



ACTUAL PROBLEMS OF MODERN SCIENCE, EDUCATION AND TRAINING

KHOREZMSCIENCE.UZ





CONTENTS

Section 1. MODERN PROBLEMS OF TOURISM AND ECONOMICS.....	4
YAKUBOVA YULDUZ /// EMPLOYEE WELL-BEING, VALUES AND FINANCIAL EDUCATION COMPARATIVE EXAMPLE TO THE CASE OF MALAYSIA.....	4
ABDUGANIYEV OTABEK ALLAJONOVICH /// COUNTRIES AND INDICATORS OF THE LEVEL OF FOOD SECURITY OF THE COUNTRY.....	9
KADIROV KHUMOYUN TOLIBJON OGLI, ELDORBEB KHOLMATOV /// POSSIBILITIES TO INCREASE THE EFFICIENCY OF SERVICES OF ISTIQLOL BRANCH OF IPOTEKA BANK.....	13
YUNUSOVA SEVARA BAKHTIYOR KIZI /// ASSESSMENT OF SOCIO-ECONOMIC EFFICIENCY AND CURRENT STATUS OF PUBLIC-PRIVATE PARTNERSHIP PROJECTS.....	17
Section 2. ACTUAL PROBLEMS OF MATHEMATICS, PHYSICS AND MECHANICS.....	22
BAIMANKULOV ABDUKARIM TUNGUSHBOEVICH, URAZBOEV GAYRAT URAZALIEVICH, TOKMUKHAMBETOVA ZHANAR SERIKOVNA /// STREAMING RUN FOR THE COEFFICIENT INVERSE PROBLEM OF HEAT PROPAGATION IN A MATERIAL.....	22
BAIMANKULOV ABDUKARIM TUNGUSHBOEVICH, ZHUASPAYEV TALGAT AMANGILDINOVICH, SHULGA IVAN IVANOVICH /// NONLINEAR COEFFICIENT INVERSE PROBLEM OF HEAT CONDUCTION EQUATIONS.....	26
Section 3. MODERN PROBLEMS OF PEDAGOGY AND PSYCHOLOGY.....	31
RUZMETOVA NODIRA XURMAT QIZI /// CULTURAL INFLUENCE ON THE STUDENTS' ACADEMIC LEARNING.....	31
YAHSHIBOYEVA DAMIRA TOLIB QIZI /// MODEL OF THE ORGANIZATION OF INDEPENDENT EDUCATION OF FUTURE TEACHERS OF BIOLOGY AND BIOTECHNOLOGY.....	36
SHARAPOVA GULNOZA VALENTINOVNA /// MODEL OF INCREASING THE EFFICIENCY OF ELECTRONIC EDUCATIONAL RESOURCES OF IMMUNOLOGY.....	42
YUSUPOVA DILOROM SOBIRJONOVNA /// THEORETICAL AND PRACTICAL ASPECTS OF TEACHER PROFESSIONAL COMPETENCE.....	47
CHORSHANBIYEV ZAFAR ESANPULATOVICH /// NATURAL SCIENTIFIC AND SPECIALIED SCIENCES WILL IMPROVE THE PROFESSIONAL TRAINING OF PROFESSIONAL DEVELOPMENT ON THE BASIS OF A STRATIFIED APPROACH IN THE ELECTRONIC ENVIRONMENT.....	51



Section 4. MODERN PROBLEMS OF PHILOLOGY AND LINGUISTICS.....	58
ERDANOVA ZEBINISO ABULKASIMOVNA /// THE SPECIFIC FEATURES OF PROFESSIONAL TERMS IN LINGUISTICS.....	58
Section 5. ACTUAL PROBLEMS IN MODERN ART AND ARCHITECTURE	
KARIMOVA NAILA MINNIGAYANOVNA, KARIMOVA KAMILLA VYACHESLAVOVNA /// AL-FARABI'S CONTRIBUTION TO WORLD MUSIC CULTURE.....	62
Section 6. MODERN PROBLEMS OF TECHNICAL SCIENCES.....	67
BOYJANOV ISLOM RAZHABBOEVICH, DUSCHANOV SANAT KURAMBOEVICH, MASHARIPOVA HUSNIBONU FARHADOVNA, ALLAMOV RAKHMATULLA GULMIRZAEVICH /// CERAMZITE FILLER BASED ON CLAY GURLEN DEPOSIT.....	67
IBRAGIMOVA GULSHAN RUSLANOVNA /// TERMINAL TECHNOLOGIES AS A SOLUTION TO THE PROBLEMS OF ABANDONED TRAINS.....	72
NURJABOVA DILAFRUZ SHUKRULLAEVNA /// USING NUMERICAL METHODS OF NAVIER – STOKES AND DIVERGENT FORM OF FLUID MODEL FOR BLOOD VESSEL WALLS.....	79
EMINOV ASHRAP MAMUROVICH, BOYJANOV ISLOM RAZHABBOEVICH, JABBERGANOV JAGONGIR SABIRBOYEVICH, ALLAMOV RAKHMATULLA GULMIRZAEVICH /// USE OF CLAY OF THE KULATAU DEPOSIT FOR OBTAINING FACADE SLABS.....	87
Section 7. ACTUAL PROBLEMS OF NATURAL SCIENCES.....	94
DJUMABAEVA SALOMAT KOMILJONOVNA /// THE ROLE AND IMPORTANCE OF STATISTICS IN TEACHING ECONOMIC AND SOCIAL GEOGRAPHY.....	94
KOSCHANOVA ROZA EREJEPOVNA /// IMPACT OF THE ANTHROPOGENIC FACTOR ON INVASIVENESS BY HELMINTHS.....	98
Section 8. ACTUAL PROBLEMS OF HISTORY, PHILOSOPHY AND SOCIOLOGY.....	101
ASHRAPOV RAVIL RAMZAEVICH /// THE INFLUENCE OF THE PHENOMENA OF BEING ON THE DEVELOPMENT OF PERSONALITY SPIRITUALITY.....	101

MODERN PROBLEMS OF TOURISM AND ECONOMICS

UDC: 332.135

EMPLOYEE WELL-BEING, VALUES AND FINANCIAL EDUCATION COMPARATIVE EXAMPLE TO THE CASE OF MALAYSIA

Yakubova Yulduz,
Senior Lecturer, Course Leader
Westminster International
University in Tashkent
yyakubova@wiut.uz

Annotasiya: Yoshlarning umumiy farovonligiga ko'p jihatdan ularning moliyaviy farovonligi ta'sir qiladi. Moliyaviy farovonlik, o'z navbatida, ko'p jihatdan mamlakatning iqtisodiy faoliyati va ijtimoiy tuzilmalariga o'z ta'sirini o'tkazadi. O'zbekistonda iqtisodiy faollik dinamikasining o'zgarishi O'zbekiston taraqqiyotining yangi bosqichini boshlab berdi, bu esa ijobiy burilish hisoblanadi. Shu bilan birga, kredit bozori kengayib, aholining bir qator moliyaviy ehtiyojlari uchun bank kreditlari olishi uchun keng imkoniyatlar yaratilmoqda. Xalqaro miqyosda ilg'or tajribalarni o'rganish, mamlakat aholisining moliyaviy savodsizligi kabi pasayishlarining oldini olish aholi umumiy farovonligi uchun muhim ahamiyatga ega. Quydagi maqolada malayziyalik xodimlar uchun bo'lgani kabi o'zbekistonlik yoshlarning moliyaviy savodxonligi, moliyaviy ta'lim darajasi va pulga bo'lgan munosabatini aniqlash, demografik ko'rsatkichlardan kelib chiqib moliyaviy farovonlikdagi farqlarni o'rganish zarurligi ta'kidlanadi.

Kalit so'zlar: Menejment, farovonlik, qadriyatlar, moliyaviy ta'lim

Аннотация: На общее благополучие молодых людей во многом влияет их финансовое благополучие. В свою очередь на финансовое благополучие во многом влияет экономическая активность и социальная структура страны, в которой вы проживаете.

Изменение динамики экономической активности в Узбекистане знаменует новый этап развития Узбекистана, который является положительным поворотом. Наряду с этим расширяется кредитный рынок, и у населения появляется больше возможностей для получения банковских кредитов на различные финансовые нужды. Изучение передового опыта на международном уровне важно для предотвращения некоторых возможных спадов быстрого роста, таких как финансовая неграмотность населения страны. В этой связи в статье ниже обсуждается пример Малайзии. В статье ниже утверждается, что существует необходимость определить уровни финансовой грамотности, ценность финансового образования и отношения к деньгам молодых узбекистанцев, аналогично тому, как это было сделано для малазийских сотрудников, изучить различия в финансовом благополучии на основе демографических данных. характеристики молодых сотрудников; проанализировать взаимосвязь между финансовым благополучием молодых сотрудников и их финансовой грамотностью, отношением к деньгам и благополучием молодых сотрудников



Ключевые слова: менеджмент, благополучие, ценности, финансовое образование

Abstract: General well-being of young adults in many ways is impacted by their financial well-being. The financial well-being in its turn largely impacted by the economic activity and social structures of the country one resides in. The change of dynamics in the economic activity in Uzbekistan has been marking a new stage of development for Uzbekistan which is a positive turn. Along with that, the credit market has been expanding and the population has been given more opportunities to obtain bank credits for a range of their financial needs. Studying best practices internationally is important in order to prevent some of the possible downturns of rapid expansion such as country population's financial illiteracy. In this regard the article below discusses the case of Malaysia. The rising cost of living and difficult economic conditions have made Malaysian individuals and households more conscious of their financial management. The article below argues that there is a need to identify the levels of financial literacy, value of financial education and money attitude of young Uzbek people, similarly as it was done for Malaysian employees, explore the differences in financial well-being based on the demographic characteristics of young employees; analyse the relationships between the financial well-being of young employees and their financial literacy, money attitude and well-being among young employees.

Keywords: Management, Well-being, Values, Financial Education

Introduction. As the case analyzed for Malaysia (Sabri & Zakaria, 2015) reports the current troublesome financial conditions have made individuals more concerned about how they spend, spare, contribute and manage risks in arrange to ensure their standard of living, particularly for the long term, impacting their well-being. It is important to understand contributing factors to financial well-being. It has been widely accepted that though financial well being is not the only determinant but is one of the main ones factoring among the ones impacting human's well-being. Financial administration aptitudes are significant at every arrange of life. Be that as it may, youthful people face especially challenging circumstances in making choices with respect to their personal finances. As youth here is generally considered a individual within the age range of 20 to 40 years old. These individuals and their family units have a moderately low income and few resources such as domestic and savings. In any case, this arrange of life is too a time when youthful grown-ups make decisions and critical ventures for their future, and most of these include debt (Haveman & Wolff, 2005) nowadays confront distinctive budgetary challenges than their guardians did. They too accumulate greater obligation at a younger age, to a great extent due to additional costs. More than ever, they need to pick up aptitudes to require a more active, responsible part in their individual finances. In expansion, budgetary strain is an important pointer of well-being that is strongly related to mental and physical health. Weight to pay off obligation, for instance, can increment push and anxiety levels (Szanton, Thorpe, & Whitfield, 2010) and influence working environment assurance as conflict between cash and work can diminish worker efficiency (Garrett, 1993). As similar trend can be observed in

Uzbekistan it is important to consider similar studies. This is to investigate the levels of financial proficiency, monetary strain, financial capability and budgetary well-being and type of cash state of mind, and investigates the relationship between the money related prosperity and the money related proficiency, money attitude, and the values related to money of the young people. These concerns influence not only the psychological and physical wellbeing of representatives but also signal as the potential client solvency trends for the financial institutions. This serves as important indicator for the financial industry in terms of risk management.

Literature Review. Satisfaction with Income/ Social Class/ Subjective Class Identification (Veenhoven, 2012; Boyce et al 2010, Blanchflower and Oswald 2000) World Database of Happiness (WDH) discusses positive correlation between subjective class identification, satisfaction with household income and happiness. Veenhoven (2012) draws the analogy that humans similarly to group of animals are intrinsically wired to seek social respect and higher positions in society. Boyce et al (2010) reported increasing individual utility from income increase is only evident upon "the perceived ranked position in the society"

Determinants of Budgetary Well-Being Researchers have detailed that a number of factors show up to be consistently associated with values related to money and well-being. Among the foremost common are demographic and financial characteristics such as gender, ethnicity, age, salary, education and conjugal status (Hira & Mugenda, 1999). It has moreover been proposed that while budgetary well-being is significantly related to a few statistic factors, other factors such as monetary literacy (Joo & Grable, 2004; Shim et al., 2009), money demeanor, monetary strain and money related capability. Financial Literacy, financial proficiency empowers individuals to make informed decisions.

Falahati, Sabri, and Paim (2012) have examined the variables contributing to financial well-being. Taylor (2009) found financial strain to be a great predictor of monetary well-being. Stressed about being incapable to pay restorative bills and being discouraged due to having small or no savings were among the budgetary strain that were highlighted in Taylor's study. Financial strain isn't as it were related with individuals' money related well-being; it also affects the efficiency of individuals. Financial Capability A think about on monetary capability and prosperity was conducted in 2009 utilizing data from the British Family Board Survey (BHPS). It was found that financially capable individuals are able to memorize how to oversee cash and individual finances, become basic buyers when purchasing goods and administrations and get it the risk in both positive and negative terms. It can be illustrated that expanding financial capability can have an suggestion on the wealth of people and families.

Research methodology. The research is conducted using the comparative analysis with a focus on Malaysian case and literature review.

Analysis and Results. The comparative case study is based upon the research of Sabri & Zakaria, (2015) used the test comprised 508 young employees working in open and private agencies in four urban ranges in central Peninsular Malaysia. This ponder utilized a multistage examining method in selecting the sample consider. This number speaks to a add up to return rate of 84.7%. The information gotten were

coded and analysed utilizing SPSS to recognize the determinants of budgetary well-being among young Malaysian employees. Variables Measurement Financial Well-Being: To measure financial well-being, this ponder utilized the Malaysian Monetary Individual Well-Being Scale (MPFWBS) created by Garman and Jariah (2006).

Money related Education levels In arrange to distinguish the levels of financial literacy, the respondents were asked thirty-four questions concerning general knowledge, credit card, obligation and loan, savings and speculation, and Islamic banking and items. In common, most of the respondents caught on the concept of credit as three quarters (78.3%) of the respondents knew that credit-card holders cannot spend without constrain. More than half (64.2%) of the respondents gave the redress reply that making cash withdrawals utilizing credit cards isn't a lowcost money related source. In the interim, 69.3% of the respondents replied correctly that credit-card holders will be charged for making cash withdrawals utilizing credit cards. The comes about moreover demonstrate that a large number of respondents (72.0%) gave the right reply when inquired almost loan repayment. In any case, 33.3% of the respondents did not know that they could not spend more than 40% of their monthly income to pay portions whereas 39.8% of them gave the off-base their monthly income.

The analysis goes beyond the above and produces detailed implications (Sabri & Zakaria, 2015) However in summary, the analysis concludes that the financial literacy and education does in fact correlate with better financial well-being. No similar study for the case of Uzbekistan has been found to date.

Conclusion and Implications. The exertion from the Malaysian case investigated the determinants of perceived money related well-being among young representatives. Regression analysis was utilized to investigate the factors contributing to monetary well-being. The comes about of this consider propose several important similarities for the case of Uzbekistan as well. To begin with, being financially able is an marker of financial well-being as monetary capability will offer assistance youthful representatives to keep track of their cash so that they can make ends meet and be made a difference in making sound choices within the occasion of any circumstances or startling circumstances. Notably, a positive attitude towards money makes a difference individuals to watch out in investing their money through budgeting and arranging for their future monetary needs. Third, it is apparent that positive early customer experiences improve youthful employees' financial literacy, which in turn includes a significant effect on their monetary administration.

The findings indicate that respondents who had moderate levels of financial literacy, financial capability and financial well-being scored high in effort and retention money attitudes and had a low level of financial strain.

In conclusion this is an important comparative analysis for the case of Uzbekistan as our country also going through a economic transformation. The research on the case of Malaysia introduces many lessons which can be adopted from Sabri and Zakaria (2015) in terms of both research on financial well-being and financial literacy investigation. Liberalisation of loan instruments and housing market credits has brought a whole range of opportunities for the consumers yet brought a need for understanding financial

literacy and financial responsibilities. As such, recommendations can be made for employer-sponsored workplace financial counseling and instruction can become a solid venture for long haul. Good financial wellness programs such as group workshops on suitable financial topics or in-person programs between employees and monetary advisors may help representatives. The given study's implications also draw to recommendations for government and ministry of education to introduce financial literacy classes from early on among young people of Uzbekistan.

References:

- [1]. Aldana, S. G., & Liljenquist, W. (1998). Validity and reliability of a financial strain survey. *Financial Counseling and Planning*, 9(2), 11–18.
- [2]. Boyce J., C et al, (2010) "Money and Happiness: Rank of Income, Not Income, Affects Life Satisfaction" *Association for Psychological Science* 21 (4) 471 - 475 [online] Available from: <http://www.teachit.so/index_htm_files/Happiness_boyce_brown_moore.pdf>
- [3]. Blanchflower D & Oswald AJ (2011) "International Happiness: A New View on the Measure of Performance" *Academy of Management Perspectives*, 25 (1), pp. 6-22.[online] Available from: <<https://www.stir.ac.uk/research/hub/publication/7629>>
- [4]. Bailey, W., Woodiel, D., Turner, M., & Young, J. (1998). The relationship of financial stress to overall stress and satisfaction. *Personal Finances and Worker Productivity*, (2)2, 198– 207. Retrieved February 14, 2004.
- [5]. Bank Negara Malaysia (2010). Annual Report. Retrieved from http://www.bnm.gov.my/files/publication/ar/en/2010/ar2010_book. Bank Negara Malaysia (2010).
- [6]. Appointment of research company to conduct survey on financial literacy. Bank Negara Malaysia: Kuala Lumpur. Retrieved from http://www.bnm.gov.my/documents/tender/2010/briefing_oecd_survey.doc Beal, D. J., & Delpachitra, S. B. (2003).
- [7]. Brines, J., & Joyner, K. (1999). The ties that bind: Principles of cohesion in cohabitation and marriage. *American Sociological Review*, 333– 355.
- [8]. Delafrooz, N., Hj Paim, L., Saberi, M. F., & Masud, J. (2010). Effects of financial wellness on the relationship between financial problem and workplace productivity. *World Appl. Sci. J*, 10(8), 871–878.
- [9]. Diener, E., & Oishi, S. (2004). Money and happiness: Income and subjective well-being across nations. In E. Diener, & E. M. Suh (Eds.), *Culture and subjective well-being* (pp. 185-218).
- [10]. MIT Press, Cambridge. Drentea, P., & Lavrakas, P. J. (2000). Over the limit: The association among health, race and debt. *Social Science & Medicine*, 50(4), 517– 529.
- [11]. Eitel, S. J., & Martin, J. (2009). First-generation female college students' financial literacy: Real and perceived barriers to degree completion. *College Student Journal*, 43(2), 616-630.
- [12]. Sabri, M. F., & Zakaria, N. F. (2015). Financial Well-Being among Young Employees in Malaysia. In Z. Copur (Ed.), *Handbook of Research on Behavioral Finance and Investment Strategies: Decision Making in the Financial Industry* (pp. 221-235). IGI Global. <http://doi:10.4018/978-1-4666-7484-4.ch013>



- [13]. Falahati, L., Sabri, M. F., & Paim, L. H. (2012). Assessment a model of financial satisfaction predictors: Examining the mediate effect of financial behaviour and financial strain. *World Applied Sciences Journal*, 20(2), 190–197.
- [14]. Federation of Malaysian Consumers Associations (2011). Retrieved from <http://www.fomca.org.my/kewangan/images/stories/pub/FLM2011> (ENG) Garrett, J. T., & Garrett, M. W. (1993). The path of good medicine: Understanding and counseling Native American Indians. *Journal of Multicultural Counseling and development*, 22(3), 134–144.
- [15]. Financial literacy among Australian University students. *Economic Papers: A journal of applied economics and policy*, 22(1), 65–78.
- [16]. Gottschalk, P. (2008). Categories of financial crime. *Journal of Financial Crime*, 17(4), 441–458. Hamermesh, D. S. (2004). Subjective outcomes in economics. *Southern Economic Journal*, 71, 2–11.
- [17]. Haveman, R., & Wolff, E. N. (2005). Who are the asset poor? Levels, trends, and composition, 1983-1998. *Inclusion in the American dream: Assets, poverty, and public policy*, 61–86. Hayslip Jr, B., Beyerlein, M., & Nichols, J. A. (1997)
- [18]. Assessing anxiety about retirement: The case of academicians. *International Journal of Aging and Human Development*, 44, 15–36. Hira, T. K., & Mugenda, O. (1999b).
- [19]. Veenhoven R., (2012) "Cross-national differences in happiness: Cultural measurement bias or effect of culture?" *International Journal of Wellbeing*, 2(4), 333-353 [online] Available from: <<https://internationaljournalofwellbeing.org/index.php/ijow/article/view/98>

UDK: 332.54 (519.862)

COUNTRIES AND INDICATORS OF THE LEVEL OF FOOD SECURITY OF THE COUNTRY

**Abduganiyev Otabek Allajonovich,
Doctor of Philosophy in Economics (PhD)
Termez State University,
Dean of the of Information Technologies Faculty
genius7722@mail.ru**

Annotation: The article analyzes the criteria and indicators of the level of food safety in the country. Also, proposals and recommendations were developed to improve these indicators.

Key words: consumer basket, modeling, agricultural products, modeling methodology.

Аннотация: Мақолада мамлакатда озиқ-овқат хавфсизлиги даражасининг мезонлари ва кўрсаткичлари таҳлил қилинган. Шунингдек, мазкур кўрсаткичларни яхшилаш бўйича таклиф ва тавсиялар ишлаб чиқилди.

Калит сўзлар: истеъмол савати, моделлаштириш, қишлоқ хўжалиги маҳсулотлари, моделлаштириш методикаси.



Аннотация: В статье анализированы критерии и показатели уровня безопасности пищевых продуктов страны. Также были разработаны предложения и рекомендации по улучшению этих показателей.

Ключевые слова: потребительская корзина, моделирование, сельскохозяйственная продукция, методология моделирования.

Introduction. Addressing the problem of food security is an important priority of public policy and the object of scientific research of any country. In the provision of food to the whole country and some of its regions, the agro-industrial complex and the agricultural sector are faced with a number of tasks that need to be addressed in a comprehensive manner.

In this regard, the President of the country Sh.M.Mirziyoev said: “Solving the problem of food security requires special attention to strict control over the production of genetically modified products. The growing number of imported fruits and vegetables in the markets of our country in recent years should definitely call us to vigilance. In order to prevent such a situation, first of all, we need to restore the disappearing ancient varieties, conduct rational and effective selection work, widely introduce scientific achievements and innovative developments in the field [1]” he said.

One of the important problems in the theory of food safety is the question of the methods and mechanisms of its provision. Of course, we are talking about the state's agricultural production and support of the food market, both internally and externally. Both directions are a complex system, operating in a free market environment is more difficult and requires effective government intervention. Theories and practices prove that the level of food security directly depends on the role and level of state regulation of the industry.

Analysis of the relevant literature. In the sectors of the economy, a lot of research has been conducted on key areas of food security in the region. Scientific and practical issues of food security in the region have been extensively studied in the scientific work of domestic and foreign economists, including B.E. The works of Mamarakhimov, TS Rasulov, TV Uskova, R.Ya. Selimenkov, A.N. Anishchenko, A.N. Chekavinsky, and others can be mentioned.

One of the scientists of our country BE Mamarahimov studied the main directions of food security, in which the state policy on food security is mainly based on the development of its own agricultural production and domestic markets, in part, the import of food products from abroad. shown to be done at the expense of imports [6].

