unfortunately, many aspects of folk culture have been lost in the relationship between man and nature. Therefore, the revival of the place occupied by mother nature in the lifestyle and traditions of people is an extremely important and useful task of today's pedagogical science and practice. In turn, Yazdonov Z.Sh. emphasizes that "the restoration of the ecological culture of the Uzbek people, the study of the laws of its development are connected with the socio-economic and cultural level of society, and the preservation of the increasingly polluted natural environment on a global scale, the role of anthropogenic factors affecting the ecological balance of the biosphere, the determination of the determinants of not only the social, economic, but also the political situation in this process and the finding of practical solutions, have their own historical forms and stages" [9].

Research Methodology

Methods of analysis and synthesis, logic and comparison, and historicism have been used in the research process.

Analysis and Results

The development of ecological awareness is carried out through the proper organization of environmental education. The goal of environmental education is to form an ecological culture, and the importance of environmental activities throughout the world relies on the factors of ecological culture and environmental education, which are its most important components.

Ecological culture is a part of universal human culture, a system of social relations, social and individual moral norms, relations between man and nature, views on the harmony of society and the natural environment, attitudes and values, a person's attitude to the natural environment, and an integral mechanism for the integration of man and nature in general.

Simply put, ecological culture is a deeply rooted set of ideas about respect for the environment, expressed in the thoughts and actions of every member of society. At the same time, ecological culture is also the degree to which people value nature, the environment, and their place in the world, as well as their relationship to the world.

While in the last century, American researchers Kreber A.Z., and Kluckhonc A. noted that there were more than 164 definitions of the concept of "culture" and that it was often used alongside the term "civilization" [1], it is noteworthy that today there are more than 250 definitions of this term.

Several studies on ecological culture were conducted during the former Soviet period, including the ideas put forward by Ojegov Y.T. and Nikonorova Y.V. on ecological culture based on their sociological research in the Aral Sea region, where the environmental situation is becoming increasingly serious, which are of scientific interest [5].

It is worth noting that their research has not lost its significance in the scientific study of the problems of forming an individual's ecological culture in the present period. Although the research of Tokhtayev A. and Khamidov A. is not directly devoted to ecological culture, they describe the history of ecological culture in Uzbekistan, factual materials on Islamic ecological norms [8].

Nowadays, the study, promotion, development of ecological science, practical application of its basic principles, production of ecologically clean and pure food products, widening the scope of ecological agriculture are considered the most important problems of human development. All humanity should be mobilized to protect the environment, and a war should be declared against those who cruelly treat nature, land, air, water, animals, plants, fish, birds, and international ecological and biological terrorism. In turn, Yazdonov Z.Sh. "Restore the ecological culture of the Uzbek people, study the laws of its development, are connected with the socio-economic and cultural level of society, and show the role of anthropogenic factors affecting the ecological balance of the biosphere, determine the determinants of not only the social, economic, but also the political situation in this process and find practical solutions, have their own historical forms and stages" [9].

Today, in accordance with the historical necessity of the principle of global ecological tolerance, developing countries with a difficult ecological situation require special attention to providing practical assistance in the field of natural environmental protection: financial, technical, technological, intellectual. In particular, economically developed countries are acting as donors of financial, technical-technological, intellectual potential [7]. Therefore, the formation of ecological culture, civilization, thinking, consciousness, upbringing and education in people has become a requirement of ecological development. Ecological culture does not mean only certain views on the development of nature and its systems. It is also associated with specific human

activities. Increasing the level of ecological culture in society depends on the ecological education of the future generation, on how they acquire ecological knowledge. This requires the formation of a civilized form of development of culture and an educational environment that embodies human culture, and at the same time, the preparation and implementation of a strategy, concept and program for the continuous development of ecological education by all peoples as the main direction of cultural development. In order for ecological education to be consistent and systematic, this process should be carried out from the first moments of personality formation, from childhood, its foundation should be laid and fully formed precisely in the family, in preschool institutions, in primary grades.

According to Ikromov E.J., and Khotamov A.A. "the ecological culture of a person is the product of all educational work" [3]. One can generally agree with the idea that other types of ecological culture in society are formed and developed in isolation from other ecological factors. However, Saidova U.G., like the above authors, says that "Ecological culture is created only by conscious people. Ecological consciousness, of course, arises through ecological education and upbringing" [6] does not have sufficient scientific basis.