TS Rasulov also studied the issues of food security, in his opinion, to ensure food security in the region due to the requirements of soil and climatic conditions, topography, cost-effective organization of production as a result of rational and correct placement of agricultural lands expediency [7].

Research methodology. The main purpose of the study is to develop scientific and practical proposals and recommendations to meet the needs of the population of our country with quality food products. Comparison, grouping and economic-statistical methods were widely used in the research process.

Analysis and discussion of results. The food problem is probably the oldest of all the problems facing humanity. In the context of globalization, providing the

population with sustainable food remains the most important component of world development. Adequate food supply and unbalanced nutrition have a negative impact on people’s average life expectancy, their health, physical performance, disease resistance, adaptation to modern high-tech manufacturing processes, and lifestyle.

We can see the following as the main causes of the food problem in the world today: the demographic situation; depletion of natural resources for food production; change the composition of consumption; food loss and food waste; biofuels; rising world food prices; crises, disputes and conflicts.

In addressing these issues, it is necessary to define a strategy for coordinating stakeholders at the global, regional and national levels, and to ensure a two-pronged approach to combating hunger, focusing on a number of principles: outbound investment; The second principle is to envisage strategic coordination of these activities at the global, regional and national levels; The third principle is to achieve a comprehensive approach to food security; The fourth principle is to increase the role and effectiveness of the many social institutions that deal with this problem; The fifth principle is the commitment of the strategic goal partners to create the conditions for long-term investments in agriculture and food security.

In this context, the country's food security is ensured not only by a set of economic and social conditions related to the development of agriculture and food production, but also by the general state of the national and world economy. There are also certain criteria in food safety, and their interrelationships can be seen from the mechanism shown in Figure 1 below.

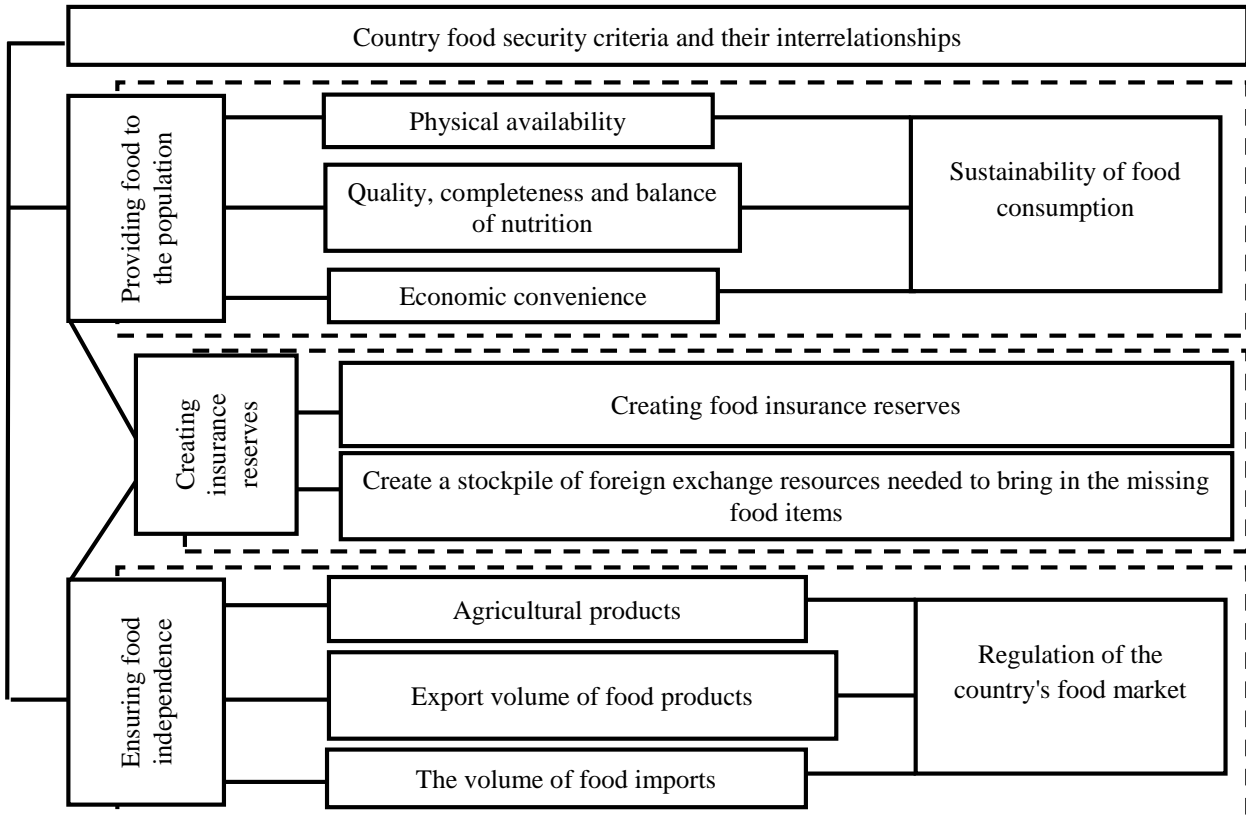


Figure 1. Country food security criteria and their linkage mechanism

The overall state of food security in the country can be assessed using average per capita indicators. However, this approach does not provide all the information needed to study, analyze, and make competent management decisions in order to achieve food security for the entire population of the country. The largest discrepancies in food consumption are observed between the first and tenth decile groups of households distributed by income level, i.e., between the poorest and richest segments of the population [9-10].

The stratification of society by income level threatens the national security of the country, and therefore its assessment using income groups on the level of food consumption is also one of the important aspects of their work to establish a system of indicators describing food security. In this sense, we pay attention to the uneven distribution of income of the population of the Republic of Uzbekistan by decil group.

The uneven distribution of income of the population of the Republic of Uzbekistan by decil groups in 2010 amounted to 8.5, and by 2020, this figure decreased by 1.6 to 6.9. If we pay attention to the data of the State Statistics Committee of the Republic of Uzbekistan, in 2020 the total income of the population will reach 401.5 trillion soums. soums and nominal growth was 15.9%, while real (including the consumer price index) growth was 2.6%.

Conclusions and suggestions. In short, in the current pandemic situation, in order to achieve significant results in reducing the poverty and hunger that may occur in the country, to overcome the worrying trends, it is necessary first of all to develop agriculture. To do this, opportunities must be created to help many farmers around the world expand their agricultural production. Turning agricultural growth into a poverty reduction factor means removing structural constraints that arise in agriculture, which is especially important for millions of producers in the agrarian economy.

Referencies

- [1]. O.A.Abduganiev. Modeling food security in the region. // International Scientific Journal Theoretical & Applied Science. [http:// T-Science.org](http://T-Science.org) Philadelphia, USA. 2018 01 (68). 166-171 P.
- [2]. O.A.Абдуғаниев. “Истеъмол саватиға кирувчи қишлоқ хўжалиғи маҳсулотларини етиштириш жараёнларини моделлаштириш.” // Monograph. – “MUMTOZ SO‘Z”. – Tashkent 2020. Pages 86-91.
- [3]. <http://stat.uz> – Official site of the State Statistics Committee of the Republic of Uzbekistan.
- [4]. S.S.Gulomov, D.S.Almatova. "The Role of Innovation in Ensuring Regional Food Security." // Proceedings of the Republican scientific-practical conference on the problems of modernization and development of innovative management in the agro-industrial complex of the Republic of Uzbekistan (Part 1). Т.: TSAU.- 2014, April 15. Pages 24-26.
- [5]. B.E.Mamaraximov. "Ensuring food security and industrial development in Uzbekistan." // Scientific electronic journal "Economy and Innovative Technologies". № 5, September-October, 2016. Pages 4-6.



- [6]. A.A. Isadjanov, R.M. Kenjabaeva, "Food Security: Current Trends and National Priorities". Scientific article. Scientific electronic journal "Economy and Innovative Technologies". № 1, January-February, 2015. Pages 5-6.
- [7]. BE Mamarahimov, "Ensuring food security and industrial development in Uzbekistan." Scientific article. Scientific electronic journal "Economy and Innovative Technologies". № 5, September-October, 2016. Pages 4-6.
- [8]. TS Rasulov, "Theoretical foundations of food security and priorities for its provision." Scientific article. O.A. Abduganiev, T.D. Makhmudov. "Model modeling and development indicators of agricultural enterprises." // Journal of Management Value & Ethics. №4, India 2020.
- [9]. O.A. Abduganiev, O. Jurayev. "Livestock statistics indicator system specific aspects of construction." // International Engineering Journal For Research & Development. №5, USA 2020. pages 14-21.
- [10]. Abduganiev O. A. Methods and criteria for assessing the food availability of the region // Economics and Innovative Technologies. – 2018. – T. 2018. – №. 3. – C. 24.

UDK: 316.3: 338.009

POSSIBILITIES TO INCREASE THE EFFICIENCY OF SERVICES OF ISTIQLOL BRANCH OF IPOTEKA BANK

Kadirov Khumoyun Tolibjon ogli
Namangan institute of engineering technology
marketing department, PhD

Eldorbek Kholmatov
Namangan institute of engineering technology
master's student

Kholmatoveldorbek@gmail.com

Annotatsiya. Ushbu maqolada Ipoteka bank "Istiqlol" filiali xizmatlar samaradorligini oshirish imkoniyatlari haqida so'z yuritilgan. Hukumatning doimiy ravishda qo'llab-quvvatlashi tufayli Ipoteka bankining salohiyati yanada oshib bormoqda. Xozirgi kunda Ipoteka bank mamlakat iqtisodiyotining pul-kredit sohasidagi islohotlar jarayonida hukumatning moliya agenti sifatida faoliyat olib borib, zimmasiga yuklangan mas'uliyatli vazifalarni doimiy ravishda ado etib kelmoqda. Bank o'z salohiyatini barqarorlashtirish, aholining ishonchini qozonish, mamlakat bank xizmatlari bozoridagi o'z mavqei va rolini mustahkamlash uchun barcha sa'y-harakatlarini safarbar etmoqda.

Kalit so'zlari: Ipoteka bank, iqtisodiyot, loyiha, strategiya, mijoz, investitsiya, biznes, moliya agenti, pul-kredit, lizing.

Аннотация. В данной статье рассматриваются возможности повышения эффективности услуг отделения "Истиклол" Ипотека Банка. Благодаря постоянной поддержке государства авторитет Ипотечного банка растет. В настоящее время Ипотека Банк выступает в качестве финансового агента правительства в процессе денежно-кредитной реформы экономики страны и регулярно выполняет взятые на себя обязательства. Банк прилагает все усилия,

чтобы восстановить свои возможности, повысить доверие населения, укрепить свои позиции и роль на рынке банковских услуг в стране.

Ключевые слова: Ипотечный банкинг, экономика, проект, стратегия, клиент, инвестиции, бизнес, финансовый агент, денежное кредитование, лизинг.

Annotation. This article discusses the opportunities to increase the efficiency of services of the "Istiqlol" branch of Ipoteka Bank. Thanks to the constant support of the government, the potential of the Ipoteka Bank is further increasing. At present, Ipoteka Bank acts as a financial agent of the government in the process of monetary reform of the country's economy and constantly fulfills the responsibilities assigned to it. The Bank is making every effort to stabilize its capacity, gain the trust of the population, strengthen its position and role in the country's banking services market.

Key words: Ipoteka banking, economics, project, strategy, client, investment, business, financial agent, money lending, leasing.

Introduction. As a result of reforms in the banking system of the country over the years of independence, a system of universal commercial banks has been formed, which will gain the trust of the population and protect the interests of a wide range of businessmen and entrepreneurs. As a result, commercial banks operating in our country today have become reliable partners of industrial enterprises, small businesses and private entrepreneurship, as well as farms.[2]

Based on the objectives of the Action Strategy for the five priority areas of development of the Republic of Uzbekistan for 2017-2021, approved by the Decree of the President of the Republic of Uzbekistan No. PD-5953 of March 2, 2020, as well as to stimulate private sector development. In order to radically transform the banking sector, the Presidential Decree No. PD-5992 of May 12, 2020 "On reforming the banking system of the Republic of Uzbekistan for 2020-2025" was adopted. [9] According to this decree, a strategy for reforming the banking system of the Republic of Uzbekistan for 2020-2025 has been developed.[8]

Paragraph 3 of the Strategy identifies important factors in reducing the share of the state in the banking sector, including: improving the quality and expanding the scope of banking services; optimization of business processes and introduction of international standards of management quality; simplification of credit allocation processes by improving the risk management system; clients are offered a wide range of services (financial consulting, investment banking, factoring, project financing, leasing, etc.).

Taking into account the above, the Strategy envisages the transformation and privatization of Ipoteka Bank and other banks with the support of the International Finance Corporation.[1]

Analysis and results. Ipoteka Bank is one of the largest banks operating in all regions of Uzbekistan. Ipoteka-Bank Joint-Stock Commercial Mortgage Bank was established by the Decree of the President of the Republic of Uzbekistan dated February 16, 2005 No. PP-10 "On measures for the construction of housing and further development of the housing market."

With active participation in large-scale economic and social reforms in the Republic of Uzbekistan, Ipoteka Bank has invested 3.9 trillion soums in housing construction. 3.3 trillion soums for services soums, 2.3 trillion soums to industry.

soums, 0.7 trillion soums to agriculture. soums and 3.0 trillion soums for retail lending. soums, totaling 13.2 trillion soums. [5]

In 2019, the bank's financial performance also grew positively. In particular, the bank's assets grew by 19.4%, the loan portfolio by 13.3% and private capital by 2.3 times. At the end of the fiscal year, net profit increased by 72% compared to 2018 and amounted to 430.0 billion. sum. The bank's asset efficiency (ROA) reached 1.8% and capital efficiency (ROE) reached 19.8%.

The signing of the Resolution of the Cabinet of Ministers No. 523 of June 25, 2019 "On measures to transform the joint-stock commercial mortgage bank" Ipoteka-Bank "and its subsequent privatization with the participation of the International Finance Corporation" marked a new stage in the bank's transformation and privatization.[3]

At the same time, the main focus in the creation of banking products was on expanding the number of types of remote services for customers. In particular, 24/7 "Online Credit" and "Online Deposit" products were introduced for customers, 12 new modular loan products were offered for business entities and 6 new modular loan products for the population. As a result, the range of remote banking services has been increased from 2 to 24 and the share of online loans in total lending has increased to 23%.

Table 1

Risk factors in the business of mortgage bank ATIB

The main indicator	MB regulations	01.01.19 y fact	Risk appetite	01.01.20 y fact
Capital adequacy	min 13,0%	13,00%	min 14,0%	25,60%
Tier 1 capital adequacy	min 13,0%	10,00%	min 10,0%	19,20%
Liquidity coverage ratio	min 13,0%	102,40%	min 110,0%	179,70%
Net sustainable financing ratio	min 13,0%	107,70%	110,00%	122,40%
Loan portfolio concentration (top 20)		44,10%	max 45,0%	40,70%
NPL contribution		1,27%	max 3,0%	1,74%

From the data in Table 1, it can be seen that at the beginning of 2019, there were several risk factors facing the bank. In particular, capital adequacy, liquidity ratios were very close to the established normative norms and the risk was within the limits of appetite, and there was a high concentration in the loan portfolio. As a result of a number of activities carried out during the reporting period, all risk mitigation measures were taken and risk reduction was achieved by the end of the year.[3]

As of January 1, 2020, the total capital of the bank amounted to 3730.3 billion soums. soums, which is 2119.5 bln. soums more than last year soums (or 132 percent).

As part of the authorized capital of the bank, ordinary shares amounted to 2809.4 billion soums. soums and preference shares - 8.0 bln. soums.[10]

As a result of the work carried out by Ipoteka Bank to provide modern banking services to customers, the bank's assets increased by 19.4% compared to the beginning of the year and amounted to 23.6 trillion soums. The loan portfolio increased by 13.3% to 19.5 trillion soums. The total capital increased by 131.6% to 3.7 trillion soums. According to the financial results, the bank earned 58.7% more than in 2018 and in 2019 - 2.8 trillion soums.[4]

In particular, in 2019, Ipoteka Bank will provide 4.0 trillion soums to small businesses. (1.4 times more than last year), as a result of which a total of 11,689 new jobs were created by small businesses.

Conclusions and suggestions. It is expedient to continue work on the program of cooperation with the International Finance Corporation to further improve the corporate governance of the bank, to provide the bank with quality and modern banking services to the population and businesses.[6]

We also believe that the important and closely interrelated strategic goals and objectives to be achieved by the bank are:

- In particular, further strengthening the Bank's Supervisory Board, increasing the number of "independent directors" with international experience to 5 and the gradual implementation of the newly developed concept of transferring all branches of the bank to a modern international model;
- Diversification of banking activities based on the banking strategy, focusing on private business and retail clients;
- Improving the bank's information technology and transition to a new IT platform, the creation of a modern call center and the improvement of the mobile application in order to further improve relations with customers and provide them with high quality services;
- Constant innovation and reform, including the establishment of mortgage centers and increasing the share of commercial mortgage lending in retail lending, is an important task to maintain the leading position in the mortgage market, taking advantage of the vast experience of the bank.

These results testify to the improvement of the business environment in the country and the growing volume of loans issued by banks to customers. In this regard, the stable and reliable joint-stock commercial bank "Ipoteka" contributes to the deepening of structural changes in the economy, modernization, technical and technological renewal of its leading sectors, creating a favorable business environment and employment.

References

- [1]. Chub B.A. Diversifirovannye korporatsii v sovremennoy ekonomike Rossii / pod red. d.e.n. V.V. Bandurina. — M.: Bukvisa, 2000. — 184 s.
- [2]. Glaz'ev S.Yu. Teoriya dolgosrochnogo tekhniko-ekonomicheskogo razvitiya [Tekst] / S. Yu. Glaz'ev. — M. : VlaDar, 1993.
- [3]. Ansoff I., McDonnell E. Implanting Strategic Management. Prentice Hall, 1990. — 568 r. www.stat.uz



- [4]. Kotler F. Marketing XXI veka. Marketing ot A do Ya. Novie marketingovie texnologii. Desyat' smertnix grexov marketinga: per. s angl. / pod red. T.R. Teor.— SPb.: Neva, 2005. — 432 s. 22.
- [5]. Raximov, D. (2019). Svobodno-ekonomicheskie zoni-rasshirenie eksportnogo potentsiala Uzbekistana. Arxivarius, (12 (45))
- [6]. Gulyamov, S.S. (2019). Blockchain technologies in the digital economy. -T.: Economy-Finance. 396 p.
- [7]. Ayupov, R.X., Baltabaeva, G.R. (2018). Digital Currency Market: Innovation and Development Prospects. –T.: Science and technology. 172 p.
- [8]. United Nations Conference on Trade and Development (UNCTAD). Digital economy report 2019.
- [9]. www.lex.uz
- [10]. www.ipotekabank.uz

UDK: 338

ASSESSMENT OF SOCIO-ECONOMIC EFFICIENCY AND CURRENT STATUS OF PUBLIC-PRIVATE PARTNERSHIP PROJECTS

Yunusova Sevara Bakhtiyor kizi
Tashkent Financial Institute,
Department of Appraisal and Investment
senior teacher

Ysb.yunmax@mail.ru

Annotatsiya. Ushbu maqolada davlat-xususiy sheriklik asosidagi loyihalarning ijtimoiy-iqtisodiy samaradorligini va zamonaviy holatini baholash haqida soʻz yuritilgan. Shuningdek, davlat-xususiy sheriklik loyihalarining samaradorligi va afzalliklarini baholash uslubi, davlat-xususiy sheriklikni rivojlantirish masalalarida investorlar, xalqaro moliya va donor tashkilotlari, ilmiy va ekspert hamjamiyatlari, bozorning boshqa ishtirokchilari bilan hamkorlikni tashkil etish haqida soʻz yuritilgan.

Kalit soʻzlar: davlat-xususiy sheriklik, loyiha, samaradorlik, tadbirkorlik, iqtisodiyot, biznes, moliyalashtirish, investor, investitsiya, mablagʻ.

Annotation. This article discusses the assessment of the socio-economic effectiveness and current status of public-private partnership projects. There was also a method of assessing the effectiveness and benefits of public-private partnership projects, cooperation with investors, international financial and donor organizations, scientific and expert communities, and other market participants in the development of public-private partnerships.

Key words: public-private partnership, project, efficiency, entrepreneurship, economy, business, financing, investor, investment, finance.

Аннотация. В данной статье рассматривается оценка социально-экономической эффективности и текущего состояния проектов государственно-частного партнерства. Также была предложена методика оценки эффективности и выгоды проектов государственно-частного партнерства, сотрудничества с инвесторами, международными финансовыми и донорскими организациями,



научными и экспертными сообществами, другими участниками рынка развития государственно-частного партнерства.

Ключевые слова: государственно-частное партнерство, проект, эффективность, предпринимательство, экономика, бизнес, финансирование, инвестор, инвестиции, финансы.

Introduction. It is known that the public-private partnership (PPP) is an effective mechanism that is successfully used in developed countries and is necessary for the further development of the business environment, small business and private entrepreneurship in the Republic of Uzbekistan.

The interaction of government and business is an important basis for the development of a modern market economy, because the successful implementation of PPP potential depends on the readiness of the state to interact with business in a complex post-crisis environment.

International and domestic experience gained over the past 15-20 years shows that the PPP mobilizes unused resources for economic development and expands the resource base, increases the efficiency of state and public property management, attracts additional resources to the public sector, reduces the severity of problems such as budget deficits. management capacity and is one of the main mechanisms that allow to combine private principles, investment, management, innovation in management.

It is well known that projects of social significance around the world are capitalized and often unprofitable, and the financial obligations of the state are increasing as budgets fail to provide them with independent support. In this case, it is advisable to raise funds for corporate and private business through PPP. In this case, the funds invested by the investor are returned to the state budget at the expense of tax revenues, as well as in certain parts by charging for consumer services. In this situation, there is a need to develop effective systems for financing socially important projects, taking into account the experience of developed countries in the relationship between public capital and private capital, adapting their own and appropriate features to local economic specifics.

Also, in the last paragraph of paragraph 3.4 of the Action Strategy for socio-economic development of Uzbekistan for 2017-2021, one of the priorities is the expansion of public-private partnership.

It is in the process of drafting a law on PPP, which creates a direct legal framework, to create favorable conditions for the development of various forms of cooperation, to promote various forms of PPP in the regions, to develop PPP in accordance with programs for strategic development of countries and regions. expansion, ensuring the development of the PPP project market, stimulating the proposals of local and foreign private investors, supporting the "growth point" of the country's economy, attracting unused resources of other entities to implement projects. That is why today the study of organizational, legal and theoretical aspects of further development of corporate structures on the basis of PPP, the development of a scientific basis for the implementation of various mechanisms for further development of corporate structures on the basis of PPP to solve the problems of transition to innovative development is one of the current problems that can be addressed.

Literature review. In the scientific literature there are many studies of foreign and domestic scientists devoted to the study of the organization of PPP. In particular, the scientific and theoretical features of the PPP were studied by CIS scientists K.A.Antonova, A.A.Alpatov, O.S.Belokrylova, I.E.Bolexov, B.G.Varnavskiy, E.A.Dynin, L.I. Efimova, V.A. Mikheev the works of scientists such as have been reviewed in World Bank reports [2,3,4]. Economist K.A.Antonova, in her book *Public-Private Partnership as a Factor in Russia's Socio-Economic Development*, describes the PPP as an institutional organizational alliance between government and business between government agencies and the private sector [2].

I.E.Bolexov said, "The field of joint action. Public-Private Partnership as a Sign of an Innovative Economy reaches [4]. Also, V.G.Varnavskiy, A.V.Klimenko and V.A.Korolev co-authored "Public-Private Partnership. Theory and Practice represents a legally binding form of interaction" [3].

E.A.Dynin argues that "PPP is the process of combining the material and intangible resources of a society (state or local government) on a long-term and mutually beneficial basis to create social goods or provide social services" [4]. Public-private partnerships are interpreted differently by various international financial institutions, foreign and national economists, experts.

In particular, the Organization for Economic Co-operation and Development (OECD) is an agreement between the government and one or more private partners (which may be a mutual executive or financing organization) under which partners provide services. The effectiveness of this relationship depends on how the risks are distributed to the private partner [5].

M.B.Gerard argues that PPP combines the attraction of private capital and sometimes the attraction of public capital to improve the quality of social services or the management of public assets [6]. The International Monetary Fund (IMF) defines PPP as "an agreement between the private sector to provide infrastructure assets and services that are traditionally provided by the state" [7].

Research Methodology. This paper uses methods of scientific observation, abstract-logical reasoning, analysis and synthesis, comparative analysis, induction and deduction.

Analysis and results. One of the most modern and effective ways to attract foreign direct investment to the country today is public-private partnership (PPP). This route is long-term, efficient and mutually beneficial. Such a mechanism is mainly used to implement infrastructure projects in the social, ie pre-school, general and higher education and health, housing and communal services, road construction and electricity supply sectors. widely used in extraction.

During 2019, important steps have been taken in the Republic in the field of public-private partnership. First of all, the Law of the Republic of Uzbekistan "On Public-Private Partnership" was adopted. The document designates the Public-Private Partnership Development Agency under the Ministry of Finance (the Public-Private Partnership Development Agency under the Ministry of Finance was established by a presidential decree on October 20, 2018) as the sole authorized body to implement public policy in the field of PPP. The law also defines the rights and obligations of the

parties to the public-private partnership, the terms of the public-private partnership agreement.

In order to reduce the burden on the budget and involve the private sector in major projects, a Public-Private Partnership Agency was established in 2018, a separate law and more than 10 resolutions were adopted in this regard. However, to date, only 9 major public-private partnership projects have been signed in the energy, medicine and utilities sectors. This figure is very low, said the head of state.

It was instructed to introduce a public-private partnership in the sale of electricity and natural gas to consumers. Only in this way can competition between producers and sellers be reduced and costs and losses reduced. President Shavkat Mirziyoyev has ordered the acceleration of 14 health projects worth \$ 270 million.

At present, investment funds, the Fund for Reconstruction and Development of Uzbekistan, state-owned joint-stock companies, commercial banks and other state corporations and companies can be included in the list of modern and promising PPP in Uzbekistan. One of the most important tools of the PPP in the country is the State Committee for Investment of the Republic of Uzbekistan [4], which is strategically important for the economy and long-term implementation. Creates all-round opportunities for private business in the implementation of projects with different timelines. In recent years, PPP has become a primary economic concept, without a new concept in developing countries. This is because this concept is firmly entrenched in the organizational structure and market infrastructure of government agencies.[8]

In particular, the number of corporate governance structures (large corporations, companies and joint-stock companies) developing on the basis of PPP in Uzbekistan is growing, and the legislation in this area is gradually being improved. Today, the adoption of the Law of the Republic of Uzbekistan "On Public-Private Partnership" provides a legal basis for the active involvement of not only large businesses but also small businesses in the national economy through the effective use of PPP in the activities of state and non-state corporate structures. In addition, the organization of corporate governance on the basis of PPP prepares the ground for free competition with large corporate enterprises of economically developed countries and increases revenues and reduces pressure on the state budget, increases the social activity of corporate structures, equipment to the extent necessary for rapid development of production and services. - creates the necessary conditions for attracting technology, labor and investment.[9]

Conclusions and suggestions. In conclusion, in our opinion, "Public-private partnership is based on the distribution of various economic, political, social, cultural and other risks, risks, risks that may arise under the existing laws, based on the long-term strategic objectives and goals of the state. is a literally mutually beneficial relationship with the private sector, which is very socio-economic for the population, if necessary, the construction of politically important facilities or the provision of social services at the same time. In general, PPP is considered as a mutually beneficial partnership between the public and private business in the implementation of socially significant projects, but such cooperation is carried out in various forms.

➤ Development of sectoral programs for the development of public-private partnerships in the priority areas of the economy and social sphere;



- Development of methods for evaluating the effectiveness and benefits of public-private partnership projects, methodological support for the preparation and implementation of these projects;
- Ensuring interagency coordination in the implementation of public-private partnership projects, as well as open dissemination of information on projects and maintenance of their register;
- Implementation of public-private partnership development programs, including assistance to ministries, agencies, business associations and local authorities in the development of specific project concepts;
- Cooperation with investors, international financial and donor organizations, scientific and expert communities, as well as other market participants on the development of public-private partnerships;
- Comprehensive assistance in protecting the rights and legitimate interests of participants in public-private partnership projects, consideration of their proposals on project financing mechanisms, including the identification and distribution of potential risks;
- Monitoring the practice of project preparation and implementation, taking into account the use of public-private partnership projects, including the budget system involved in the projects, as well as international experience in relevant fields.

References

- [1]. Kabashkin V.A. Public-private partnership in the regions Russian Federation: study guide / Kabashkin V.A. - M.: Delo, 2010. P.120.
- [2]. Varnavsky V.G., Klimenko A.V., Korolev V.A. Public-private partnership: theory and practice: teaching aid / Varnavsky V.G., Klimenko A.V., Korolev V.A. - M.: 2010.
- [3]. Dynin E.A. Business Risks in a Public-Private Partnership / Dynin E.A. // Society and Economy. - 2007. - No. 5-6. P.111.
- [4]. Dedicated Public-Private Partnership Units: A Survey of Institutional and Governance Structures, OECD, 2010.
- [5]. Gerrard M.B. What Are Public-Private Partnerships, and How Do They Differ from Privatizations?//Finance & Development. 2001. Vol.38.
- [6]. Public-Private Partnerships. International Monetary Fund, 2004.
- [7]. Green Paper on Public-Private Partnerships and Community Law on Public Contracts and Concessions. Brussels. 30.04.2004. P.3.
- [8]. Guidelines for Financial Support to Public Private Partnerships (PPPs) in Infrastructure, Government of India, 2006.
- [9]. Treasury National Infrastructure Unit, Guidance for Public Private Partnerships (PPPs) in New Zealand (Wellington, 2009)
- [10]. Hans Wilhelm Alfen (ed.), Public-Private Partnership in Infrastructure Development -Case Studies from Asia and Europe// Bauhaus-Universität Weimar, 2009.



UDC 519.62:624.131

**STREAMING RUN FOR THE COEFFICIENT INVERSE PROBLEM OF
HEAT PROPAGATION IN A MATERIAL**

Baimankulov Abdukarim Tungushboevich,
Doctor of sciences in
Physics and Mathematics, Professor of the
Department of Information Systems
of the Baitursynov Kostanay Regional University,
Kostanay, Kazakhstan.
bat_56@mail.ru

Urazboev Gayrat Urazalievich
Doctor of sciences in Physics
and Mathematics of Urgench State University,
gurazboev@gmail.com

Tokmukhambetova Zhanar Serikovna,
2nd year master's student,
"Mathematical engineering and
computer modeling" of the Baitursynov
Kostanay Regional University,
Kostanay, Kazakhstan.
zhanara-tulegeno@mail.ru

Annotatsiya Maqolada bir jinsli bo'lmagan muhidagi issiqlik tarqalish masalasi uchun teskari masala o'rganilgan. Hayrash usuli yordamida qo'yilgan masala uchun hisoblash formulalari olingan.

Key words: issiqlik o'tkazuvchanlik koeffitsienti, funktsional gradient, haydash usuli

Аннотация. В статье исследуется обратная задача распространения тепла в неоднородной среде. Получены расчетные формулы для решения задачи, поставленной методом прогонки.

Ключевые слова: коэффициент теплопроводности, функциональный градиент, метод прогонки.

Abstract: The paper studies the inverse problem of heat propagation in an inhomogeneous medium. The calculation formulas for solving the problem posed by the stream sweep method are derived.

Key words: thermal conductivity coefficient, functional gradient, flow-through method

1. Formulation of the problem.

In the area $Q = (0, H) \times (0, T)$, conductive heat distribution is being studied [1-2]

$$\gamma_0 c \frac{\partial \theta}{\partial t} = \frac{\partial}{\partial z} \left(\lambda \frac{\partial \theta}{\partial z} \right), \quad (1)$$



$$\theta|_{z=0} = T_1, \quad \lambda \frac{\partial \theta}{\partial z}|_{z=H} + \alpha(\theta - T_b)|_{z=H} = 0 \quad (2)$$

$$\theta|_{t=0} = \theta_0(z), \quad 0 \leq z \leq H, \quad \theta|_{z=H} = \theta_1(t), \quad 0 \leq t \leq T \quad (3)$$

System (1) - (3) describes the process of heat propagation from the inside of the material, point $z = 0$ to the outside of the material, point $z = H$. The Oz axis is directed vertically upward. The $\theta(0, t) = T_1$ condition means that the temperature on the inside of the material remains constant. The second condition (2) expresses the law of heat conservation on the outside of the material. Where $T_b = T_b(t)$ is the ambient temperature. Condition (3) is the temperature distribution at the initial time of the soil along the Oz axis, from 0 to N . In addition, we assume that the material temperature is set on the outside of the material.

That is:

$$\theta(H, t) = \theta_1(x), \quad t \in (0, T)$$

Task. Using equation (1) and the initial boundary conditions (2) - (3), determine the thermal conductivity of the material. This section deals with the simplest case when the thermal conductivity is constant along the Oz axis, from 0 to N . Physically, this means that the material in question is homogeneous.

The segment $(0, H)$ is divided into N equal parts with a $h = \frac{H}{N}$ step; and the segment $(0, T)$ is divided into m equal parts with a step $\Delta t = \frac{T}{m}$. This will end up with a mesh area:

$$Q_N^m = \{X = ih; i = 0, 1, \dots, N; Y = j\Delta t; j = 0, 1, \dots, m\}$$

A difference problem is studied in the Q_N^m grid dissemination.

$$\gamma_0 c Y_{i\bar{z}}^{j+1} = (\lambda Y_{i,z}^{j+1})_{\bar{z}} \quad i = 1, 2, \dots, N-1; \quad j = 0, 1, \dots, m-1, \quad (4)$$

$$Y_0^{j+1} = 0, \quad \lambda Y_{N\bar{z}}^{j+1} + \alpha(Y_N^{j+1} - T_b(t_{j+1})) = 0, \quad j = 0, 1, \dots, m-1. \quad (5)$$

$$Y_i^0 = \theta_0(z_i), \quad z_i = ih; \quad i = 1, 2, \dots, N-1. \quad (6)$$

In work [3] we obtained the conjugate problem

$$\gamma_0 c U_i + (\lambda \bar{U}_{\bar{z}})_{\bar{z}} = 0 \quad (7)$$

$$U_i^m = 0, \quad U_0^j = 0, \quad \lambda U_{N,\bar{z}}^{j+1} = -2(Y_N^{j+1} - \theta_1(t_{j+1})) \quad (8)$$

The thermal conductivity coefficient is determined by the following formula

$$\lambda_{n+1} = \lambda_n - \beta_n \sum_{i,j} Y_{\bar{z}}^{j+1} U_{\bar{z}}^j h \Delta t$$

2. Streaming Run for the Forward Difference Problem

To calculate the gradient of the functional, we must find $Y_{i,\bar{z}}^{j+1}$ and $U_{\bar{z}}^j$ programmatically [3]. We will determine the temperature flux; for this, system (4) will be rewritten in the following form

$$A_i(Y_{i-1}^{j+1} - Y_i^{j+1}) - A_{i+1}(Y_{i-1}^{j+1} - Y_i^{j+1}) - d_i Y_i^{j+1} = -f_i, \quad i = 1, 2, \dots, N-1.$$

We will insert the function (flow) $P_{i-1}^{j+1} = A_i(Y_{i-1}^{j+1} - Y_i^{j+1})$, then system (4) has the following form $P_{i-1}^{j+1} - P_i^{j+1} - Y_i^{j+1}d_i = -f_i, i = 1, 2, \dots, N-1$. From the equality $P_i^{j+1} = A_{i+1}(Y_i^{j+1} - Y_{i+1}^{j+1})$ we find, $Y_{i+1}^{j+1} = Y_i^{j+1} - \frac{P_i^{j+1}}{A_{i+1}}$. Substituting it into $Y_{i+1}^{j+1} = \bar{\alpha}Y_i^{j+1} + \bar{\beta}_i$ then $Y_i^{j+1} - \frac{P_i^{j+1}}{A_{i+1}} = \bar{\alpha}Y_i^{j+1} + \bar{\beta}_i$ from here we obtain the relation $(1 - \bar{\alpha}_i)A_{i+1}Y_i = P_i + \bar{\beta}_iA_{i+1}$. Taking the $(1 - \bar{\alpha}_i)A_{i+1} = \alpha_i, \bar{\beta}_iA_{i+1} = \beta_i$ notation, we rewrite it as follows

$$\alpha_i Y_i^{j+1} = P_i^{j+1} + \beta_i \quad (9)$$

The $P_{i-1}^{j+1} - P_i^{j+1} - Y_i^{j+1}d_i = -f_i$ is determined from the $Y_i^{j+1} = \frac{P_{i-1}^{j+1} - P_i^{j+1} + f_i}{d_i}$ flow equation and we substitute it into (9) then $\alpha_i P_{i-1}^{j+1} - \alpha_i P_i^{j+1} + \alpha_i f_i = (P_i + \beta_i)d_i$ or

$$P_i^{j+1} = \frac{\alpha_i}{\alpha_i + d_i} P_{i-1}^{j+1} + \frac{\alpha_i f_i - \beta_i d_i}{\alpha_i + d_i} \quad (10)$$

using this formula, all $P_i^{j+1}, i = 1, 2, \dots, N-1$, are determined. It is necessary to determine the initial condition for P_i^{j+1} . To do this, put $i = 0$ in (9), then $\alpha_0 Y_1^{j+1} = P_0^{j+1} + \beta_0$. Hence it is determined

$$P_0^{j+1} = \alpha_0 Y_1^{j+1} - \beta_0 \quad (11)$$

Accordingly, using (10) and (11), the P_i^{j+1} is programmatically determined, $i = 1, 2, \dots, N-1$. To obtain a recurrent formula for determining α_i, β_i , the following formula is transformed

$$\alpha_i = (1 - \bar{\alpha}_i)A_{i+1} \quad (12)$$

From the scalar sweep, we have $\bar{\alpha}_i = \frac{A_{i+2}}{d_{i+1} + A_{i+1} + A_{i+2} - A_{i+2}\alpha_{i+1}}$ from here

$$1 - \bar{\alpha}_i = 1 - \frac{A_{i+1}}{d_{i+1} + A_{i+1} + A_{i+2} - A_{i+2}\bar{\alpha}_{i+1}} = \frac{d_{i+1} + A_{i+2}(1 - \bar{\alpha}_{i+1})}{d_{i+1} + A_{i+1} + A_{i+2}(1 - \bar{\alpha}_{i+1})} = \frac{d_{i+1} + d_{i+2}}{d_{i+1} + A_{i+1} + \alpha_{i+1}}$$

substituting it into (12) we get

$$\alpha_i = A_{i+1} \frac{d_{i+1} + \alpha_{i+1}}{d_{i+1} + A_{i+1} + \alpha_{i+1}} \quad (13)$$

Taking into account the recurrence relation $\bar{\beta}_i = \frac{A_{i+1}\bar{\beta}_{i+1} + f_{i+1}}{d_{i+1} + A_{i+1} + A_{i+2}(1 - \bar{\alpha}_{i+1})}$, $\beta_i = A_{i+1}\bar{\beta}_i$ is transformed, that is

$$\beta_i = A_{i+2} \frac{A_{i+2}\bar{\beta}_{i+1} + f_{i+1}}{d_{i+1} + A_{i+1} + A_{i+2}(1 - \bar{\alpha}_{i+1})} = \frac{\beta_{i+1} + f_{i+1}}{d_{i+1} + A_{i+1} + \alpha_{i+1}} \quad (14)$$

Let us proceed to determining the initial conditions for formulas (13) and (14). To do this, we multiply the second equation (5) by and rewrite it in the form

$$A_N \left(\frac{1}{1+E} - 1 \right) Y_{N-1}^{j+1} - A_N (Y_{N-1}^{j+1} - Y_N^j) + A_N \frac{E}{1+E} T_b = 0.$$

Using the definition, temperature flux, the last inequality is written as

$$\frac{A_N E}{1+E} Y_{N-1}^{j+1} - P_{N-1} + A_N \frac{E}{1+E} T_b = 0.$$

Comparing it with the equality $\alpha_i Y_i = P_i + \beta_i$ for $i = N-1$ we get

$$\alpha_{N-1} = \frac{A_N E}{1+E}, \quad \beta_{N-1} = \frac{A_N E}{1+E} T_b.$$

By adding them to formulas (13) and (14), we obtain a design scheme

$$\alpha_i = A_{i+1} \frac{d_{i+1} + \alpha_{i+1}}{d_{i+1} + A_{i+1} + \alpha_{i+1}} : i = N-2, N-3, \dots, 0 \quad \alpha_{N-1} = \frac{A_N E}{1+E}$$

$$\beta_i = A_{N-1} \frac{\beta_{i+1} + f_{i+1}}{d_{i+1} + A_{i+1} + \alpha_{i+1}} : i = N-2, N-3, \dots, \beta_{N-1} = \frac{A_N E}{1+E} T_b$$

The temperature flux is determined by the following formula

$$\begin{cases} P_i^{j+1} = \frac{\alpha_i}{\alpha_i + d_i} P_{i-1}^{j+1} + \frac{\alpha_i f_i - \beta_i d_i}{\alpha_i + d_i} : i = 1, 2, \dots, N-1 \\ P_0^{j+1} = \alpha_0 Y_0^{j+1} - \beta_0 \end{cases}$$

Using α_i, β_i we can define $Y_i^{j+1} : i = 1, 2, \dots, N$. To do this, from the $(1 - \bar{\alpha}_i) A_{i+1} = \alpha_i$ formula, $\bar{\beta}_i A_{i+1} = \beta_i$ is determined $\bar{\alpha}_i = 1 - \frac{\alpha_i}{A_{i+1}}, \bar{\beta}_i = \frac{\beta_i}{A_{i+1}}$ and substituted into $Y_{i+1}^{j+1} = \bar{\alpha}_i Y_i^{j+1} + \bar{\beta}_i$, then

$$Y_{i+1}^{j+1} = \left(1 - \frac{\alpha_i}{A_{i+1}} \right) Y_i^{j+1} + \frac{\beta_i}{A_{i+1}} ; i = 1, 2, \dots, N-1, \quad Y_0^{j+1} = T_0.$$

This formula can be used with $A_{i+1} \gg 1$. If the coefficients $A_{i+1} \ll 1$, then

$$Y_{i+1}^{j+1} = \frac{d_{i+1} + \alpha_{i+1}}{d_{i+1} + A_{i+1} + \alpha_{i+1}} Y_i^{j+1} + \frac{\beta_{i+1} + f_{i+1}}{d_{i+1} + A_{i+1} + \alpha_{i+1}} : i = 1, 2, \dots, N-1$$

$$Y_0^{j+1} = T_0$$

References:

- [1]. Martinov G.A. Teplo i vlagoperenos v promerzayuschih i ottaivayuschih gruntah. Osnovi geokriologii merzlotovedenie, – M.:1959, pod.red. N.A.Citovich. gl.VI p.153-192.
- [2]. Chudnovskii A.F. Teplobmen v dispersnih sredah. – M.Gostehizdat, 1954, p. 444.
- [3]. Risbaiuli B., Baimankulov A.T., Mahambetova G.I. Obratnaya zadacha konduktivnogo rasprostraneniya tepla v odnorodnoi srede // Vestnik NAN RK, 2008 №1, p.11-13.



UDC 519.62:624.131

NONLINEAR COEFFICIENT INVERSE PROBLEM OF HEAT CONDUCTION EQUATIONS

Baimankulov Abdukarim Tungushboevich,
Doctor of sciences in
Physics and Mathematics, Professor of the
Department of Information Systems
of the Baitursynov Kostanay Regional University,
Kostanay, Kazakhstan.

bat_56@mail.ru

Zhuaspayev Talgat Amangildinovich
Candidate of Physical and Mathematical Sciences,
senior lecturer at the Dulatov KINEU,

g_talgat_a@mail.ru

Shulga Ivan Ivanovich,
2nd year master's student of the specialty
7M06107 "Mathematical engineering
and computer modeling",
A. Baitursynov Kostanay
Regional University, Kostanay, Kazakhstan.

Annotatsiya. Bu maqolada, issiklik tarqalish masalasi uchun teskari koeffitsientli masala o'rganiladi. Sirtida berilgan temperatura bo'yicha tuproqning nohizikli issiklik tarkalish koeffitsiyenti izlanadi. Masalani yeshish uchun iteratsion usul taklif qilingan.

Kalit so'zlar: teskari masala, issiqlik o'tkazuvchanlikning chiziqli nohiziqli koeffitsienti, iterativ usul, monotonlik, funksional.

Аннотация. В работе изучается обратная коэффициентная задача процесса распространения тепла. Используя температуру заданную на поверхности ищется нелинейный коэффициент теплопроводности грунта. Для решения задачи предлагается итерационный метод.

Ключевые слова: обратная задача, нелинейный коэффициент теплопроводности, итерационный метод, монотонность, функционал.

Annotation. This work studies the reciprocal sum of the heat distribution process in multivendor environment. Using the temperature, specified on the parts of the border, the coefficient of thermal conduction is finding. The iterative method is offered.

Keywords: inverse problem, nonlinear coefficient of thermal conductivity, iterative method, monotonicity, functional.

Introduction. In connection with the development of technology and production, it is often necessary to solve inverse problems. Many production problems are reduced to solving the coefficient inverse problem of the nonlinear equation of heat conduction. In this paper, a new method for solving a nonlinear coefficient inverse

problem is developed. Namely, knowing the temperature on the surface of the earth for a certain time, the coefficient of thermal conductivity of the soil is determined.

1. Statement of the problem.

In this work, we study the one-dimensional problem of temperature propagation in the soil. In general, any problem of heat transfer in an inhomogeneous region is a three-dimensional problem, but if the dimensions of the width and length of the region under consideration are large enough, and the surface of the considered part of the earth is almost flat, then in this case the horizontal temperature gradient is almost zero. In this case, together with the three-dimensional problem, one can consider the one-dimensional problem.

Let in the area of $Q=(0,H)\times(0,T)$, $z\in(0,H)$, $t\in(0,T)$ heat propagation occurs under the influence of the ambient temperature, in our case it is the air temperature. Numerous experiments have previously proved that the spread of heat in the soil is described by the heat conduction equation [1-2]

$$\gamma_0 C \frac{\partial \theta}{\partial t} = \frac{\partial}{\partial z} \left(\lambda(\theta) \frac{\partial \theta}{\partial z} \right) \quad (1)$$

where γ_0 is the specific mass of soil, $\text{кг}/\text{м}^3$; C - soil heat capacity, $\text{ккал}/\text{кг} \cdot \text{град}$; λ - coefficient of thermal conductivity, $\text{ккал}/\text{м} \cdot \text{час} \cdot \text{град}$. On the surface of the earth with air, the law of conservation of energy is valid

$$\lambda \frac{\partial \theta}{\partial z} \Big|_{z=H} + \alpha(\theta - T_b) \Big|_{z=H} = 0, \quad (2)$$

where α - is the coefficient of soil heat transfer to the environment. It was found that at a certain depth of the earth the temperature of the soil remains constant. Based on this fact, the boundary condition is set

$$\theta(0,t) = T_1 = \text{const} \quad (3)$$

Note that the Oz axis is directed vertically upward. At the initial moment of time, at $t=0$ the temperature distribution in the soil is set, i.e.

$$\theta(z,0) = \theta_0(z), \quad 0 \leq z \leq H \quad (4)$$

In order to determine the coefficient of thermal conductivity of a heterogeneous soil, the measured temperature of the soil at the surface of the earth is additionally set

$$T_g(t), \quad 0 < t < T \quad (5)$$

Some inverse problems (1) - (5) were studied in [3-4]. But nonlinear inverse problems for the heat equation have not been studied.