Conclusion and suggestions

The formation of ecological culture involves the development of ecological awareness and ecological sensitivity in everyday communication with nature in the pedagogical process. Ecological education covers the formation of a person's knowledge in the field of ecology and his moral responsibility for the protection of the natural environment. The ecological education system is an integral part of human life and culture, therefore, today, in order for the processes of forming ecological awareness and ecological culture to yield successful results, each state must take progressive steps in its legislation. Uzbekistan, which is part of the civilized world, should contribute to the development of ecological culture by creating a legislative framework based on modern approaches.

From the above, it is clear that the state and local self-government bodies should be interested in establishing joint cooperation in the field of maintaining ecological balance and environmental protection. All these factors include the importance of environmental education. We should accept the concepts of environmental education and environmental culture as an organic whole and make environmental protection and maintaining ecological balance the most important areas.

In conclusion, today the problem of nature protection and the struggle for environmental purity has become a global problem that covers countries and peoples of the world. The establishment of ecological education on a systematic basis is a requirement of the times, and acquiring an ecological culture and treating nature with love, as if it were one's own mother, is the honorable duty of every citizen today.

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GAMES AND SONGS IN KHOREZM WEDDING CEREMONIES

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Annotatsiya. Qadimdan o‘zbek to‘y-marosimlari sayil ko‘rinishida o‘tkazilgan. Unda yetti yoshdan yetmish yoshgacha bo‘lgan barcha ishtirok qilgan. Bolalar va o‘smirlarning o‘yin kulgusi to‘yga alohida fayz qo‘shgan. Ba’zi xalq o‘yinlari – “Chiprodalli”, “Chag‘olloq” va “Zimlaq” kabi hazil qo‘shiqlar bilan birgalikda ijro qilingan. Maqolada Xorazm to‘y-marosimlarida kuylangan o‘yin-qo‘shiqlar haqida so‘z boradi.

Kalit so‘zlar: *To‘y, marosim, qo‘shiq, raqs, “Chiprodalli”, “Chag‘olloq”, “Zimlaq”.*

Аннотация. С древних времен узбекские свадебные обряды проводились в форме *сайил*. В нем приняли участие все желающие от семи до семидесяти лет. Смех детей и подростков придавал свадьбе особое очарование. Некоторые народные игры, такие как “Чипродаллы,” “Чаголлак” и “Зимлак,” исполнялись вместе с юмористическими песнями. В статье говорится об играх и песнях, исполняемых в хорезмских свадебных обрядах.

Ключевые слова: *Свадба, церемония, песня, танец, “Чипродалли,” “Чаголлак,” “Зимлак.”*

Abstract. Since ancient times, Uzbek wedding ceremonies have been held in the form of *sayil*. All those wishing to participate, from seven to seventy years old. The laughter of children and teenagers gave the wedding a special charm. Some folk games, such as “Chiprodally,” “Chagollak” and “Zimlak,” were performed along with humorous songs. The article talks about the games and songs performed in Khorezm wedding ceremonies.

Keywords: *Wedding, ceremony, song, dance, “Chiprodalli,” “Chagolloq,” “Zimlaq.”*

Introduction

One of the interesting features of Uzbek weddings is their mass celebration. Relatives, in-laws, neighbors, and community members all turn the day into a grand holiday. Men usually gather in tea houses, women in the “inner” rooms, and children enjoy games and entertainment in spacious open areas. In particular, the wedding ceremony, especially the “nikah” (marriage) ceremony, which is considered the largest, always captures the attention of everyone present. Due to reasons like these, festive gatherings and celebrations are organized.

Literature Review

In the mid-19th century, the Hungarian traveler and linguist Armin Vamberi, who visited Khiva, emphasized his enjoyment of witnessing performances by local musicians both inside the royal court and outside during various ceremonies and festivals [1]. He noted that Said Muhammad Khan held musicians in high regard.

Since the 1950s, numerous ethnographic scholars have undertaken research on the history and culture of Khorezm. Snesarev G.P. [6], who studied the pre-Islamic customs and rituals of Khorezm, focused on the daily life and rituals of the local people. Folklorist To‘ra Qilichev [7] examined the wedding games and their artistic aspects in his studies of the region’s traditions.