In this paper, we consider the case when $\lambda(\theta) = A\theta + B$. This is the most common case in practice. Let $X = (A, B)$. The initial approximation $X_n = (A_n, B_n)$ is set. The next approximation is determined from the monotonicity of the functional

$$J(X) = \int_B^T (\theta(H, t) - T_g(t))^2 dt.$$

The solution of problem (1) - (4) for the initial data $X_n = (A_n, B_n)$ is denoted by $\theta(z, t; X_n)$, and for X_{n+1} we denote by $\theta(z, t; X_{n+1})$. Then, for the difference $\Delta\theta = \theta(z, t; X_{n+1}) - \theta(z, t; X_n)$, the problem is

$$c \frac{\partial \Delta\theta}{\partial t} = \frac{\partial}{\partial z} \left[(A_n \Delta\theta + \Delta A \theta(n+1)) \frac{\partial \theta(n+1)}{\partial z} + \Delta B \frac{\partial \theta(n+1)}{\partial z} + B_n \frac{\partial \Delta\theta}{\partial z} \right], \quad (6)$$

$$\left[(A_n \Delta\theta + \Delta A \theta(n+1)) \frac{\partial \theta(n+1)}{\partial z} + \Delta B \frac{\partial \theta(n+1)}{\partial z} + B_n \frac{\partial \Delta\theta}{\partial z} \right]_{z=H} + \alpha \Delta\theta = 0, \quad (7)$$

$$\Delta\theta|_{z=0} = 0, \quad \Delta\theta|_{t=0} = 0. \quad (8)$$

Here $\theta(n+1) = \theta(z, t; X_{n+1})$, $\theta(n) = \theta(z, t; X_n)$.

2. Related task.

We multiply (6) by an arbitrary function $\psi(z, t)$ and integrate over the $Q = (0, H) \times (0, T)$ domain. After a single integration over the variables t and z , we get

$$\begin{aligned} & \int_0^H c (\Delta\theta \psi)|_{t=0}^{t=T} dz - \int_0^H \int_0^T \Delta\theta c \frac{\partial \psi}{\partial z} dt dz = - \int_0^H \int_0^T A_n \Delta\theta \frac{\partial \theta(n+1)}{\partial z} \frac{\partial \psi}{\partial z} dz dt - \\ & - \int_0^T \Delta A \int_0^H \theta(n+1) \frac{\partial \theta(n+1)}{\partial z} \frac{\partial \psi}{\partial z} dz dt - \int_0^T \int_0^H \frac{\partial \Delta\theta}{\partial z} \lambda_n \frac{\partial \psi}{\partial z} dz dt - \alpha \int_0^T \Delta\theta(H, t) \psi(H, t) dt - \\ & - \int_0^T \int_0^H \Delta\theta \frac{\partial \theta(n+1)}{\partial z} \frac{\partial \psi}{\partial z} dz dt - \int_0^T \int_0^H B_n \frac{\partial \Delta\theta}{\partial z} \frac{\partial \psi}{\partial z} dz dt \end{aligned}$$

We put that $\psi(z, T) = 0$. The penultimate integral on the right-hand side of the equality is integrable by parts. We assume that $\psi(0, t) = 0$. Collecting such terms, we derive

$$\begin{aligned} & - \int_0^T \int_0^H \Delta\theta \left[c \frac{\partial \psi}{\partial z} + \frac{\partial}{\partial z} \left(\lambda_n \frac{\partial \psi}{\partial z} \right) + A_n \frac{\partial \theta}{\partial z} \frac{\partial \psi}{\partial z} \right] dz dt + \\ & + \int_0^T \Delta\theta(H, t) \left[\lambda \frac{\partial \psi(H, t)}{\partial z} + \alpha \psi(H, t) \right] dt = \\ & = - \int_0^T \int_0^H \Delta A \theta \frac{\partial \theta}{\partial z} \frac{\partial \psi}{\partial z} dz dt - \int_0^T \int_0^H \Delta B \theta \frac{\partial \theta}{\partial z} \frac{\partial \psi}{\partial z} dz dt - \int_0^T \int_0^H A_n \Delta\theta \frac{\partial \Delta\theta}{\partial z} \frac{\partial \psi}{\partial z} dz dt - \\ & - \int_0^T \int_0^H \Delta A \left(\Delta\theta \frac{\partial \theta}{\partial z} + \theta \frac{\partial \Delta\theta}{\partial z} \right) \frac{\partial \psi}{\partial z} dz dt - \\ & - \int_0^T \int_0^H \Delta A \Delta\theta \frac{\partial \Delta\theta}{\partial z} \frac{\partial \psi}{\partial z} dz dt - \int_0^T \int_0^H \Delta B \frac{\partial \Delta\theta}{\partial z} \frac{\partial \psi}{\partial z} dz dt. \end{aligned}$$

From the latter, the equality is composed of the conjugate problem



$$c \frac{\partial \psi}{\partial z} + \frac{\partial}{\partial z} \left(\lambda_n \frac{\partial \psi}{\partial z} \right) + A_n \frac{\partial \theta}{\partial z} \frac{\partial \psi}{\partial z} = 0 \quad (9)$$

$$\left(\lambda \frac{\partial \psi}{\partial z} + \alpha \psi \right)_{z=H} = 2(\theta(H, t) - T_g(t)), \quad (10)$$

$$\psi(0, t) = 0, \quad \psi(z, T) = 0. \quad (11)$$

To ensure the monotonicity of the functional $J(X)$, we take the equalities

$$\Delta A = \beta_1(n) \int_0^T \int_0^H \theta \frac{\partial \theta}{\partial z} \frac{\partial \psi}{\partial z} dz dt, \quad (12)$$

$$\Delta B = \beta_2(n) \int_0^T \int_0^H \frac{\partial \theta}{\partial z} \frac{\partial \psi}{\partial z} dz dt. \quad (13)$$

In this case, the difference between the sequential values of the functional is written in the following form

$$\begin{aligned} J(X_{n+1}) - J(X_n) &= -\beta_1(n) \left(\int_0^T \int_0^H \theta \frac{\partial \theta}{\partial z} \frac{\partial \psi}{\partial z} dz dt \right)^2 - \beta_2(n) \left(\int_0^T \int_0^H \frac{\partial \theta}{\partial z} \frac{\partial \psi}{\partial z} dz dt \right)^2 - \\ &- A_n \int_0^T \int_0^H \Delta \theta \frac{\partial \Delta \theta}{\partial z} \frac{\partial \psi}{\partial z} dz dt - \int_0^T \int_0^H \Delta A \left(\Delta \theta \frac{\partial \theta}{\partial z} + \theta \frac{\partial \Delta \theta}{\partial z} \right) \frac{\partial \psi}{\partial z} dz dt - \\ &- \int_0^T \int_0^H \Delta A \Delta \theta \frac{\partial \Delta \theta}{\partial z} \frac{\partial \psi}{\partial z} dz dt - \Delta B \int_0^T \int_0^H \frac{\partial \Delta \theta}{\partial z} \frac{\partial \psi}{\partial z} dz dt. \end{aligned}$$

3. Block diagram of the calculation.

Step 1. Initial approximations A_n and B_n are specified.

Step 2. Problem (1) - (4) is solved and $\theta(z, t; x_n)$ and $\theta(z, t; x_{n+1})$, $\frac{\partial \theta}{\partial z}$ are determined.

Step 3. The adjoint problem (9) - (11) is solved and $\psi(z, t; x_n)$, $\frac{\partial \psi}{\partial z}$.

Step 4. The next approximations to the unknown quantities A_{n+1} and B_{n+1} are determined by formulas (12) and (13). That is

$$A_{n+1} = A_n - \beta_1(n) \int_0^T \int_0^H \theta(z, t; x_n) \frac{\partial \theta}{\partial z} \frac{\partial \psi}{\partial z} dz dt,$$

$$B_{n+1} = B_n - \beta_2(n) \int_0^T \int_0^H \frac{\partial \theta}{\partial z} \frac{\partial \psi}{\partial z} dz dt.$$

Step 5. The functions $\beta_1(n)$ and $\beta_2(n)$ are chosen so that the inequality $J(X_{n+1}) - J(X_n) < 0$ holds.

Step 6. If $|J(X_{n+1}) - J(X_n)| < \varepsilon$ the computation process ends.



References:

- [1].Alifanov O.M._Obratnie zadachi teploobmena_ Moskva_ mashinostroenie, 1988, str. 280.
- [2].Rysbaiuly B., Baymankulov A.T. - Development and justification of the method of calculation of the capillary diffusion of the soil // Austria, Wulfenia Journal (impact factor 0.25), № 3, 2014.-P.483-500.
- [3].Risbaiuli B., Baimankulov A.T., Mahambetova G.I._ Obratnaya zadacha konduktivnogo rasprostraneniya tepla v odnorodnoi srede_ // Vestnik NAN RK, 2008, №1, str. 11-13.
- [4].Zhuaspaev T.A._Sopryajennaya zadacha identifikacii obobschennogo koeficienta // Bishkek_ Izvestiya Vuzov, №3, 2014, str.19-21.

UDC: 372.881.111.1

CULTURAL INFLUENCE ON THE STUDENTS' ACADEMIC LEARNING

Ruzmetova Nodira Xurmat Qizi,
PhD, Lecturer of the department of
“English language and literature”,
Urgench State University
Nodiraruzmetova555@gmail.com

Annotatsiya. Bu maqola talabalarning madaniy kelib chiqishi ularning akademik ilm olishiga qanday ta'sir ko'rsata olishi haqida mulohaza yuritadi va talabalarning madaniyati, kelib chiqishi va ta'limiga doir adabiyotlarni ko'rib chiqadi. Shuningdek, o'qituvchilar va ta'lim beruvchilar orasida mavjud bo'lgan akademik muammolar haqida ya'ni ularning ta'lim sohasida talabalarning ijtimoiy-madaniyati katta ahamiyatga ega ekanligini anglamayotganligi haqida so'z yuritadi.

Ba'zi izlanuvchilar fikricha, talabalarning ijtimoiy madaniyatini inobatga olmaslik ta'lim samaradorligini pasaytiradi, chunki ijtimoiy madaniyat ta'lim beruvchilar ahamiyat qaratishi kerak bo'lgan muhim omillardan biridir. Bu maqola talabalarning ijtimoiy madaniyatining ularning akademik o'zlashtirishiga bo'lgan ta'sirini ta'lim beruvchilar inobatga olishini nazarda tutadi.

Kalit so'zlar: madaniy kelib chiqish, ta'lim sifati, madaniy ta'sir, akademik muhit, tadqiqotchilar qarashlari.

Аннотация. Данная статья рассматривает культурного происхождения на академическую успеваемость. Также, статья анализирует литературу касательно связи и обучения. Кроме того, автор подчёркивает.

В этой статье обсуждается влияние культуры на академическое обучение студентов, и приводится обзор литературы, посвященной культуре и обучению. В ней также говорится об академических проблемах, существующих среди преподавателей, что они не осознают значение культуры для обучения обучающихся. Подходы исследователей к этому противоречивые. Некоторые считают, что незнание культуры может замедлить прогресс в учебе, поскольку культура - один из важнейших факторов, которые учителя должны знать. В этой статье автор предлагает учителям это учитывать.

Ключевые слова: культура, качество обучения, культурное влияние, академический контекст, подходы исследователей.

Abstract. This article discusses how culture can affect academic learning of the students and reviews literature regarding culture and learning. It further states the academic issues existing among teachers and educators that they are not realizing the significance of culture on the students' learning. Some researchers consider that ignorance of culture can make learning progress slow as culture is one of the essential factors teachers should know. This article suggests that teachers should consider it.

Keywords: culture, educational quality, cultural influence, academic context, researchers' approaches.



Introduction. Culture general is the outstanding values and beliefs that have a more significant impact on how a decision is made. In each learning area, stands a culture that influences the other components. Unfortunately, culture in many regions is always taken for granted and not given attention by both the learners and teachers. In every faculty, teacher and instructor, they should pay attention to the cultural factors because this will directly influence the sober decision on other components of learning. Most of the time educators mind is crossed with diversity in any learning area, and their thought cannot escape culture as one of the features to consider. According to research, teachers never or rarely consider cultural factors when they are making their curriculum and also during the lesson development. They are not considering how culture will aid in the student's ability to participate and study.

Literature review. Culture's importance in students' learning has been emphasized by several researchers (Teng, 2007; Eilisha, 2007; Raymond & Choon, 2017). Eilisha (2007) pointed out that students from different cultures have different learning styles, as their behaviors and identities can affect their knowledge. Raymond and Choon (2017) researched Asian and Chinese students and discovered that even though the Asian students, including Chinese students, seem silent in the classroom according to some researchers (Murphy, 1987; Hing, 2013), they are pro-active about asking questions and welcome class discussions. Moreover, Raymond and Choon (2017) identified cultural similarities in learning among students from different countries. According to their results, Chinese, South Korean, and Vietnamese students share similar learning styles based on teacher-centered learning, the high level of respect given to teachers, and implicit communication among students. These cultural patterns are also shown in the study of Kim and Ruzmetova (2019). They found similarities between the learning styles of students from the Philippines and Thailand. Meanwhile, students from Western countries, such as the UK, Australia, and the USA, showed different learning ways based on individualism.

Kang and Chang (2016) also indicated that Confucius culture impacts students learning within a Western online learning context. In particular, Mainland China, Taiwan, Korea, Japan, and Singapore represent Confucius culture (Biggs, 1996). Kang and Chang (2016) mentioned that Confucius culture's impact on education is shown in the following perceptions: teachers are more than a lecturer; conflictive ways of learning are avoided, it is not an effective way of learning; academic achievement and education should be the focus of knowledge, with no attention given to pleasure. In contrast, students of Western cultures value individualism and personal freedom; individual interests are essential for students. All in all, Western teaching is based on collaboration-based constructivism and the development of critical thinking (Palloff & Pratt, 2001).

Pat (1994) presented many controversial approaches towards culture and learning style differences in the schools. For example, while one method shows people differ about whether educators should gain more detailed information about different cultural values and expectations, the other is opposite to this opinion. Another issue is whether the relationship between the culture-learning style affects student achievement or not. The author also analyzes different views about how cultural identity and self-esteem are related, according to him. However, these questions remain open. He

concludes that while attempting to accommodate the students' cultural and learning differences, it is most important to respect, profoundly, each person's uniqueness.

Research methodology. All the studies conducted questionnaires or surveys related to culture or learning to assess the learners' learning patterns, techniques, interests, orientations, or cultural awareness. The findings demonstrate a secure connection between the preferences of culture and learning; this indicates that learners preferred learning strategies influences (Boykin et al., 2005; Charlesworth, 2008; Ellison, Boykin, Tyler, & Dillihunt, 2005 ;). Nevertheless, learning styles are not necessarily determined by membership in a racial group, as individuals develop these biases through awareness and lived experiences (Boykin et al., 2005).

Main body of the research. Almitra Berry-Jones, Ed. D. explains in his book "*Cultural Relevance and Academic Equity in the Age of ESSA*," that knowing the impact of culture, picking the onset-mindset of a student and also putting in mind a series of engagement with similar content always aid the teacher or instructor in realizing educational equality in their classroom. Berry further says that culture is not genetic, and in most cases, learners will have not less than three, i.e., domicile, peer, and school.

Of such importance is communication as mostly the language and even though the behavior of every learner is not the same. In many cases, you find several students with the home language being divergent when they find going to school as being in a different world. An example is where you find a child at home being narrowed by visibility and not sound or hearing; such students find it very difficult to speak or even participate in-class activities. The teachers may also see some learners as rude or undisciplined while on the contrary, the issue is between home and school culture.

It is essential for those delivering knowledge to the students to consider those students who are not in a position to speak the school's language. "The greater connection is between the poverty scale a student is brought up in and the educational success of the parents and language. In most cases, poverty creates a burden in development that influences a more significant population of kids who are not submissive to learning. There is a gap in feedback, as the interaction between these kids and adults have been negative. When such kids join the school, they are never in a position to understand the role a teacher is playing or how they will be able to start developing a healthy relationship with the teacher. There are some trusted ways on how an educator or a teacher can be in a position to address these gaps. Putting in mind that every school should be working towards ensuring that all learners are treated equally and being provided with what he or she needs to achieve or realize his or her goals" (Berry, A. L., & Brown, G. , 2013).

All the instruction areas that impact the achievement gap and how to provide classes to different learning and cultural needs should be fully understood. Berry-Jones (2013) did come out with areas that are affected by the culture that can influence success. These areas are:

- Listening and speaking
- Thinking
- Reading
- Writing



For instance, at any moment, an approach is given on how students think the student's life experience should be a priority before the knowledge execution in the classroom. You realize the community has influenced most of the things that run through their thought. She further advises in her book, that teachers are supposed to develop a pedagogy that entails culture that is self-based or sustaining, and these need known instruction and practice. Berry-Jones (2013) believe that the process to be taken is the need to train and provide outstanding feedback that will fully understand the escalation in their skills, teachers also required not to be rigid but rather be more open in learning any new idea or techniques that are associated with cultural factors. She further points out that it is worth it for the teachers or educators to provide consistency and be able to tolerate beyond any measure with the learners who are having challenges.

The issue here is that most educators or teachers consider some students not ready to learn, not knowing some cultural influences give them a hard time during the learning process. Teachers must provide an avenue for students to talk openly about how they are viewing the world and be in the driving seat of their education. "We can push so much further, not by putting more and more information in front of them, but by...believing that they can do what we are asking them to do and stretching them and giving them opportunities through discussion," said Berry-Jones (2013). "Let them talk peer-to-peer about what they are seeing, what they are learning, what they are reading. Furthering that conversation is what keeps students interested and engaged in instruction. It is not our song and dance routine" (p. 125).

There is a remarkable influence of culture in most, if not all, learning institutions. Each culture of a learner is crucial and should be understood fully. It is the educators' work to come in handy to understand all the cultural factors surrounding any learning sector (Kovacs, 2017). This is because any other components based in these schools are learning areas and are directly influenced by culture. It is by this virtue of understanding that a teacher will be in a position to assist the learners in achieving their dreams and become successful in their undertakings. Students should not be considered having weird behaviors or are being undisciplined, so the teacher should understand their cultural background and help them prosper. Equity in all learning areas should be as all learners should have the same treatment in their fields of study. This will also be achieved with the help of the teacher or educators during their delivery. Teachers are the key people to bridge the gap of cultural factors in the learning institution. They should be ready to adjust to any changes that can enhance their skills in doing so (Kovacs, 2017).

There is a dominant culture within every educational environment that influences all the other aspects. Religion is often forgotten or ignored in most learning environments or even outside the learners' or even teachers' awareness. Bates (2019) explains why faculty and teachers should pay close attention to cultural factors to make conscious decisions about how to teach international students. He defines culture as "*the dominant values and beliefs that influence decision-making*" (p.305). The author states that every learning environment has a dominant culture. For example, in single-sex schools, the dominant value is "being a lady" or "developing boy's skills." He points out that changing the dominant culture is difficult, but the teacher should match his/her

teaching techniques considering the learning environment in the classroom because cultural diversity can affect the learning environment in the class.

An integrative analysis of research related to cultural notions of learning shows similar conclusions that knowledge is strongly mediated by the involvement of learners of their culture (Fischer, 2009; Gutierrez & Rogoff, 2003). This means that putting learners within culturally relevant contexts enables learning to occur naturally. Research exploring the culture and learning shows culture as the primary subject, and that culture is essential to the learner's learning habits, types, strategies, and experiences. Culture is expected to be crucial to learning. Such studies are guided by an interdisciplinary theory of socio-cultural, cooperative learning, cognition, perception, learning styles, and language learning.

Conclusion. To sum up, individuals from different cultures learn differently. Their learning expectations are probably different. Students from some cultural backgrounds, for example, tend to study in collaboration with others, while the others preferred style is to work independently. This article suggests that teachers should gain awareness of the cultures portrayed in their classrooms and adapt lessons to optimize learning opportunities. The following strategies can help in this situation:

- Bridge cultural differences through effective communication
- Teach and talk to students about differences between individuals
- Show how differences among the students make for better learning
- Attend community events of the students and discuss the games with them.

Each culture has a different educational system, and these systems affect students' learning styles. International students from different nationalities represent their cultures' ways of learning in a different academic context (Sheets, 1999).

References:

- [1]. Bates, T. (2016). Culture and effective online learning environments. Retrieved from <https://www.tonybates.ca/2016/05/15/culture>
- [2]. Berry, A. L., & Brown, G. D. (2013). *Effecting change intervention for culturally and linguistically diverse learners*. Huntington Beach, California: Shell Education.
- [3]. Biggs, J. B. (1996). *Western Misperceptions of the Confucian-heritage Learners*. Hong Kong: University of Hong Kong and ACER.
- [4]. Boykin, A. W., Albury, A., Tyler, K. M., Hurley, E. A., Bailey, C. T., & Miller, O. A. (2005). Culturebased perceptions of academic achievement among low-income elementary students. *Cultural Diversity and Ethnic Minority Psychology*, 11 (4), 339–350.
- [5]. Charlesworth, Z. M. (2008). Learning styles across cultures: Suggestions for educators. *Education and Training*, 50 (2), 115–127.
- [6]. Eilisha, B. (2007). *Effectiveness of Working Individually Versus Cooperative Groups: A Classroom-Based Research Project*. Pittsburgh: University of Pennsylvania.
- [7]. Ellison, C. M., Boykin, A. W., Tyler, K. M., & Dillihunt, M. L. (2005). Examining classroom learning preferences among elementary school students. *Social Behavior and Personality*, 33 (7), 699–708.
- [8]. Fischer, G. (2009). Cultures of participation and social computing: Rethinking and reinventing learning and education. Paper presented at the 2009 Ninth IEEE International Conference on Advanced Learning Technologies, Riga, Latvia.



- [9]. Gutierrez, K. D., & Rogoff, B. (2003). Cultural ways of learning: Individual traits or repertoires of practice. *Educational Researcher*, 32(5), 19–25.
- [10]. Hing, W.S. (2013). “Characteristics of Chinese Students' Learning Styles”. *International Proceedings of Economics Development and Research* 62: 36-39.
- [11]. Kim, J & Ruzmetova, N. (2019). “A Teacher's Role in the Academic Socialization Process of a Group of International Students in a Korean EFL Classroom.” *Journal of Learner-Centered Curriculum and Instruction* 19: 747-70.
- [12]. Kang, H. & Chang, B. (2016). “Examining Culture's Impact on the Learning Behaviors of International Students from Confucius Culture Studying in Western Online Learning Context”. *Journal of International Students* 6: 779-97.
- [13]. Kovács, G. (2017). Culture in Language Teaching. *Acta Universitatis Sapientiae, Philologica*, 9 (3), 73-86.
- [14]. Murphy, D. (1987). “Offshore education: A Hong Kong perspective”. *Australian Universities Review* 30: 43-44.
- [15]. Palloff, R. M., & Pratt, K. (2001). *Lessons from the Cyberspace Classroom: The Realities of Online Teaching*. San Francisco: Jossey-Bass.
- [16]. Pat, G. (1994). The culture/learning style connection. *Educating for diversity*, 51 (8), 16-21.
- [17]. Rymond, C.Y. & Choon, T. (2017). “Understanding Asian Students Learning Styles, Cultural Influence and Learning Strategies”. *Journal of Education & Social Policy* 7: 56-67.
- [17]. Sheets, R. (1999). Relating competence in an urban classroom to ethnic identity development. In R. Sheets (Ed.), *Racial and ethnic identity in school practices: Aspects of human development*. Mahwah, NJ: Lawrence Erlbaum Associates.
- [18]. Teng, L. (2007). “Collaborating and Communicating Online: A Cross-bordered Intercultural Project between Taiwan and the US”. *Journal of Intercultural Communication* 13: 57-78.

UDC: 576.8: 681.142.37: 371.3

MODEL OF THE ORGANIZATION OF INDEPENDENT EDUCATION OF FUTURE TEACHERS OF BIOLOGY AND BIOTECHNOLOGY

Yahshiboyeva Damira Tolib qizi
Lecturer, Navoi State Pedagogical
Institute, "Biology" department
yashiboevadamira@gmail.ru

Annotatsiya. Ushbu maqolada bo'lajak biologiya o'qituvchilarining biotexnologiya fanidan mustaqil ta'limini tashkil etish usullariga oid taklif va tavsiyalar hamda tashkil etish modeli keltirilgan.

Tayanch so'zlar: biotexnologiya, model, mustaqil ta'lim, tajriba-sinov, Student-Fisher, global tarmoq, axborot-ta'lim muhiti.

Аннотация. В статье представлены предложения и рекомендации по организации самостоятельного обучения будущих учителей биологии биотехнологии, а также организационная модель.



Ключевые слова: биотехнология, модель, самостоятельное обучение, эксперимент, Студент-Фишер, глобусная сеть, информационно-образовательная среда.

Abstract. This article provides suggestions and recommendations on how to organize independent education of future biology teachers in biotechnology, as well as an organizational model.

Keywords: biotechnology, model, independent learning, experiment, Student-Fisher, globe network, information-educational environment.

Introduction. One of the requirements for the training of modern specialists is the continuous improvement of the didactic basis of professional training in higher education, the development of science-based approaches to the pedagogical process as a creative collaboration of students [1-3].

The purpose of higher education institutions is to develop future professionals as professional, competitive, self-disciplined and creative thinkers with a high level of independence and professional competence.

In this regard, one of the most pressing issues for today's educational process is to improve the system of organization of independent learning activities of future professionals, including future biology teachers in higher education institutions and the development of their preparation for independent professional activity.

The State Education Standard, which consists of the subjects taught in the training of future biology teachers in higher education institutions, defines the knowledge, skills and competencies they must acquire, which are very difficult for students to acquire during lectures, practical and laboratory classes [4].

Therefore, the professor-teacher should consider the acquisition of certain skills and abilities of students in independent educational activities, which is a necessary form of teaching [5-7].

Therefore, there is a serious need to improve the system, mechanism and methodology of organizing independent learning activities of future biology teachers [8-11].

Literature review. G.J.Abylova, H.S.Bakiev, N.A.Muslimov on the theory and technology of development of independent learning skills of students in our country, on the basis of interactive teaching methods in the process of independent work, the formation of their necessary competencies, the theoretical basis for the development of independent learning processes of future professionals, O.Kusynov, M.U.Kuchkarov, J.T.Yarashev, B.R.Mukimov, I.Kh.Iminahunova.

Also, scientists of the Commonwealth of Independent States in the process of independent work on the formation of research skills of students of higher education institutions, methods of developing students' cognitive activity, independent learning, the formation of their professional competencies, the development of cognitive thinking, including O.V.Vishtak, N.F.Vlasova, R.M.Garanina, G.N.Dinits, Yu.B.Drobotenko, V.I.Ermolaeva, N.L.Kalugina, N.G.Lukinova, A.O.Prokubovskaya, O.N.Proxorova, C.V.Pyxova, T.D.Rechkina, T.V.Rudina, H.B.Smetanina, E.N.Trushchenko, M.A.Fedorova, M.A.Tsyvareva, I. Researched by scientists such as V.George.



The research of these scientists provides methods of organizing independent learning activities and independent work of students in higher education, mathematics, computer science, pedagogy, vocational education and primary education, as well as medicine, mechanisms and methods of formation, development of their competence.

At the same time, in the continuing education of the country on the methodology of organizing independent learning activities of pupils and students of biology researches were carried out by L.M.Karakhanova, M.N.Ibodova, G.S Ergasheva, U.B.Bakhodirova.

Although the above research puts forward some theoretical and practical approaches to improving the methodology of independent study of biology students in higher education, a special monograph on improving the methodology of independent study of biotechnology teachers in pedagogical higher education institutions. not studied. Therefore, the proposed research is one of the most pressing issues for today's educational process.

It is desirable to improve the system of organizing independent educational activities of future biology teachers in professional disciplines, in particular in biotechnology.

Because the science of biotechnology is based on methods of processing raw materials for the separation of biologically active substances and purification of biologically active substances, improvement of bioobjects used in the manufacture of drugs by cell engineering methods, the role of proteins in the body, synthesis methods, enzymes in metabolism, genomics and proteomics., learns to create drugs.

Classroom sessions do not bring these topics to a high level of awareness. In doing so, independent learning activities play a complementary developmental role.

The research focuses on these issues, one of the professional disciplines taught in the training of future biology teachers, the organization of educational activities independent of the subject of biotechnology. Therefore, the study analyzed the independent learning activities of future biology teachers in biotechnology. Based on the analysis, we witnessed that the students did not have the necessary didactic teaching aids to organize independent learning activities, and the existing ones were outdated. It was also reported that professors give students independent assignments in the field of biotechnology, such as writing an essay, reviewing the topic. These problems can hinder the development of the science of biotechnology and lead to the underdevelopment of the competencies of future biologists. Therefore, the proposed research is one of the most pressing issues in biology education today.

Research methodology. It is the formation of a creative personality of a specialist capable of self-development, education and innovation of future biology teachers [12-13]. Completion of these tasks is not possible only by transferring knowledge from the professor-teacher to the student in the completed form. There is a need to transfer the student from a passive consumer of knowledge to an active knowledge creator who can formulate the problem, analyze ways to solve it, find the optimal result and prove its correctness.

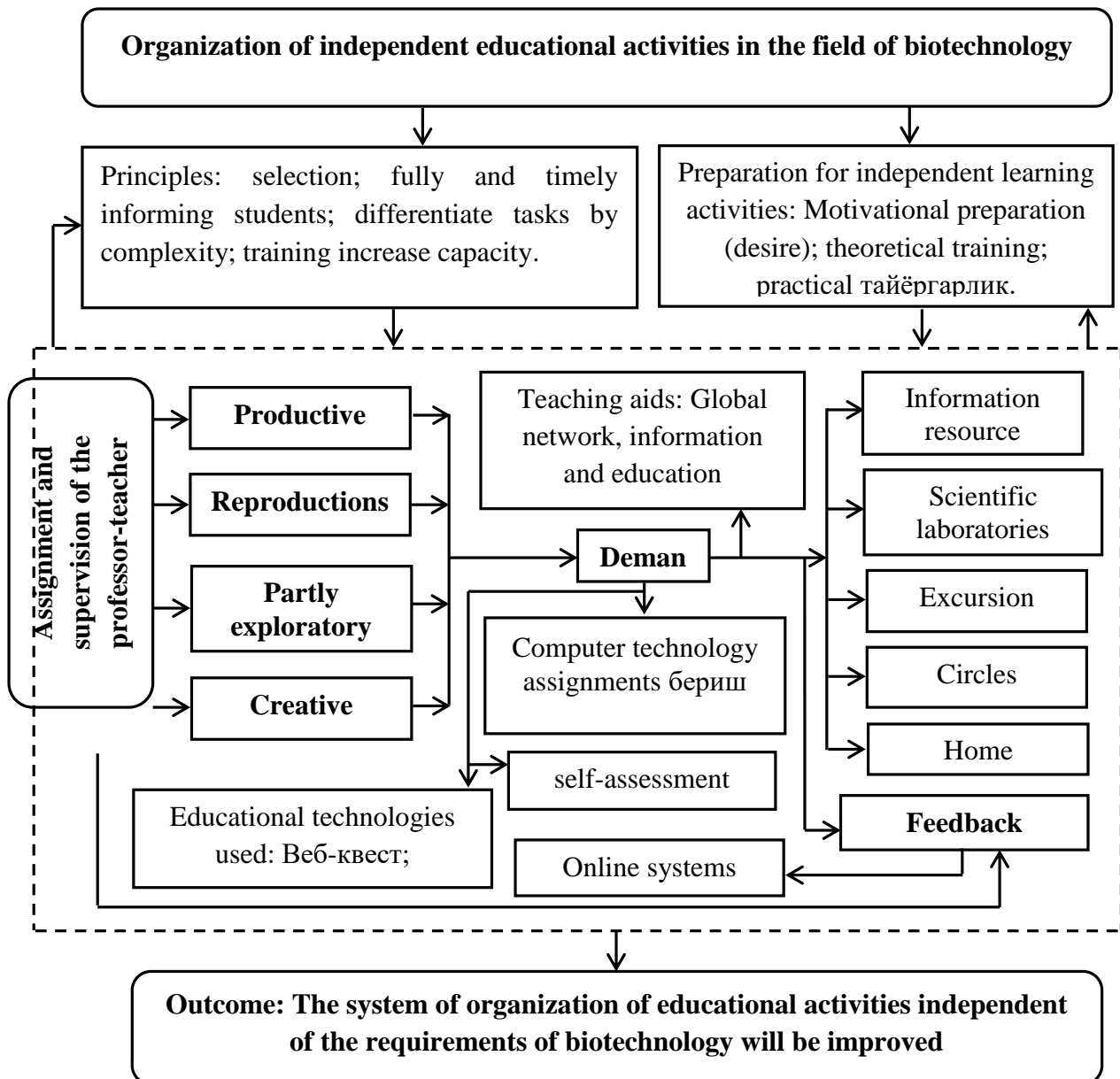


Figure 1. Requirements model of organization of independent educational activity in the field of biotechnology.

Therefore, the professional sciences, especially biotechnology, which teach future biology teachers in higher education institutions, require the development of a model for the organization of independent learning activities in order to improve the methodology of organizing independent learning activities. In this regard, as part of the study, we developed a model for the organization of educational activities independent of the subject of biotechnology, which is one of the professional disciplines of future biology teachers (see Figure 1).

This model enhances the learner's self-education, continuous updating of knowledge, independent cognitive activity in the rapidly changing and evolving world of science and industry. It also provides the formation of skills for independent learning activities in the future, as a means, mechanism, direction and independent work of the process of self-education as a specially organized form of the learning process.

Analysis and results. In the training of future teachers of biology, experimental work was carried out to improve the system of organization of independent educational

activities in the professional disciplines taught, including biotechnology. Experimental work is aimed at determining the level of efficiency of the above-mentioned model. In order to determine the level of effectiveness of the presented model, future biology teachers were divided into experimental and control groups. A total of 72 future biology teachers were involved for the experimental and control groups. Independent learning activities were organized for future biology teachers assigned to the experimental group based on the use of the above model. The control group was traditionally organized. The results of future biology teachers involved in this experiment were analyzed and a mathematical-statistical analysis based on the Student-Fisher criterion was performed to verify their reliability. Appropriate mean values for the selections when using this criterion $\bar{X} = \frac{1}{n} \sum_{i=1}^4 n_i X_i$, scattering coefficients $D_n = \sum_{i=1}^4 \frac{n_i (x_i - \bar{X})^2}{n-1}$, standard deviation $\tau_n = \sqrt{D_n}$, indicators of variation $\delta_n = \frac{\tau_n}{\bar{X}}$, reliable deviations from the assessment $\Delta_n = t_{kh} \cdot \frac{D_n}{\sqrt{n}}$, while determining the mastery indicators $A \% = \frac{\bar{X}}{3} \cdot 100\% - \frac{\bar{Y}}{3} \cdot 100\%$ formulas were used. According to the calculation, the average mastering rate of the experimental group was higher than that of the control group, ie increased by 7.8%.

Conclusions and suggestions. 1. Not less than 50% of classroom time, not less than 70% for evening students and not less than 75% for part-time students are allocated for independent study of future biology teachers currently studying in full-time higher education institutions. Therefore, it is necessary to improve the system and methodology of organizing independent learning activities of future biology teachers.

2. The requirements of higher education institutions require an approach to the organization of independent educational activities, taking into account their psychological characteristics. Because the student will have the opportunity to self-educate and make independent decisions in independent learning activities.

3. The use of cloud, blockchain technologies and LMS systems is effective in organizing the independent study of future biology teachers in higher education institutions in professional disciplines, including biotechnology. Based on these technologies, future biology teachers will have the opportunity to study at any time and place.

4. From the above statistical analysis, it can be said that it is advisable to use the model developed in the framework of research in the organization of independent educational activities in the field of biotechnology, which is one of the professional disciplines of future biology teachers..

References

[1]. Nikadambaeva H.B. Methods of using computer technology in teaching the subject "Natural Geography of Uzbekistan" (on the example of higher education) // Dissertation for the degree of Candidate of Pedagogical Sciences. - Tashkent, 2012. - 223 p



- [2]. Dinits G.N. Independent work as a means of professional training of students // Dissertation for the degree of candidate of pedagogical sciences. Moskav, 2002 .-176 p.
- [3]. A.A. Gareev Study blog as a means of organizing the independent work of students of a technical university on the development of professional foreign language competence // Abstract of the thesis for the degree of candidate of pedagogical sciences. - Izhevsk, 2020 .-- 24 p.
- [4]. Baxodirova U.B. Methodology of organization of students independent study activities in microbiology with the use of virtual education technologies // European Journal of Research and Reflection in Educational Sciences. – EJRRES Vol.8, 2020. – № 10. –P. 111–117.
- [5]. Dinits G.N. Independent work as a means of professional training of students // Dissertation for the degree of candidate of pedagogical sciences. Moskav, 2002 .--176 p.
- [6]. A.A. Gareev Study blog as a means of organizing the independent work of students of a technical university on the development of professional foreign language competence // Abstract of the thesis for the degree of candidate of pedagogical sciences. - Izhevsk, 2020 .--24 p.
- [7]. Lutfillaev M.H. Theory and practice of integration of information technologies in improving the educational process in higher education (on the example of computer science and natural sciences) // Dissertation for the degree of Doctor of Pedagogical Sciences. –Tashkent, 2007. - 246 p.
- [8]. Ibodova M.N. Methods of improving the independent work of students in biology through the use of information resources (on the example of academic lyceums) // Abstract of the dissertation for the degree of Doctor of Philosophy (PhD) in pedagogical sciences. - Tashkent, 2019. - 49 p.
- [9]. Ergasheva G.S. Improving the effective use of interactive software in biology education // Abstract of the dissertation of Doctor of Pedagogical Sciences (DSS). – Tashkent, 2018. - 56 p.
- [10]. Baxodirova U.B. Improving the methodology of using virtual educational technologies in the teaching of microbiology (on the example of pedagogical higher education institutions) // Dissertation for the degree of Doctor of Philosophy (PhD) in Pedagogical Sciences. - Karshi, 2020. - 156 p.
- [11]. Truschenko, E. N. Organization of independent work of university students on the basis of a competence-based approach to professional training of specialists: author. ... Cand.ped. Sciences / E. N. Trushenko. - M, 2009.
- [12]. Belyaeva E.N. Formation of emotional-of the central students' attitude to wildlife in the process of teaching biology (chapter "animals") // Abstract of dissertation. ... cand. ped. sciences. - Astraxan, 2014. - 25 p.
- [13]. Bespamyatnykh T.A. Methodology of educational research work of students in the in-depth study of general biology // Abstract of dissertation. ... n.c.p.n. - SPb. : RGPU. Academ-Print, 2002 .-- 20 p.



UDC: 576.8: 681.142.37: 371.3

MODEL OF INCREASING THE EFFICIENCY OF ELECTRONIC EDUCATIONAL RESOURCES OF IMMUNOLOGY

Sharapova Gulnoza Valentinovna
Navoi State Pedagogical Institute,
Lecturer of "Biology" department
sharapovagulnozavalentinovna@gmail.com

Annotatsiya. Ushbu maqolada immunologiya fanini o'qitish samaradorligini oshirish modeli keltirilgan va uni bo'lajak biologiya o'qituvchilarining ta'lim-tarbiya jarayoniga joriy etish bo'yicha taklif va tavsiyalar keltirilgan.

Tayanch so'zlar: immunologiya, model, kognitiv, axborot-ta'lim muhiti, kasbiy kompetensiya, elektron ta'lim resurs, integrativ yondashuv.

Аннотация. В статье представлена модель для повышения эффективности преподавания иммунологии и предложений по его осуществлению в образовательном процессе будущих преподавателей биологии.

Ключевые слова: иммунология, модель, познавательная, информация и образовательная среда, профессиональная компетентность, электронный образовательный ресурс, интегративный подход.

Annotation. The article presents a model for increasing the effectiveness of teaching immunology and proposals for its implementation in the educational process of future biology teachers.

Keywords: immunology, model, cognitive, information and educational environment, professional competence, electronic educational resource, integrative approach.

Introduction. Today, when the field of information and communication technologies is rapidly developing and improving, the organization of training using information technologies, the full imparting of its content in the minds of students is considered an urgent task [1]. In the modern environment of information technology, a problematic approach to learning is widely used in combination with information-receptive and reproductive methods. In this environment, e-learning resources are used to improve the quality of learning by providing educational content, to develop the cognitive interest of the student, and also as tools for the management and control of cognitive activity [2, 3].

Therefore, one of the urgent problems is the introduction of new approaches to the educational process of higher educational institutions, the introduction of computer technologies, didactic electronic learning resources [4, 5].

Literature review. To increase the effectiveness of teaching biology in higher educational institutions, it is necessary to develop modern educational technologies, modern approaches to the use of elearning didactic resources.

In this regard, research is being carried out on the theory and practice of scientific and methodological training of biology teachers in our country Tolipova Zh.O., Usmanova M.S. Rakhimov, Research work on the formation of healthy lifestyle skills in teaching biology by Isabaeva M.M., improving future biology teachers in the preparation of innovative professional activities based on modular technologies and an



integrated approach, as well as A study dedicated to improving the methodological system for assessing the level of formation of professional competencies of future biology teachers was carried out by Z.A. Mardanov, D.M. Elmuratova, S.F. Salimov.

As well as research on the development of methods of teaching biology in the context of the scientific community of students of the Commonwealth of Independent States N.P. Stepanova, investigation of the use of integral-modular methods of biological education in pedagogical universities S. B. Bakhvalova, research work on the methodology of teaching and research of students on in-depth study of biology T.A. Bespamyatnykh, research to improve the quality of teaching biology based on the organization of environmental activities of students N. B. Firsova, research work on a systematic approach to the study of the animal world in the biology course of grades 6-7 of the general education school A.A. Bogomolov, research on the formation of students' emotional-value attitude towards wildlife in the process of teaching biology Belyaeva E.N., a study aimed at building a system of reflective learning using an innovative educational and methodological complex for teaching biology was carried out by E.N. Arbuzova. Despite the fact that within the framework of the research of the above scientists, research was carried out on methods to improve the effectiveness of teaching biology in the system of lifelong education and various approaches to the development of students' competencies, in his work, insufficient attention is paid to the use of computer technology, its practical and instrumental programs, as well as elearning resources to improve the effectiveness of teaching this subject. Today, a new type of information perception appears through the use of the global educational network, television, computer programs [6]. For future biology teachers studying in higher education, traditional sources of information, such as a textbook or a professor's speech, are losing their meaning, which leads to a decrease in interest in the learning process. If in the organization of the educational process of future biology teachers use e-learning resources, they will be able to work with information, develop independent research and creativity [7,8].

The relationship between professors and students will also change, an environment of cooperation will emerge, and an environment for problem-heuristic learning and differentiated learning, development-oriented learning will be created [9].

Therefore, the introduction of didactic e-learning resources is one of the most pressing issues of increasing the effectiveness of teaching biology in higher education, including "Immunology", the formation and development of students' creative abilities and competencies in this subject.

Research on this problem in the Commonwealth of Independent States, including on the methods of using information, communication and multimedia technologies in teaching biology E.A. Filippov, O. G. Petrov, on the method of using modern information and communication technologies in organizing homework in biology T.I. Krylova, research on the use of modern computer teaching technologies in teaching general biology to 9th grade students E.S. Smooth, A.S. on the methodology of complex application of traditional teaching aids and new information technologies in the course of general biology. Lysenko, Yu.A. on biology on the methodology of distance learning of children with disabilities and intellectual disabilities. Komarov, the research devoted to the methodology of the formation of

cognitive learning movements in the process of teaching biology in the informational educational environment was studied by V.A. Smirnova.

In this regard, in order to increase the efficiency of the use of interactive software in biological education in our country, i.e. in pedagogical universities, improving the methods of using virtual teaching technologies in teaching microbiology, methods of improving the independent work of biology students in academic lyceums through information resources, grade 7 on improving the methodology of using electronic educational resources in teaching biology. *Research work was carried out by Ergasheva G.S., Bakhodirova U.B., Ibodova M.N., Karakhanova L.M., Khasanova Sh.B.*

While the aforementioned pedagogical study focuses on the methodology for using elearning resources to improve the effectiveness of biology teaching in lifelong learning, in his work, the methodology of using electronic educational resources to improve the efficiency of teaching the subject "Immunology" in pedagogical universities was not specifically monograph.

Therefore, at present there is a need to improve the methodology of organizing lectures, practical classes and independent educational activities of students with the help of electronic educational resources in pedagogical universities on the subject "Immunology".

Research methodology. Immunology is one of the most advanced disciplines of higher education, it is important for future biologists, biology teachers and future doctors [10,11].

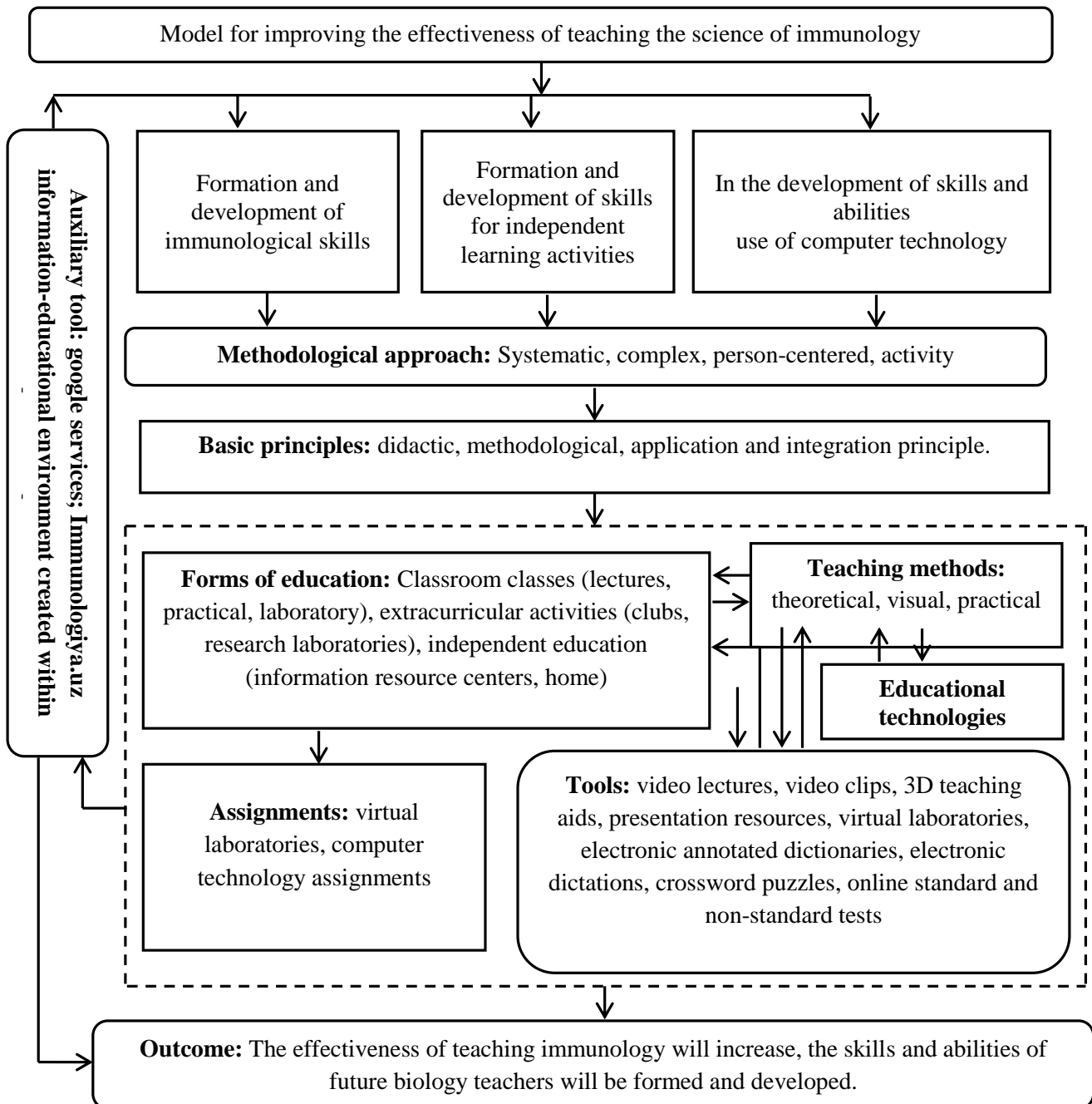
An important feature of the science of immunology is that it develops as a fundamental science, mastering the most advanced methodological approaches and specific methods of physicochemical biology, biochemistry, and molecular genetics. Using them, he promotes the development of hundreds of newly discovered laws and ideas of physical and chemical biology.