Research Methodology

Khorezm’s musical arts are distinct not only in their musical and linguistic features but also in their unique customs and rituals compared to other parts of Uzbekistan. Khorezmian wedding ceremonies involve not only gatherings of men and women, but also games and dances performed by children and young people. Popular games such as “Chiprodalli” [3], “Chog‘olloq” [3], and “Zimlaq” [3] have played an important role in uplifting the spirits of the youth, strengthening their physical health, and fostering their spiritual growth as well-rounded individuals.

Analysis and Results

Many of these games involve specific dance movements and humorous songs. These songs, which have been performed at weddings, festivals, and fairs for centuries, have been preserved to this day. Over time, the lyrics of these songs have been adapted to fit the changing times, and their performance traditions continue to be demonstrated.

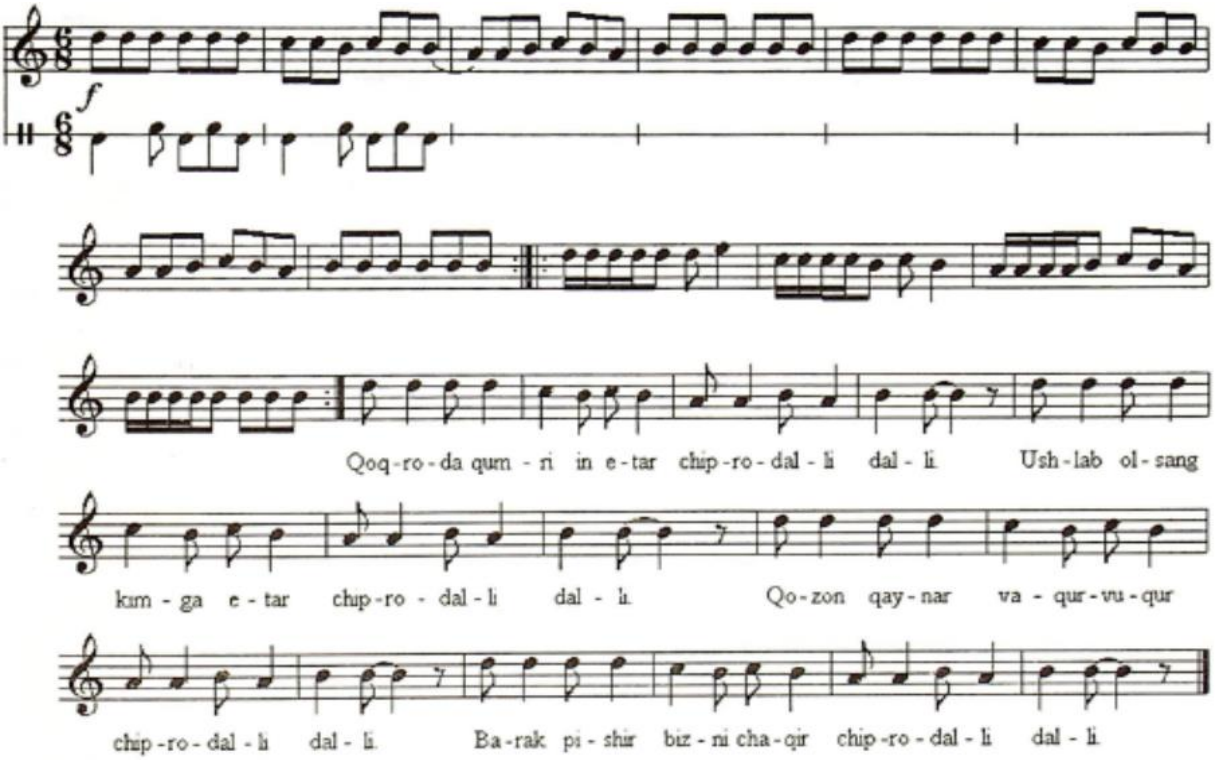
One of the humorous songs of Khorezm, “Chiprodalli,” involves the qumri (musicha) bird building its nest and the performers playfully engage in wordplay. After each verse, the phrase “Chiprodalli-dalli” is repeated. Interestingly, the qumri bird, unlike migratory birds, does not travel to different regions but rather makes its home in a single location, building its nest on trees and walls of houses. The song encourages loyalty to one’s homeland and family, fostering the development of human values in children.