One of the conditions for increasing the efficiency of teaching immunology in higher educational institutions is the use of elearning didactic resources, serves as an important tool for the successful solution of the assigned pedagogical tasks. The process of using e-learning didactic resources in teaching immunology should be targeted. For this, it is necessary to develop a new approach to the use of e-learning didactic resources in the field of immunology.

This model provides the following features:

- to gradually increase the readiness of future biology teachers to use distance learning technologies, information and educational environment and the global network (formation of competencies of future biology teachers in media and ICT);
- to form the readiness of future biology teachers to use the global network, distance learning technologies and information and educational environments, cloud technologies based on the creation of modular content of the immunology course.

To do this, initially increasing the efficiency of teaching the science of immunology requires the development of a model for using e-learning resources. Therefore, the study developed a model to improve the effectiveness of teaching immunology (Picture 1.).



Picture 1. A model for increasing the effectiveness of teaching the science of immunology

Analysis and results. Pedagogical experiments were carried out on the use of didactic e-learning resources in the training of future teachers of biology in the professional disciplines, in particular, to increase the effectiveness of teaching immunology. During the experiments, future biology teachers were divided into experimental and control groups. Of these, 26 future biology teachers were involved in the experimental group and 25 in the control group. Prospective biology teachers assigned to the experimental group were trained using the above model. The control group was traditionally organized. The results of future biology teachers involved in this experiment were analyzed and a mathematical-statistical analysis based on the Student-Fisher criterion was performed to verify their reliability. Appropriate mean

values for the selections when using this criterion $\bar{X} = \frac{1}{n} \sum_{i=1}^4 n_i X_i$, scattering coefficients

$$D_n = \sum_{i=1}^4 \frac{n_i(x_i - \bar{X})^2}{n-1}, \text{ standard deviation } \tau_n = \sqrt{D_n}, \text{ indicators of variation } \delta_n = \frac{\tau_n}{\bar{X}}$$

reliable deviations from the assessment $\Delta_n = t_{kh} \cdot \frac{D_n}{\sqrt{n}}$, while determining the mastery

indicators $A \% = \frac{\bar{X}}{3} \cdot 100\% - \frac{\bar{Y}}{3} \cdot 100\%$ formulas were used. According to the calculation, the average mastering rate of the experimental group was higher than that of the control group, an increase of 8.4%.

Conclusions and suggestions. Based on research, it can be said that the active development of information and communication technologies, including distance learning technologies and their introduction in increasing the effectiveness of teaching the science of immunology can be recognized as one of the most pressing issues today. The analysis of observations in the field shows that the country pays great attention to the use of information and educational environments for distance learning of students studying in higher education institutions. However, it became clear that the practice of higher education institutions does not have knowledge of the problem of shaping the readiness of students to use distance learning technologies, the culture of use is insufficient and there is a need for methodological developments.

Therefore, in order to increase the effectiveness of teaching the science of immunology, it is necessary to first develop didactic e-learning resources related to the global network and mobile phones. With the help of these, future biology teachers will have the opportunity to study and test their knowledge at any time and place.

References:

- [1]. Baxodirova U.B. Improving the methodology of using virtual educational technologies in the teaching of microbiology (on the example of pedagogical higher education institutions) // Dissertation for the degree of Doctor of Philosophy (PhD) in Pedagogical Sciences. - Karshi, 2020. - 156 p.2.
- [2]. Allambergenova M. X. Creation of interactive educational complexes of computer science and their use in the educational process // Dissertation for the degree of Candidate of Pedagogical Sciences.– Tashkent, 2012. –117 p.
- [3]. Danilkevich A.V. Methods of teaching multimedia technologies to future specialists in the field of aesthetic and humanitarian management in the field of professional education // Dissertation for the study of the degree of candidate of pedagogical sciences. - Volgograd, 2013. - 175 p.
- [4]]. Danilova O.V. Preparation of students of a pedagogical university for design of electronic educational resources. Abstract of the thesis. Cand. ped. sciences. Cheboksary, 2010. -- 23 p.
- [5]. Lysenko A.S. The method of complex application of traditional teaching aids and new information technologies in the course of general biology // Avtoref. dis. ... Cand. ped. Science. - St. Petersburg, 2007. –18 p.
- [6]. Vaganova O.I., Aleshugina E.A., Maksimova K.A. Designing e-learning courses // Azimuth of scientific research: pedagogy and psychology. 2019.Vol. 8.No. 3 (28). S. 57-59.
- [7]. Filippov E.A. Methods of using multimedia in teaching general biology // Dissertation candidate of pedagogical sciences. - St. Petersburg, 2001. –149 p.



- [8]. Petrova O.G. *Information and communication environment for teaching biology as a means of improving the quality of general biological education // Avtoref. dis. ... Cand. ped. sciences. - Moscow, 2012 .-- 12 p.*
- [9]. Barteneva T.P., Remontov A.P. The use of information computer technologies in biology lessons. International Congress "Information Technologies in Education." - Moscow. -2003.
- [10]. Smirnova V.A. Methodology for the formation of cognitive educational actions in the process of teaching biology in a subject information and educational environment // Avtoref. diss. ... for a job. learned. step, cand. ped. sciences. - Moscow, 2019 .-- 24 p.
- [11]. Komarov Yu.A. Methodological support of distance learning in biology of children with disabilities and intact intellect // Avtoref. dis. ... Cand. ped. sciences. - St. Petersburg, 2014 .-- 18 p.

UDK: 372.881.

THEORETICAL AND PRACTICAL ASPECTS OF TEACHER PROFESSIONAL COMPETENCE

Yusupova Dilorom Sobirjonovna
Teacher of Andijan State University
Teacher of the Department of General Pedagogy
yusupova_dilorom@gmail.com

Annotatsiya. Ushbu maqolada o'qituvchi kasbiy kompetentsiyasini takomillashtirishning nazariy va amaliy aspektlari keng yoritilgan bo'lib, pedagogik kompetensiya o'qituvchining pedagogik faoliyati zamirida takomillashib boradi. Pedagogik faoliyat yosh avlodni hayotga, mehnatga tayyorlash uchun jamiyat oldida, davlat oldida javob beradigan, ta'lim-tarbiya berishda maxsus tayyorlangan o'qituvchilar mehnati faoliyatidir.

Kalit so'zlar: pedagogik kompetensiya, pedagogik texnika, pedagogik nazokat, pedagogik qobiliyat, pedagogik hamkorlik.

Аннотация. В статье описаны теоретические и практические аспекты повышения профессиональной компетентности учителя, при этом педагогическая компетентность развивается на основе педагогической деятельности учителя. Педагогическая деятельность - это работа специально подготовленных учителей, ответственных перед обществом и государством за подготовку подрастающего поколения к жизни и работе.

Ключевые слова: педагогическая компетентность, педагогическая методика, педагогическая деликатность, педагогические способности, педагогическое сотрудничество.

Abstract. The article describes the theoretical and practical aspects of improving the professional competence of a teacher, while pedagogical competence develops on the basis of the teacher's pedagogical activity. Pedagogical activity is the work of specially trained teachers who are responsible to society and the state for preparing the younger generation for life and work.



Key words: pedagogical competence, pedagogical methodology, pedagogical delicacy, pedagogical abilities, pedagogical cooperation.

Introduction. Of all the professions, the teaching profession has a unique and important social significance. After all, a teacher is an architect of the maturity of the young generation, a person who educates young people. Today, he trains young people ideologically and politically, teaches them the laws of nature, society, social life, the development of thinking, prepares them for work, helps them to master the secrets of the profession and socio-economic development, which is important for society solves situations. It is the responsibility of the teacher to become a master of his profession, to influence the students, to develop their interests, abilities, talents, beliefs and practical skills. It requires a professional who is looking for a job. To do this, constantly improve the professional skills, abilities and competencies of the teacher, to take care of him, to create the necessary conditions for him, to provide the necessary material and scientific-methodical and technical assistance, to regularly monitor the teacher's creative initiative should be encouraged to increase.

Literature review. Pedagogical competence develops as a teacher's pedagogical activity. Pedagogical activity is the work of specially trained teachers who are responsible to society and the state for preparing the younger generation for life and work. [1]

The future teacher should know the following components of his / her pedagogical activity:

- The purpose of pedagogical activity.
- Object and subject of pedagogical activity.
- Means of pedagogical activity.

The system of skills required for a teacher's pedagogical activity to be effective: knowledge, comprehension of the child, observation, speaking skills, organization, foresight, ability to focus, accurate assessment of the situation, emergence timely resolution of all possible contradictions, interest of students in learning. From the content of science to manage the educational process to solve tasks and tasks related to the profession, to approach it from the point of view of pedagogical and psychological education, to model education in the spirit of our national traditions on the basis of modern methods, information on the need for teacher skills for the application of advanced pedagogical technologies in the educational process and systems for their improvement.

Accordingly, "Pedagogical Competence" provides information on pedagogical techniques, pedagogical cooperation, pedagogical delicacy, speech culture for the formation of professional knowledge and skills in teachers, the development of creativity, the acquisition of skills, abilities and maps goes This goal is achieved by the future teacher by regularly performing the following tasks: [2]

- prospective teachers will be equipped with the theoretical and methodological foundations of pedagogical competence.

- have a system of knowledge on the components of the subject of pedagogical competence, such as pedagogical techniques, pedagogical cooperation (communication), pedagogical delicacy, pedagogical ability, pedagogical skills, management of the educational process, speech culture, pedagogical creativity.



- future teachers will develop the need and desire to independently master the secrets of pedagogical competence, reflected in our national traditions and customs and the rich creative heritage of Central Asian thinkers.

- on the basis of the acquired pedagogical-psychological and methodological knowledge, skills and abilities, each prospective teacher forms his own pedagogical competence.

- regularly master the theoretical and practical foundations of the organization and management of the educational process on the basis of the latest modern methods and forms of world standards.

- teachers learn the forms, methods and tools of personal and creative development to improve their professional skills.

Research Methodology. The solution of these goals and objectives teaches the teacher-educator to keep pace with the times, to live with the pain of educating young people and to see the future clearly. Each teacher teaches to use their abilities, knowledge and experience to conscientiously and accurately imagine the current problems, goals and objectives of our country, as well as to develop the skills of a creative approach to pedagogical activity. Thus, in order to have pedagogical competence, a teacher must know his subject in accordance with the requirements of the time, have pedagogical and psychological knowledge and have a sense of humanity, inquisitiveness and dedication. I.P.Rachenko describing pedagogical competence as a part of pedagogical art, writes: an ethical and aesthetic attitude to life, confidence in one's own reasoning and determination". [3]

The professional pedagogical training of teachers is conditionally carried out in the following directions:

- personal training of the teacher;
- Psychological training of the teacher;
- Socio-pedagogical and scientific-theoretical training of teachers;
- The teacher acquires special and specialized methodological knowledge;

Analysis and results. It should be noted that pedagogical competence is a combination of personal and professional qualities of a teacher-educator, which must constantly acquire the factors that ensure the formation of teacher skills, pedagogical-psychological, methodological knowledge. The factors that contribute to the formation of high pedagogical competence are:

- excellent knowledge of the subject in the specialty, at the level of modern, scientific and technical development, the ability to ensure its interaction with other disciplines;

- take into account the age, physiological, psychological and personal characteristics of students, objectively monitor and evaluate their activities;

- democratization and humanization of the educational process;

- have a basic pedagogical, psychological and methodological knowledge to organize the educational process at the level of modern requirements;

- be able to use the opportunities of modern information technology in the teaching of science;

- to be able to "see" the team, to be able to understand and sympathize with the interests and aspirations of students, the difficulties they face, to understand their views

in a timely manner, to intelligently understand the character, abilities, will of each child be aware of the form, method, means of successful exposure;

- have the ability to improve their personal qualities (fluency of speech, organizational skills, artistic needs, taste, etc.). [3]

In conclusion it can be said that the pedagogical competence of a teacher is formed in pedagogical higher education institutions. The requirements for the training of high-level pedagogical staff, the improvement of their skills and the system of retraining, the formation of teachers who can adapt to the continuous development of their profession, will ensure the growth of the national status of future teachers.

While participating in the process of educating a harmoniously developed generation, a teacher should not only be an example to others with his spiritual and moral culture, but also to demonstrate pedagogical skills, to educate a perfect person as a mature teacher, to train highly qualified personnel. Should make a worthy contribution to the work of preparation.[5]

Professional self-improvement is considered today as a specific type of professional activity of teachers as an integral part of their professional training and retraining. Professional self-improvement is the result of a conscious interaction between a teacher and a particular social environment, during which he or she develops personal qualities and skills that ensure success in professional activities and in life in general. The conditions and forms of achieving the highest peaks of professional activity of the teacher's activity and personality are studied seeking forms of self-organization, self-correction and development.

Professional self-improvement of a teacher is a deliberate, purposeful process of improving their professional skills, professional development are important qualities in accordance with external social requirements, conditions of pedagogical activity and personal development program.[9]

Conclusion. If the self-control and correction phase is adequately acted upon, the effectiveness of the specialist's self-improvement will increase significantly. The essence of the activity of the specialist at this stage is that he controls the work on himself, constantly keeps it in his mind (reflects) and on this basis timely identifies possible deviations of the program of self-improvement (or prevents). makes adjustments to the plan for the given, planned, next work. "Thinking begins when there is a deviation from the pattern or a protest from previous schemes". For this purpose, you can keep diaries, plans, schedules, etc., which, through self-reporting, reflect the content, the essence of working on yourself for the past day, week, month. Here, in addition to improving control, specific psychological mechanisms are activated: if the task is written on paper, the person's responsibility for its performance increases significantly.[7]

The ability to analyze one's own experience, evaluate success and construct errors based on internal and external motives helps the teacher determine the next individual trajectory of self-improvement. Such focused introspection can be very effective and is one of the factors that greatly influences the growth of professional skills.

The problem of organizing self-improvement is of a systemic nature, depending on many factors. In solving the problem of organizing teachers self-improvement, there must first be a systematic approach.

References

- [1]. Hoshimov K., Nishonova S. History of pedagogy - T.: Publishing House of the National Library of Uzbekistan named after A. Navoi, 2005. 287-297-p.
- [2]. Wolfson B.F. Sravnitel'naya pedagogika M: «Prosveshchenie», 2003 g.189-190-p
- [3]. Mutalipova M.J. Pedagogical competence - T.: Alisher Navoi National Library of Uzbekistan Publishing House, 2011, pp. 269-270.
- [4]. Alekseeva L. P., Shablygina N. S. Pedagogical staff: the state and problems of professional competence.- M., 1994.
- [5]. Belitskaya G.E. Social competence of the person.- M., 1995.
- [6]. Kuzmina N.V. Professional skills of the teacher and production master.- M., 1990.
- [7]. Markova A.K. Professional psychology.- M., 1996.
- [8]. Mitina L.M. Psychology of professional development.- M., 1998.
- [9]. Petrovskaya L.A. Communication competence.- M., 1989 y.

UDK 378

NATURAL SCIENTIFIC AND SPECIALIED SCIENCES WILL IMPROVE THE PROFESSIONAL TRAINING OF PROFESSIONAL DEVELOPMENT ON THE BASIS OF A STRATIFIED APPROACH IN THE ELECTRONIC ENVIRONMENT

Chorshanbiyev Zafar Esanpulatovich
Karshi engineering-economics institute
PhD on pedagogical sciences,
associate professor
finaledition2@mail.ru

Annotatsiya. Maqolada keltirilgan fikrlar texnika oliy ta'lim muassasasida tahsil oluvchi bo'lajak muhandislarning kasbiy tayyorgarligini tabaqalashtirilgan yondashuv asosida takomillashtirishga imkon yaratadigan elektron ta'lim muhiti modelini ishlab chiqish va amalga oshirish mexanizmlari haqida fikrlar uyg'unligi keltirilgan.

Kalit so'zlar: ingerentlik, tabaqalashtirilgan yondashuv, SWOT tahlil, forum, muammoli vaziyat, onlayn-chat, qiziqarli modellashtirish, ijodiy laboratoriya, intellektual jumboq, kognitiv-faoliyatli.

Annotatsiya. Высказанные в статье взгляды представляют собой совокупность взглядов на механизмы разработки и внедрения модели электронной обучающей среды, которая позволит на основе дифференцированного подхода повысить профессиональную подготовку будущих инженеров, обучающихся в техническом вузе.

Ключевые слова: интеграция, стратифицированный подход, SWOT-анализ, форум, проблемная ситуация, онлайн-чат, веселое моделирование, творческая лаборатория, интеллектуальная головоломка, когнитивно-активный.

Abstract. The views expressed in the article are the combination of views on the mechanisms for the development and implementation of a model of e-learning environment that allows to improve the professional training of future engineers studying in technical higher education on the basis of a differentiated approach.

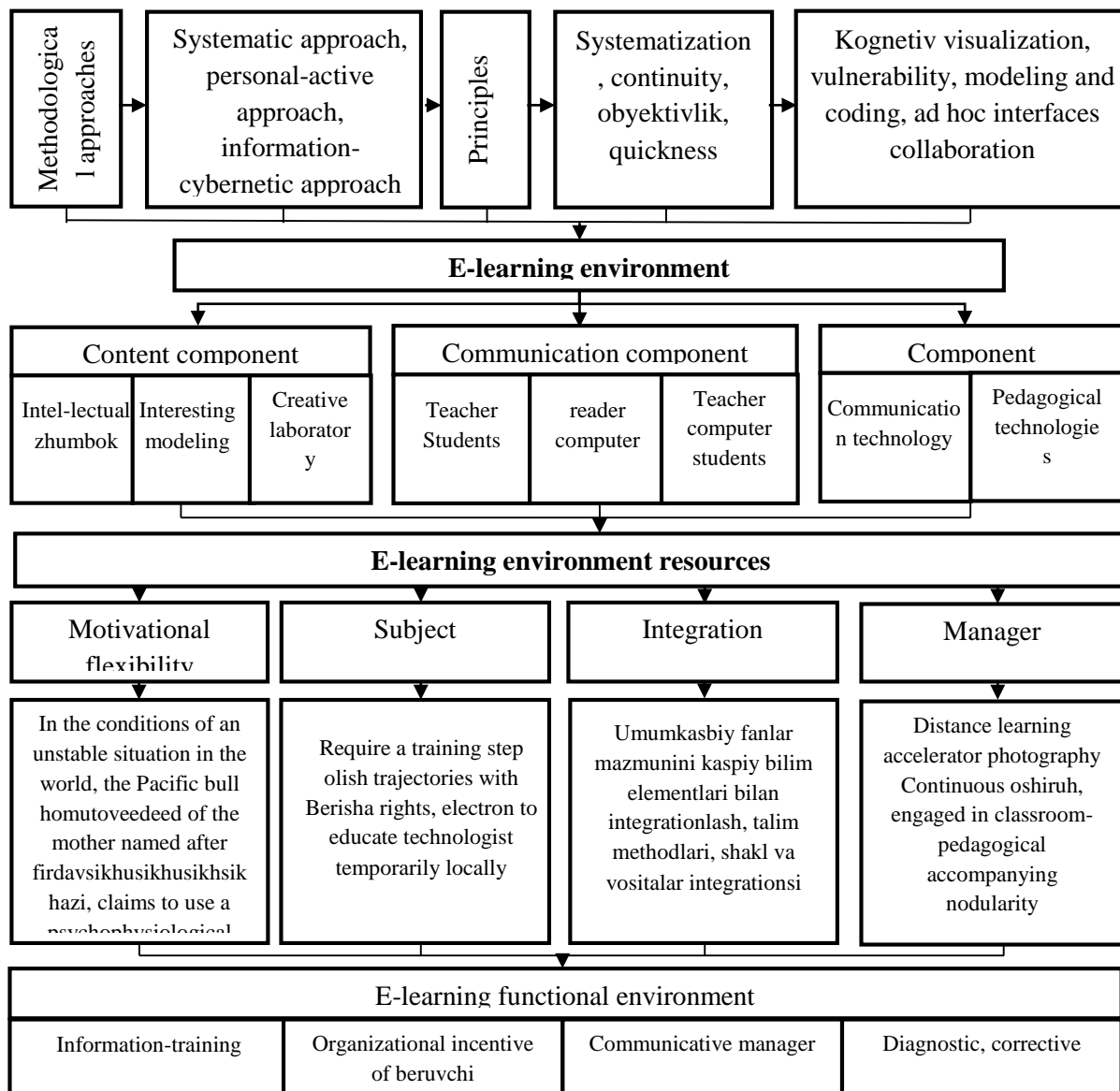
Keywords: integration, stratified approach, SWOT analysis, forum, problem situation, online chat, fun modeling, creative lab, intellectual puzzle, cognitive-activity.

Introduction. Improving the professional training of the future engineers in the e-learning environment is improved in the context of the electronic learning environment presented.

It points to the fact that it is becoming modeled by modeling is much simply simpler, especially:

The Interior desires to what extent is the developed model to the future.

The quality of a adequacy ensures that it is compatible with its original characteristics. Thus, the realization of these properties of the model developed offers the opportunity to achieve the goal.



1-picture. Content of the e-learning environment.

Standards, curricula for design of e-learning environmental model awarded to the training of students in mathematics and special subjects, have been studied, working programs on sciences Competentations Matrices were analyzed, and also discussed with teachers of departments specializing in mathematics and specialty subjects. It should be noted that the process of modeling the electronic learning

environment should be considered in the context of its structural and functional characteristics.

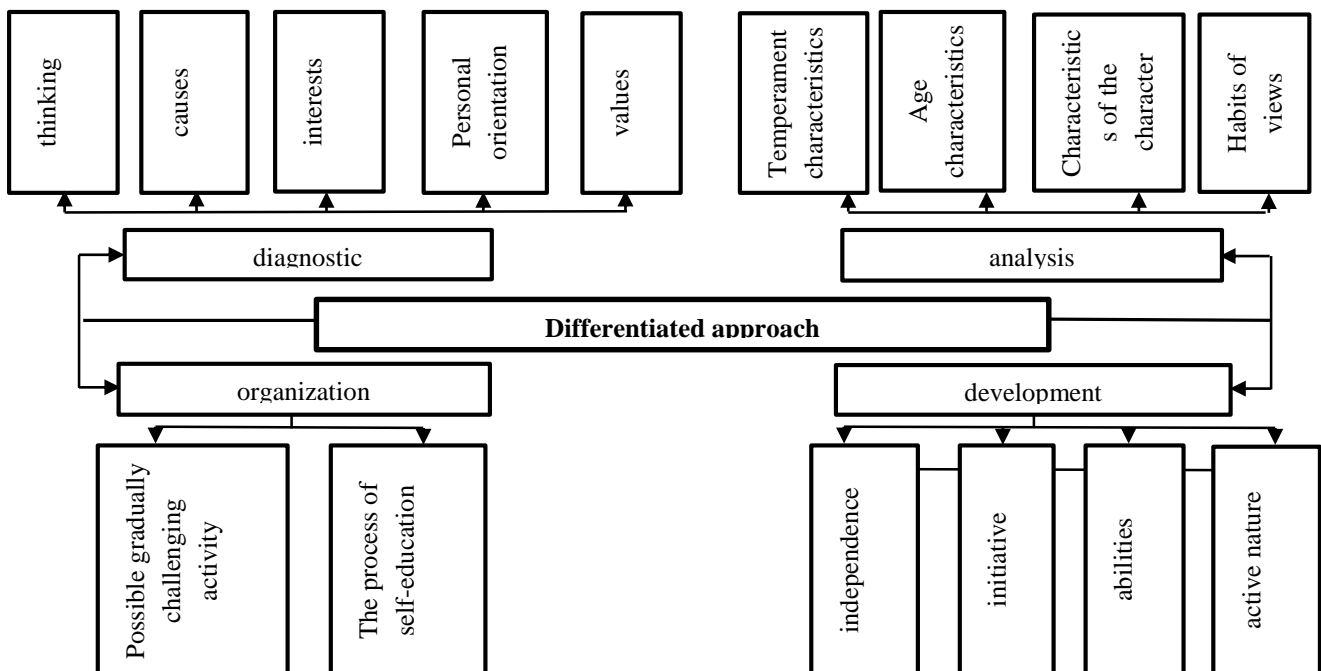
Research Methodology. Theoretical and methodological block represents the theoretical basis for creating an e-learning environment model aimed at improving the professional training of higher education students in mathematics and specialty subjects and is based on the following rules.

The observation of the category "Attention" indicates that the system "perceives" as a source and tool of the environment as a means of use of resources. The environment fills the system, provides it [1; 2]. In this case, the vector of interaction between the system and environment is of no immorality. The system is in an environment and will test constant effects called factors. As a result, there is a condition of the system to claim by an environment, this environment is an important area of scientific research of any natural systems, their analysis and understanding.

The authors point out the main system former function of education at the current level of development - creation of favorable conditions for teaching and educating a person competitive, independent, active person.

Analysis and results. The pedagogical essence of the stratified approach is as follows: the elimination of the mandatory discretion of the educational process, ensuring its continuity; Ensuring the ability and ability to obtain an independent field through the accelerating information fluctuation, enslerance; Add a student to the learning process as a subject, ensuring a whole whole, combined effect on a person [4].

The analysis of the Basic Rules of the differentiated approach allows us to conclude that: the process of improving the teaching of mathematics and specialized subjects in the e-learning environment can be characterized as an integral complex of complex pedagogical Systems, activities and elements that experience the influence of the environment.



2-picture. Didactic functions of the implementation of a differentiated approach in the electronic environment in the process of Higher Education.

We look at the e-learning approach as a key methodological procedure for



implementing the professional training of meetings of prior deplications in mathematics and specialty. The environment can also manifest the formation of a person's formation as a potential to control the formation of the individual and as a means of deciding the competence of the upcoming specialist. In this situation, the main task of the teacher is transforming the environment into an educational direction, in which the main focus is on strengthening the internal activity of the student, self-study, itself, and self-improvement.

It should be noted that the atmosphere of the environment is the ideas of an environment that can be understood as a set of specific educational capacity of certain educational potential is an educational institution of an environment that can be understood as a higher educational institution Allows you to determine the depth and level of impact on the preparation process.

The ideas of this approach served as a basis for creating theories aimed at improving the efficiency of education in mathematical and natural and scientific sciences. Our research contributes to great interest, such as the theory of the concepts, productivity theory, the concept of visual thinking, theory of visual thinking. Under modern conditions, it is demanding the reconsidance of these concepts. In particular, the process of widely distributing and implementing electronic training in educational practice is demonstrating this.

The latest state has determined the issue of reviewing the basics of information and cybernetic approach and its ideas in the field of educational environment, and the issue of improving the professional training of technical training of technical training in mathematics and specialty. This foundation is the synthesis of information and cybernetic approaches. Let's take a closer look at the features of each of them in the context of the learned problem.

In a broad sense, the nature of the information approach is determined by the performance, construction and interaction of complex systems, and the study of an information aspect. Scientists also emphasize the closeness of the system and active approach to the approach. This position is explained by the following factors. First, the information approach is based on the general theory of systems and is aimed at studying the exchange of information between systems. Second, the information is inseparable from it as the measure of the system (system is not information without information). Third, any activity implements information and is based on the reform of existing information.

In the essence of the information approach, the essence of the information approach is expressed and opened through the construction of a very abstract model, a very abstract model of information, the level of information-theoretical knowledge systems. "

This approach is widespread due to the development of programmatic teaching and the use of automated training programs. The studied foundation allows you to display and model the interdependence process between teachers and the interdependence process between teachers, as well as remote technologies and electronic educational technologies; The management will help the management as one of the leading types of activities of the subjects of the educational process. In this case, usually a teacher or curriculum is a managing system, and the student is a managing

system.

The analysis of psychological and pedagogical literature allowed to determine the two main ideas of the cybernetic approach to improving the training of prior deplis in mathematics and specialty training in mathematics and specialty subjects.

By summarizing the above points, we form the main positions of a differentiated approach in the modeling of e-learning in mathematics and specialty subjects. The main concepts are: analysis in terms of the management of pedagogical systems and the relationship between the interaction of information flows; improvement and optimization of education through technical means, study systems, etc. in order to increase the efficiency of the educational process; Management of the learning process by making a reflection between the subjects. In higher education institution, the approaches to the study in the creation of the model of e-learning in mathematics and specialty subjects are represented on the basis of a set of specific principles. The first principles group is basic, specific to the preparation process and its entire development process (systemic, continuity, impartness, speed speed, forecasting, principles). The second principles). The content and characteristics of these principles were revealed in the first chapter.

As we develop an electronic learning environment, we analyze the current electronic resources in mathematics and specializing sciences Analysis During the analysis, the teaching materials partially or to ' The non-matchless, not sufficient interactive, the cognitive visualization principle has been almost not done. Therefore, in the development of the composition of e-learning environments, we relied on the first chapter on the professional training of mathematics and specialty subjects [5; 6].

In this regard, it is necessary to analyze the content of the blocks of study and diagnostic. We will consider mathematics, physics and chemistry as important disciplines in our research, as well as the context of mathematics and specialization in accordance with the requirements of state educational standards.

Content of mathematics and natural sciences applied in vocational education.

Table 1.

Physics	Higher mathematics	Chemistry
Physicistic bases of mechanics	Linear and vector algebra	Nobalectroly and electrolyte mixes
Molecular-kinetic theory and thermodynamics	Analytical geometry	The main laws of the going chemical processes
Electrostatics and constant current	Introduction to mathematical analysis	Electrical technical materials
Magnetic field and electromagnetic induction	Differential and integrated calculation of function	The main methods of research of substances and compounds



Vibration and waves	Differential equations	
Quantic physics	Theory of functions of complex variables	

Based on Table 1, three cases that determine the content of e-learning environments have been developed: "In the eyes of physics engineer," Vehicational Covenics in the eyes of the Engineer ", " Bin of Chemical Discoveries ". E-learning is available to change and repair the cases provided due to the openness of the environment. This fact is very important because it takes the characteristics of different directions of teaching.

It should be noted that tasks in the preparation of future engineers are playing an important role. First, their use ensures the integrity, technology and seizure of the educational process [5; 6]. Second, students use their knowledge and use their skills, the skills of analysis, modeling and diagnosis of their skills. This, in turn, contributes to the formation of the cluster of competers provided in the study. Practical description of the process of preparation of future engineers plays special importance (practical tasks). This can be seen as the tasks outside mathematics and resolved in mathematical methods.

Third level assignments - Creative tasks include open or partial open type tasks. Open types of open assignments have a bit confusing, how it is difficult to try to move, what to use the issue, but the necessary result is understandable. Partially in the open-type tasks can be a "immortal part" or "excess". At the same time, their solution may include familiar activity algorithms that are familiar to the student.

Such tasks provide for various ways of the solution, help to form research and reflection skills, diagnostic skills. In the preparation of future engineers, this type of task is very important than one position, which allows us to apply a non-standard way of thinking in the realization of the idea of an Evertisciciary (higher education in addressing tasks. Stage of preparation of future engineers in mathematics and specialty mathematics and specialty training centers).

In solving this type of problems, usually students who are usually high motivated, who are able to judge themselves. They will have the ability to improve mathematical hardware and natural scientific knowledge in emergencies, and have the ability to interpret the possible consequences of data.

The experience of using video lectures in the professional training of meetings in mathematics and specialty professionals has allowed us to allocate its main opportunities:

- showing various experiences in the context of real training experiences, conducts difficulties or impossible;
- Presentation of modern technologies and technological processes carried out in real industrial enterprises;
- Idlitional advice of physical, mathematical, chemical models.

Conclusion. The e-learning environment listed is possible in the framework of the web seminars of a differentiated approach. Webinar (abbreviated from the word



"Webinar", "Web-Based seminar") - online seminar, lecture, presentation, these are organized in direct broadcast mode using web technologies. is to do. This approach, one of the main tasks of the teacher is the rational selection and use of proposed methods, forms and teaching methods depend on students' level and direction, learning materials and others.

References.

- [1]. Mur, M. Ispol'zovanie IKT v distansionnom obrazovanii: spes. kurs /M. Mur, L. Blek ; per. s angl. - M.:ID «Obuchenie- Servis, 2006. - 632 s.
- [2]. Afanas'ev, V. G. Sistemnost' i obshestvo /Afnas'ev V.G.. - Izd.2 - B. m. : URSS, 2018. - 368 s.
- [3]. Bepal'ko V. P. Pedagogika i progressivnie texnologii obucheniya. M . : Pedagogika, 1996. – 243 s.
- [4]. Chorshanbiev, Z. E. (2021). DIFFERENSIROVANNOE OBUChENIE STUDENTOV NA ZANYaTIYax VISShEY MATEMATIKI V TEXNICHESKOM VUZE. Academy, (4 (67)), 42-47.
- [5]. Gorev P.M., Utemov V.V. Nauchnoe tvorchestvo: prakticheskoe rukovodstvo po razvitiyu kreativnogo mishleniya. -M.: Knijniy dom “Librokom”, 2013. -112 s.
- [6]. Juykova O. V. Organizasiya samostoyatel'noy raboti studentov-budushix injenerov pri izuchenii graficheskix dissiplin v texnicheskom vuze. avtoreferat dis. ... kandidata pedagogicheskix nauk : 13.00.08 . –Kazan'. – 2014. 24s.
- [7]. Suprunova L.L., Ivanova A.V. Differensirovanniy podxod k obucheniyu v visshey shkole SShA // Pedagogika. - 1998. - № 8. - S. 105-112.
- [8]. Chorshanbiev Z.E. Kredit modul tizimida talabalarning kasbiy tayyorgarligini tabaqalashtirilgan yondashuv asosida amalga oshirish mazmuni //Ta'lim, fan va innovatsiya. -2021 - №5. B. 14-20.
- [9]. Chorshanbiev Z.E. Differensirovannoe obuchenie studentov na zanyatiyax visshey matematiki v texnicheskom vuze. Academy, 2021, №4 (67), S.42-47.
- [10]. Chorshanbiev Z.E. Ta'limda tabaqalashtirilgan yondashuvni joriy etish ijtimoiy pedagogik muammo sifatida // Mug'allim hem uzliksiz bilimlendirio'. № 4/1 Qoraqalpog'iston-2021-y. B. 31-36.

UDC: 881.111.1

THE SPECIFIC FEATURES OF PROFESSIONAL TERMS IN LINGUISTICS**Erdanova Zebiniso Abulkasimovna**
Samarkand State Institute of foreign
languages**Teacher of the Department of English**
lexicology and Stylistics[**prestonzebo1987@mail.ru**](mailto:prestonzebo1987@mail.ru)

Annotasiya. Mazkur ilmiy maqolada jamiyatimizda yangi kasb-hunar turlarining paydo bo'lishi, tilshunosligimizda kasbiy atamalarning ishlab chiqilishi va faollashuvi yoritilgan. Tilshunoslarni kasbiy juft so'zning leksik-semantik sohasida ikki leksemaning umumiy qo'llanilishi qiziqtiradi. Inson faoliyatini tavsiflovchi atama va iboralarning rivojlanishi tilga "assimilyatsiya" atamasining kirib kelishi bilan bog'liq. Terminologiya, aslida, nutqimizda muayyan soha yoki ishlab chiqarish sohasida lisoniy birliklarning paydo bo'lishi, shakllanishi, tarkibi va qo'llanilishini o'rganadigan va tahlil qiladigan sohadir.

Kalit so'zlar: atamashunoslik, kasb-hunar, tilshunoslik, so'zlarni o'zlashtirish, terminologiya, terminologiya, terminologiya, funksional lug'at.

Аннотация. Эта научная статья описывает появление в нашем обществе новых профессий, развитие и активизацию профессиональных терминов в нашей лингвистике. Лингвистов интересует общее употребление двух лексем в лексико-семантическом поле слова профессиональная пара. Развитие терминов и словосочетаний, описывающих деятельность человека, связано с введением в язык термина «ассимиляция». Терминология - это фактически отрасль, которая изучает и анализирует возникновение, формирование, состав и использование языковых единиц в определенной области или области производства в нашей речи.

Ключевые слова: терминология, профессия, языкознание, усвоение слов, терминология, терминология, терминология, функциональная лексика.

Abstract. This scientific article describes the emergence of new professions in our society, the development and activation of professional terms in our linguistics. Linguists are interested in the general use of two lexemes in the lexical-semantic field of the word professional pair. The development of terms and phrases that describe human activity is associated with the introduction of the term "assimilation" into the language. Terminology is actually the branch that studies and analyzes the emergence, formation, composition, and use of language units belonging to a particular field or field of production in our speech.

Keywords: terminology, profession, linguistics, assimilation words, terminology, terminology, terminology, functional vocabulary.

Introduction. In the National Encyclopedia of Uzbekistan, the word "atama" is now widely used with words such as "term", "terminology". However, these words do not fully interpret the word "term". According to the encyclopedia, the word "term" is

used to refer to geographical objects, well-known names, while the word "term" is mostly used in historical texts. However, O. Akhmedov distinguishes the concepts of "atama", "term", "terminology", "nomenclature", and the terms have a common lexical-semantic pattern, which is transferred to the vernacular through a certain terminological system. After all, terms and common words are complementary lexical units ... ” Language units are those that serve to enrich and shape language vocabulary using terms.

Nowadays, the field of terminology is developed in linguistics until the 1960s, scholars conducted research on such concepts as “terminological system” (D.S. Lotte), “terminological field” (L.A. Kapanadze). In particular, D. As Sageder puts it: “Rapid development and the advancement of technology required not only the appearing of new concepts, but also an agreement on the use of terms. As a practical result, terminological work began to be organized within certain specialized areas (specialties).

Therefore, Russian scholar A.V. Superanskaya explains the term as follows: “The term is a special word that is accepted in a particular professional activity and used in certain areas, conditions. A term is a concept that is part of a system of concepts that is a specific area of professional knowledge and is expressed in words. The term is a basic conceptual element of a language intended for special purposes. Within its own terminological field, the term is used in a sense. The same terms used in different fields are homonyms. The term requires a special definition in order to be understood correctly”. The official recognition of the concept of "terminology" at a scientific symposium at Lomonosov Moscow State University was a great achievement. From this time the rapid development of this field in 1969 was achieved.

Research methodology. Linguists present many scientific views in order to regulate and classify the system of terminology. In particular, Sven Jakobson classifies the concept of terminology as follows: "... the lack of standardization in the terminology of the social sciences has led to an unlimited increase in new concepts in a number of disciplines." In his article "Three types of terminologies" the scientist systematizes the terminology and there are three types of classification of terms in different areas:

- a) *academic or professional terminology that is subject to standardization, allows to avoid misinterpretation, and is highly compatible as a result of terms and extralinguistic factors;*
- b) *academic or professional terminology that has a greater impact on the active use of the term by the user;*
- c) *terminology that occurs in the periphery of the terminological system and the common language, and in many cases has a developmental orientation similar to that of ordinary language, despite attempts to normalize it.*

The article emphasizes that the terms of the first round are of great importance for science and technology.

Analysis and results. The lexical meaning of the terms belonging to the Uzbek language can identify the performer of the activity and also divide it into lexical-semantic groups:



For example, we call people engaged in weaving activities as *chitfurush* (*person who prepare materials with cotton*), *shoyifurush* (*person who prepare materials with silk*), shopkeeper, *ghazalafurush* (*person who prepare materials*), seller and so on.

The development of society gives an impact on modern linguistics. Along with the emergence of new fields, the entry of language units belonging to them into the language dictionary and their assimilation into human activity are closely related phenomena.

It is known that in recent days the attention of linguists has been drawn to the introduction and formation of terms in the field of computer science, economics, politics, law and medicine.

If we analyze many terms related to the banking and financial system in Uzbek and English, we will be interested in how the terms of banking and finance, exchange, which are available in English, are expressed in Uzbek, their stages of formation and development. Common terms in banking and finance, which are the main part of the economy: *currency market* – валюта бозори; *gross national product* – умумий миллий маҳсулот; *global quota* – умумий квота are divided into separate groups.

As far as we know, there are many meaningful words in the vocabulary of the language. Such ambiguous terms are “banking and financial terms are special polysemantic lexical units. For example: "quote" - 1) the contribution of participants in the production or sale of a national or international association under the relevant agreement; 2) the country's contribution to the charter capital or capital of an international economic or financial-monetary organization; 3) the tax rate levied per unit of taxation; 4) part, contribution, norm, quantitative restrictions of something »

The widespread use of terms related to social spheres in the lexicon of language increases their level of belonging to a particular field in a narrow sense.

Today, along with the development and improvement of the Uzbek economy, there are a number of problems with the direct introduction of economic terms.

The development and improvement of terminology in the Uzbek economy took place in two stages: the lexicon of the Uzbek language develops on the basis of other language elements (foreign language words and phrases). Often includes terms learned from Persian-Tajik, Arabic, and Russian; the second stage is the formation of new terms using existing word-formation tools in the Uzbek lexicon.

In the English lexicon, Internet terms are mainly in the form of equestrian compounds, ie “internet + horse” are complex internet terms: *broadcast*, *keyword*, *key shelf*, *keycap*, *fieldbus*, *datagram*, *chatbot*, *chatterbot*, *card bus*, *backbone*, *checkpoint* and other languages. Numerous studies have shown that these terms have come from common vocabulary or other field terminology and have become internet terms as a result of the shift in meaning: *checkpoint*, *checksum*, *callback*, *databank* and others.

Conclusion. Indeed, the role of terms in the development, formation and content of linguistics is incomparable. The terms used in each field are mainly formed in the speech of the representatives of that field and become a means of interaction.

We know that terms frequently used in the speech of existing field representatives may mean an incomprehensible or abstract concept by other distant



field representatives: For example: in linguistics: *assimilation, reduction, dissertation, lexicography*.

If we analyze the lexical-semantic properties of terms, the term differs primarily in terms of *sema (meaning)*. The ambiguity and scientific significance of the term differs in the order in which it is used in speech. This is because determining the extent and extent of the use of terms attracts the attention of many researchers.

The rapid development of technology in society is leading to the emergence of new professions and activities, as well as the introduction of terms, terms and language units in speech.

References:

- [1]. Axmedov O.S. Linguistic analysis and translation problems of tax and customs terms in English and Uzbek: Filol.fan.d-ri. ... diss. –T., 2016.
- [2]. Axmedov O.S. and others. English-Uzbek dictionary of banking, finance and tax terms. - Tashkent: Economy and Finance, 2018. - B. 132
- [3]. National Encyclopedia of Uzbekistan. –T .: 2000. - B.323.
- [4]. Sageder D. Terminology Today: A Science, an Art or a Practice? Some Aspects on Terminology and Its Development Brno Studies in English Volume 36, No. 1, 2010. <http://www.phil.muni.cz/plonedata>
- [5]. Superanskaya A.V. Common terminology. - M., URSS, 2003. - p. 56
- [6]. Sven Jacobson. Three types of Terminologies, 1984. – 355 Euralex.org <http://www.euralex.org/elx>
- [7]. Xusanov N. Texts of lectures on the subject "Language of specialization". -T .: TMI, 2001



ACTUAL PROBLEMS IN MODERN ART AND ARCHITECTURE

UDC: 7.092

AL-FARABI'S CONTRIBUTION TO WORLD MUSIC CULTURE

Karimova Naila Minnigayanovna,
associate professor,
department of music education,
Termez State University,
Termez, Uzbekistan.
normurodov.oibek@mail.ru

Karimova Kamilla Vyacheslavovna,
Lecturer,
department of music education,
Termez State University,
Termez, Uzbekistan.

Annotatsiya: Maqola umuminsoniy ma'naviy-madaniy merosda yorqin iz qoldirgan arab-musulmon o'rta asr Sharqining atoqli olim-entsiklopedisti va faylasufi Abu Nasr Forobiy ijodiga bag'ishlangan. Forobiyning estetik merosida garmoniya nafaqat olam borligining mezoni, balki she'riyat va musiqaning asosi hisoblanadi. Al-Forobiyning musiqiy merosini o'rganish va tahlil qilishda musiqa fanining keng va murakkab nazariy asoslarini qayd etish mumkin. Al-Farobiyning musiqa va musiqiy garmoniya haqidagi bir qator nazariy kontseptsiyalarida musiqa va olam o'rtasidagi bog'liqlik haqiqatan ham o'z ifodasini topgan.

Kalit so'zlar: madaniyat, musiqa san'ati, cholg'u asboblari, garmoniya, peripatetizm, renessans.

Аннотация: Статья посвящена творчеству выдающего ученого-энциклопедиста и философа арабо-мусульманского средневекового Востока Абу Насра аль-Фараби, оставившего яркий след в общечеловеческом духовном и культурном наследии. В эстетическом наследии аль-Фараби гармония выступает критерием существования не только мироздания, но она выступает основой поэзии и музыки. Изучая и анализируя музыкальное наследие аль-Фараби, можно отметить обширную и сложную теоретическую основу музыкальной науки. Ряд теоретических концепций аль-Фараби о музыке и музыкальной гармонии действительно отражает связь между музыкой и универсумом.

Ключевые слова: культура, музыкальное искусство, музыкальные инструменты, гармония, перипатетизм, ренессанс.

Abstract: The article is devoted to the work of the outstanding scientist-encyclopedist and philosopher of the Arab-Muslim medieval East Abu Nasr al-Farabi, who left a bright mark on the universal human spiritual and cultural heritage. In the aesthetic heritage of al-Farabi, harmony is a criterion for the existence of not only the universe, but it is the basis of poetry and music. Studying and analyzing the musical heritage of al-Farabi, one can note the vast and complex theoretical basis of musical

science. A number of Al-Farabi's theoretical concepts of music and musical harmony truly reflect the connection between music and the universe.

Key words: culture, musical art, musical instruments, harmony, peripateticism, renaissance.

Introduction. In the Address of the President of the Republic of Uzbekistan Shavkat Mirziyoyev to the Oliy Majlis, it was mentioned that science and education have the paramount importance for increasing the intellectual and spiritual potential of not only young people, but also our entire society. Where science does not develop, there is regression, the backwardness of society in all spheres. The great thinkers of the East said: “The greatest wealth is reason and science, the greatest inheritance is a good upbringing, the greatest poverty is the lack of knowledge” [1].