In the 19th century, Russian traveler Y. Kileveyn, who visited Khiva, wrote about the Khorezmian music, noting that he had seen musicians and dancers perform with instruments such as surnay, gijjak, dutar, and doira. He observed that dancers focused more on hand and head movements rather than footwork [2]. To‘ra Qilichev suggests that these movements could refer to dances like “Chog‘olloq” [7].

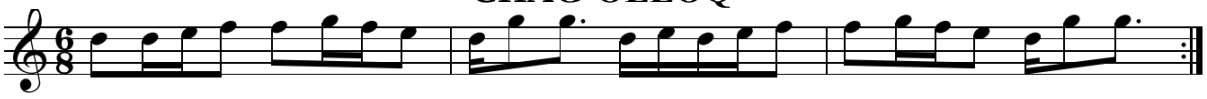
This song, “Chag‘alak,” involves movements imitating the attempts of a fish to escape, and the performers engage in hand and body movements associated with “catching a fish.” Periodically, the performers make bird-like chirping sounds. It is worth noting that a similar game called “Kim oladi” exists in the folklore of the Kashkadarya-Surxondaryo regions, where a game is played with a hat or a bowl in the center, and the participants attempt to touch the bowl with their lips while avoiding the hands of others.

The song was traditionally performed in a playful call-and-response manner by boys and girls, promoting quick-wittedness and intellectual development. An example of the lyrics is as follows:

CHIPRODALLI

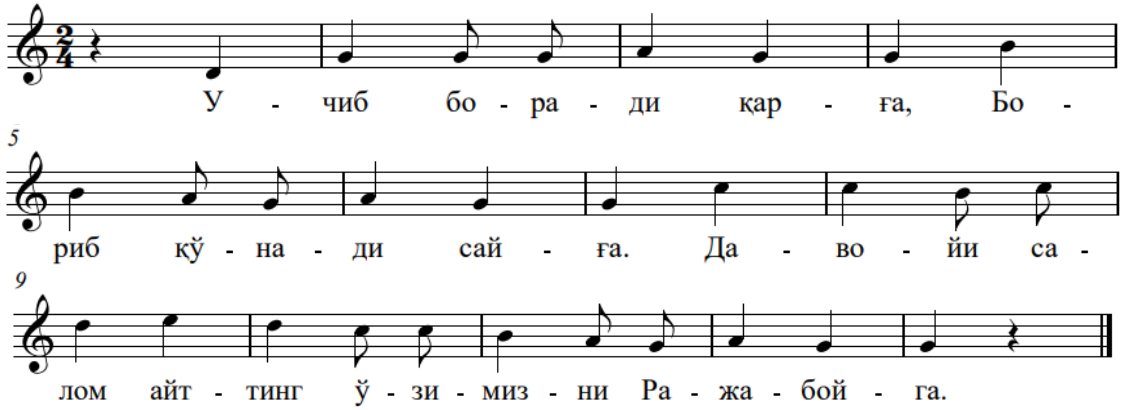


CHAG‘OLLOQ



One game that teaches proper breathing techniques to children is called “Zimlaq.” Historically, boys and girls worked on agricultural tasks and cared for livestock, and during these times, they played various games to pass the time. When the animals were released into the fields, children would sing and perform games linked to their daily life. “Zimlaq,” according to national folk singer Norbek Abdullayev, is performed in a way similar to the traditional “chillik” game.

ZIMLAQ



In this game, the player who is losing must follow the “chillik” to the point where it lands, saying “Zummmmm....” all the way, while ensuring they do not lose breath. The purpose of the game is to avoid cheating and teaches players to control their breath.

Additionally, to strengthen the community physically, various games with themes tied to the Stone Age such as “Norim-norim,” fire-worship-related “Orazibon” [4], the “Lazgi” dance [5], and others imitating animal movements, such as the “Qirg‘ovullar raqsi” (dance of the ravens), were performed during festivals. These types of games and dances served as artistic embellishments in the wedding ceremonies.

Conclusions

In conclusion, the wedding ceremonies of Khorezm, with their wonderful games, songs, and cultural traditions, play an important role in the spiritual and physical development of the people. Games like “Chiprodalli,” “Zimlaq,” “Chog‘olloq,” and others not only served to develop the minds and bodies of the youth but also helped foster a love and respect for their homeland and family values.

Thus, it is essential for us to be responsible for passing on these ancient traditions, songs, and rituals to future generations. After all, is there any event more enjoyable in life than a wedding celebration or festival?

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