Science in its development is based on the historical experience of the wisdom of past eras. The whole world is known for outstanding discoveries in the field of mathematics, astronomy, medicine, social science, philosophy, such our great ancestors as Muhammad al-Khorezmi, Abu Raikhan Beruni, Abu Ali ibn Sina, Mirzo Ulugbek and many others. Among these thinkers in the development of world philosophical thought, a special place is occupied by the views of the founder of Arabic-speaking peripateticism, Abu Nasr al-Farabi, who is also considered as a founder of the humanistic tradition, the moral and ethical views of the medieval East, who during his lifetime deserved the honorary nickname “Muallimus Sonya” which means “Second Teacher”, which determined his place after the famous Aristotle. Farabi made a significant contribution to musicology. His main work in this area is the «Big Book of Music», which is the most important source of information about the music of the East and the ancient Greek musical system. In this work, he noted that only hearing is critical in identifying sounds.

Al-Farabi was truly a world-class man, he brought together and synthesized in his work the most valuable achievements of the Arab, Persian, Greek, Indian and his own, Turkic culture. E.E.Bertels wrote about the thinker: “Al-Farabi is the author of the greatest creations. Al-Farabi's legacy is the author of the greatest creations. Al-Farabi's legacy is endless and diverse. He wrote an enormous amount of works on music theory. He was widely known as a composer, is the creator of a new musical instrument. «Al-Farabi is an excellent musician and music theorist. He knew how to use all the musical instruments of his time. Music was considered one of the areas of mathematical science, which included arithmetic, geometry and astronomy. His works dedicated to music are «Kitabul-musikiy al-kabir» (Big book on music), «Kilamufil-musikiy» (Book about the methods of music) and others. One of the followers of al-Farabi's path was Abu Ali ibn Sino.

Describing al-Farabi as one of the leading medieval music theorists, the famous researcher of Arabic music GJ Farmer writes: “Al-Farabi was probably the greatest author of music theory during the Middle Ages. His consideration of theoretical science (music) not only advanced what was done by the Greeks, but did not exist in Western Europe.

Literature review. The relevance of this work is devoted to the study of the concept of musical science of the outstanding Arab-Muslim philosopher, scientist and music theorist Abu al-Farabi in the treatise «The Big Book of Music» - «Kitab al-

Musika al-Kabir». The greatest monument of the «Muslim Renaissance» (X century), took scientific interest in which arose already in the Middle Ages (XI-XIII centuries) and, with the development of musicology, grew and specialized. In the XX century. traditions of considering the musical-theoretical system of al-Farabi are continued in the works of the greatest researchers of Arab music - G.J. Farmer, and R.D. Erlange. T.S.Vyzgo, I.O.Radzhabov, O. Matyakubov, A.B.Djumaev, A.F.Nazarov and others studied the musical theoretical views of Farabi in Russian literature. They tried to reveal and define the problems of correlation between the theory and practice of music in the writings of al-Farabi. In search of landmarks, let us turn to the values of the past.

Analysis and results. The aim of the study is to provide a systematic historical and typological cultural understanding of the problem of artistic development at different stages of the formation of culture and art. As a result, it is supposed to identify the function of culture at different historical stages, in the development of a person's essential forces at different stages of life. The inclusion of each person in the past, present and future of culture. Today there is a need to understand education as a mechanism for the development of culture based on both socio-cultural realities and cultural orientations. This is evidenced by ancient written sources relating to the history of the musical art of the people of Central Asia, which prove the presence of a high culture of these peoples. Their best examples were highlighted in the works on the music of the Central Asian scientists of the Middle East Al-Farabi (9-10 centuries), Ibn-Sina (10-11 centuries), Al-Khwarizmiy (11 century) and FakhruddinAr-Razi, which became a composite partly in the European musical-theoretical science, which received brilliant development in the subsequent era. Al-Farabi, in his works devoted to music, substantiated the theory of the music of the East. His works dedicated to music are «The Big Book on Music», «The Book on the Methods of Music» and others. Al-Farabi's books on music theory were the most complete and well-known in the East and served as a source for the works of subsequent scholars of musicology. Farabi regarded music as an integral part of the model of happiness, or harmonious being. According to his socio-ethical views, musical art is a conductor of virtue, a guarantor and at the same time a sign of happiness and virtue.

The treatise «The Big Book of Music» was the result of titanic work and talent, the fruit of the entire life of a thinker. This encyclopedic and synthetic work covers the problems of the theory of knowledge, logic and aesthetics, poetry and pedagogy, acoustics and instrumentalities, physics and mathematics; consistently and systematically covers the theory and practice of musical art. She has absorbed everything valuable that was created by the geniuses of the past.

The content of this treatise, firstly, showed that a musical theory arose in medieval Islamic culture, reflecting the specific level of development of musical culture and its specifics. Secondly, it demonstrated that a theory of the sound of musical instruments that were widespread in the Arab-Muslim East during that historical period appeared in a systematic form. The doctrine of musical harmony developed here is of great value. In the aesthetic concept of al-Farabi, harmony is not only a criterion for the existence of the universe. She acts as the basis of poetry and music. Harmony for him is the basis of musical art. Al-Farabi's concept of music and musical harmony reflects the connection between music and the universe.



The term «music» is defined by the thinker as a melody. Characterizing the art of music as a melody, the thinker gives the following definition: «musical art is what deals with melodies (songs) and what makes them harmoniously composed, thanks to which they become more perfect and more enjoyable». “Most importantly, the perfection of music depends on the professional” says al-Farabi. A person who studies music must be, first of all, a theoretician.

Based on this, al-Farabi examines the theoretical and practical foundations of musical art in unity.

Major historians of culture and science noted the greatness and uniqueness of the Farabi figure. Astronomy, logic, theory of music and mathematics, sociology and ethics, medicine and psychology, philosophy and law - this is the list of his interests. Apparently, even in his younger years, Farabi left his hometown and practically visited all cities associated with Islam and the Arab Caliphate, in Bukhara, Merv, Alexandria, Cairo, Damascus, Baghdad. He spent many years of his life in Baghdad, which was the political and cultural center of the Arab Caliphate. Here he thoroughly replenishes his knowledge, studying the works of the figures of «Beit al-Hikma», a translator of Greek authors, comes into contact with prominent scientists and after a certain time takes a leading place among them due to his moral height and power of thought. It was here that he was awarded the title «Muallim Assana» - the Second Teacher. The title of «second» means the presence of the «first», who is Aristotle.

Indeed, they have much in common: the breadth and versatility of scientific interests, the desire to philosophically understand the existence and place of man in it, the proximity to the «generally accepted opinion», to the practical everyday wisdom of the people.

In the writings of al-Farabi, there is no sharp separation of philosophy and private sciences. In this matter, he is characterized by the attitude to the system of knowledge that developed in his era. Before proceeding to the merits of the case, two introductory remarks.

First, al-Farabi highly values the authority of science and people involved in it. Science requires people of a pure heart, high thoughts, devoid of all vanity and petty selfishness. The atmosphere of scientific research forms the culture of a person, his ability to be objective and bow to the truth.

Secondly, the study of al-Farabi's contribution to science and art is of fundamental importance from the point of view of refuting those who speak about the absence of original thinking in the «East», because the development of natural science, in essence opposite to mysticism and superstition, is a fact of extreme importance.

On the issue of the perception of musical sounds, al-Farabi, in contrast to the Pythagorean school, which did not recognize the authority of hearing in the field of sounds and took only calculations and measurements as the starting point of reasoning, believes that only hearing is decisive in determining sounds, adjoining in this matter to the harmonic school of Aristoxenus.

The fact that al-Farabi methodologically correctly solves a number of issues related to the mathematics of the science of nature deserves special mention. Using the theory of music as an example, he demonstrates the fruitfulness of the application of mathematical methods in the study of the objective laws of nature and art. He

completely lacks the numerical mysticism inherent in the musical teaching of the Pythagoreans. With all due respect to the heritage of the ancient Greeks, al-Farabi does not bow before the authorities, to the new achievements of natural science. An example is al-Farabi's criticism of the theory of music and the cosmology of the Pythagoreans.

The opinion of the Pythagoreans that the planets and stars, when they move, generate sounds that are harmoniously combined, he considers erroneous. The assumption that the movement of heavenly bodies can generate any sound is untenable. Scientific interest in the cultural heritage of Abu Nasr is of great interest today in Uzbekistan and abroad. Over a thousand pages manuscript, completed approximately in the first half of the 10th century. According to some reports, in 943, she presented a new direction for her time in musicology.

Conclusion. Thus, the name of al-Farabi has firmly entered the history of world science and culture. His works, had a great influence on the European Renaissance, became a connecting bridge for the convergence of cultures and philosophies of the West and the East.

Thanks to Al-Farabi, a new direction in the development of the sciences and arts of that time began. Being talented in everything, Al-Farabi devoted a lot of time to musicology. So, he gave the concept of musical sounds, described their nature and found out from which categories and elements any musical work is built.

Honoring the memory of the great scientist-encyclopedist on an international scale is evidence of the need to master the cultural heritage of the past as the most important link in the struggle for social progress, for humanism. Farabi thought as a reformer of pedagogy, striving to bring knowledge into the mass of the people, to combine enlightenment with the development of humanity in people.

Al-Farabi was truly a thinker of world significance, a symbolic figure of the Islamic world during the so-called «Golden Age», who synthesized in his work the achievements of Arab, Persian, Greek, Indian and Turkic culture and, thus, made a valuable contribution to the treasury of socio-philosophical, ethical-aesthetic, natural-scientific world thought.

Al-Farabi is a man of the world who, in his search for knowledge and truth, managed to overcome existing differences in ethnic, cultural, linguistic, religious grounds and bring together various cultural traditions. Having generalized the achievements of the material and spiritual culture of his era, he created a progressive humanistic system. And today the words of the Great Teacher of the past al-Farabi are very relevant: “The whole earth will become virtuous if peoples help each other to achieve happiness” [2]. More than ten centuries separate the era of al-Farabi from us. During this time, humanity has made tremendous progress in all areas of knowledge, but one should always remember about those who pave the way to the truth. They laid bricks in the foundations on which modern culture is built.

References:

- [1].Poslanie Prezidenta Respubliki Uzbekistan Sh.M.Mirziyoeva Oliy Majlisu 25 yanvarya 2020 g.
- [2].Al'-Farabi. Traktat o vzglyadax jiteley dobrodetel'nogo goroda / Al'-Farabi. Filosofskie traktati. – Alma-Ata, 1972.

UDC: 666.9-127

CERAMZITE FILLER BASED ON CLAY GURLEN DEPOSIT**Boyjanov Islom Razhabboevich****Ph.D., Assoc. Doctoral student of the Department
of Chemical Technologies,
Urgench state university****Duschanov Sanat Kuramboevich
Researcher for the Department of
Chemical Technologies
Urgench state university****Masharipova Husnibonu Farhadovna
Assistant teacher of the department
"Construction",
Urgench state university****Allamov Rakhmatulla Gulmirzaevich
PhD student of the Department
of Chemical Technologies,
Urgench state university
sduschanov@bk.ru**

Annotasiya: Gurlan koni gili xarakteristikalarini o'rganish natijasida uni gidroslyudali yengil suyuqlanuvchan gillar turkumiga kirishi aniqlandi. Gurlan koni gili asosida yog'-moy korxonalari chiqindisi - paxta gudronini ishlatib yuqori sifatli keramzit olish imkoniyatlari o'rganildi. Xom-ashyo aralashmasi tarkibiga ma'lum miqdorda paxta gudronini qo'shish uni ko'pchishini oshirishi aniqlandi.

Kalit so'zlar: gil, keramzit, g'ovak to'ldiruvchi, issiqlik izolyasiyalovchi material, gilsimon jins, ko'pchish, issiqlik ishlovi, organik qo'shimcha, paxta gudroni.

Аннотация: В результате исследования характеристика глины Гурленского месторождения установлено что, Гурленская глина относится к классу легкоплавкого глинистого сырья гидрослюдистого типа. Исследована возможность получения высококачественного керамзита на основе глины Гурленского месторождения с добавками отхода местных масло-жировых комбинатов хлопкового гудрона. Определено, что введение в сырьевую смесь хлопкового гудрона в указанных пределах значительно повышает вспучиваемость.

Ключевые слова: глина, керамзит, пористый наполнитель, теплоизоляционный материал, порода, вспучивание, термическая обработка, органическая добавка, хлопковый гудрон.

Abstract: The article explores the possibility of obtaining high-quality keramzite based on the clay of the Gurlen deposit of the Republic of Uzbekistan with additives for waste from local oil and fat factories of cotton gudron. It has been

determined that the introduction of cotton gudron into the raw mixture within the specified limits of the content significantly increases the swelling.

Key words: clay, keramzite, porous aggregate, heat-insulating material, rock, swelling, heat treatment, organic additive, cotton gudron.

Introduction. Due to the limited nature of porous aggregates, as well as reserves of raw materials such as perlite and vermiculite, the demand for such materials in the Republic of Uzbekistan today is mainly covered by the production of expanded clay filler. On the territory of Uzbekistan, well-swollen bentonite and hydromica clays suitable for the production of expanded clay are scarce. Most of them are located far from the place where the organization of expanded clay production is possible [1].

From the foregoing, it can be seen that expanding the raw material base of the Republic of Uzbekistan for obtaining expanded clay aggregate is an urgent task.

Literature review. The colossal scientific and practical work of obtaining expanded clay from clay minerals was carried out with S.P. Onatsky [2], modern research on obtaining expanded clay are described in [3].

In the production of expanded clay, various organic additives are used to increase the swelling of clay. According to their physical state, organic additives are divided into solid and liquid. As liquid additives used diesel oil, fuel oil, petrolatum, anthracene, pyrolysis resin, shale oil, sulfide alcohol stillage (SSB), and from solid - ground coal, sawdust, gumbrin, etc. [4].

In addition to the above known organic additives, in the production of expanded clay, researchers have also studied the use of organic additives of acid oil tar [5], oil sludge [6], and other industrial wastes.

One of these organic industrial waste is cotton tar. Cotton tar (gossypol resin) is a homogeneous viscous-flowing mass from dark brown to black color, containing from 52 to 64% of crude fatty acids and their derivatives, as well as products of condensation and polymerization of gossypol and its transformations formed during the extraction of oil, mainly thus, in the process of distillation of fatty acids from soap stocks [7].

Since in oil and fat factories of the Republic of Uzbekistan cotton seeds obtained from cotton grown in the Republic are mainly used to obtain vegetable oil, cotton tar in these factories in the process of distillation of fatty acids from soap stocks is released as waste in huge quantities. Proceeding from this, we chose cotton tar as a liquid organic additive to obtain expanded clay [8].

Research Methodology. GOST 9169-75, GOST 9758-86, GOST 32026-2012 и GOST 9757-90, modern methods of physical and chemical analysis, such as chemical, X-ray, complex thermographic, etc.

Analysis and results. In this work, we investigated the physicochemical properties of clay from the Gurlen deposit and the possibility of obtaining high-quality expanded clay on its basis with the addition of cotton tar.

Clay of the Gurlen deposit, located in the Khorezm region and is located close to the settlements of the Tuprakkala region, with the necessary infrastructure [9].

The results of chemical analysis show that the clay of the Gurlen deposit is a raw material that is homogeneous in chemical composition, the chemical composition of the samples under study is presented in Table 1.

Table 1.

Results of chemical analysis of clay from the Gurlen deposit

Content of oxides, mass %									
SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	SO ₃	TiO ₂	Na ₂ O	K ₂ O	П.П.П
59,00	17,64	5,53	0,23	1,35	0,25	0,58	2,40	2,22	10,04

According to the results of X-ray analysis, the presence of the following minerals was established: muscovite c d=0,997; 0,498; 0,334; 0,256; 0,212; 0,181; 0,137 нм, hydromuscovite c d=0,340; 0,239; 0,199; 0,138; 0,129 нм, quartz with d=0,425; 0,334; 0,245; 0,228; 0,223; 0,212; 0,197; 0,181; 0,154; 0,138 нм, kaolinite with d=0,714; 0,446; 0,228; 0,137 нм, sericite with d=0,245; 0,223; 0,199 нм, montmorillonite with d=0,131 нм, biotite with d=0,140 нм and chlorite with d=0,140; 0,199 нм.

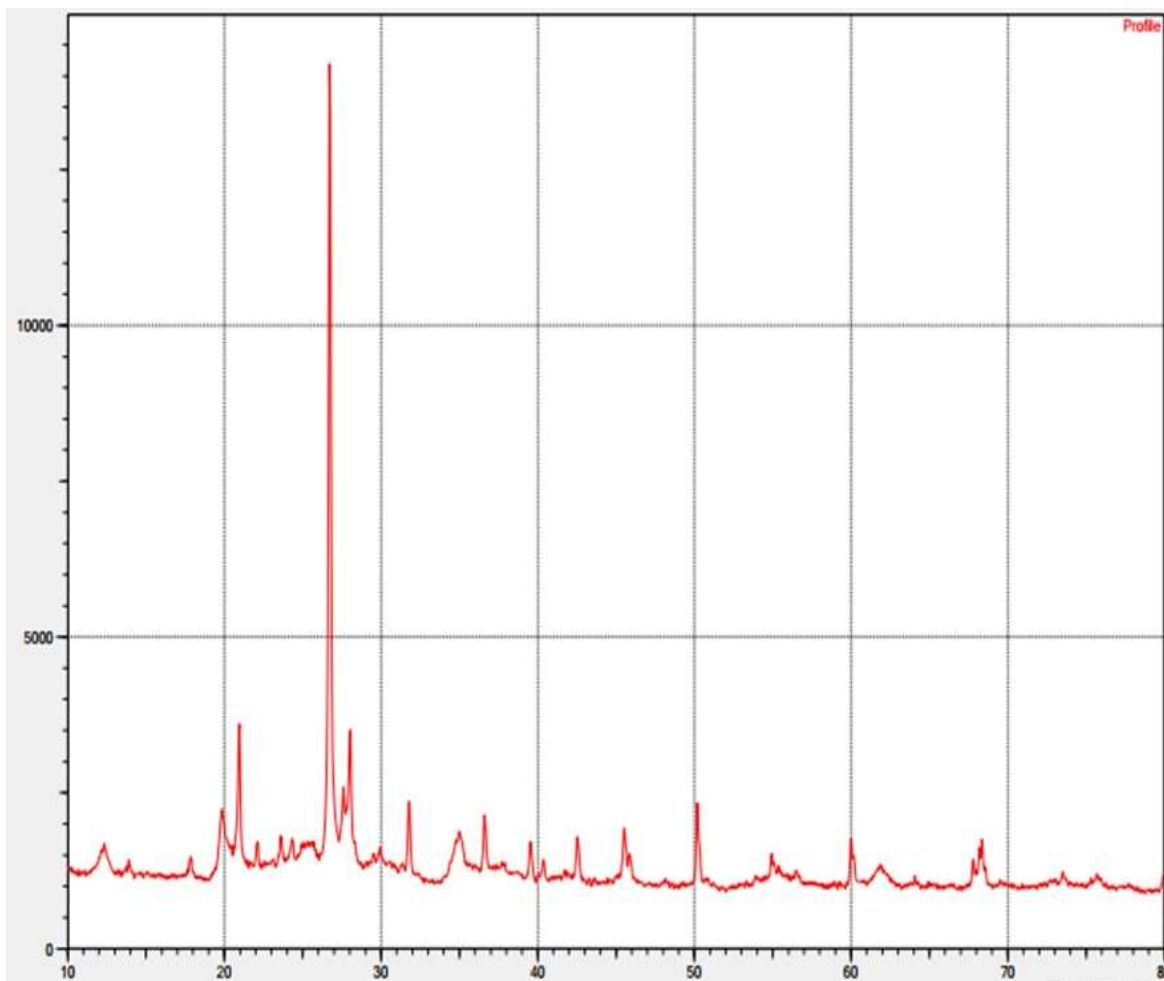


Fig. 1. X-ray diffraction pattern of clay from the Gurlen deposit

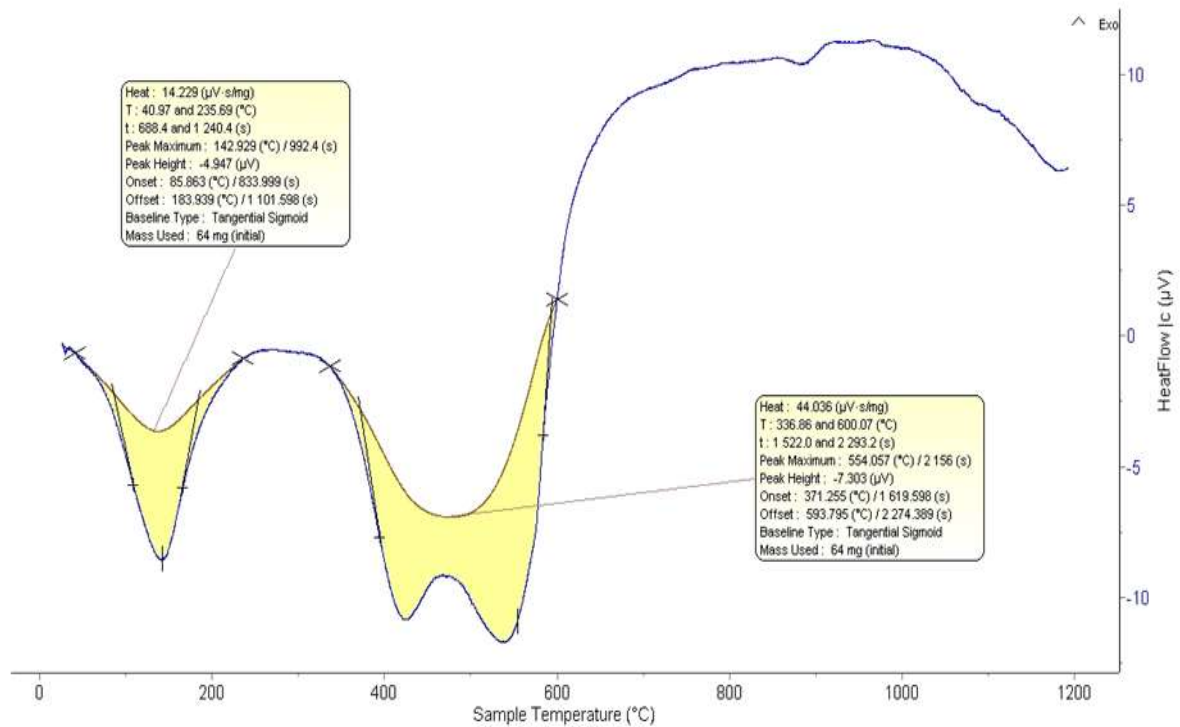


Fig. 2. HDSC curve of clay from Gurlen deposit

The complex thermo gram of the Gurlen clay shows three periods. The first period in the temperature range 85-1830C with a maximum temperature of 142°C is characterized by the presence of an endo-effect and is associated with the process of removing the loss of hygroscopic and interlayer water of clay minerals. The second period in the temperature range 371-593 ° C with a maximum of 554 ° C is characterized by the presence of an endothermic effect, which indicates the decomposition of the crystal lattice of clay minerals with the release of hydroxyl groups, as well as polymorphic transformations of quartz. A weak exothermic effect at 960 ° C is associated with the formation of new crystalline phases, mainly mullite (Fig. 2).

The sintering temperatures of the samples under study were established from the water absorption of the samples. The pressed tiles were fired in laboratory muffle furnaces at a temperature range (850-1050 ° C). Samples from the test sample at 950 ° C provide a ceramic shard with a water absorption of not more than 5.0%. When the temperature rises to 1000 ° C, a sharp decrease in water absorption occurs to 2.0%. Shrinkage correspondingly increases from 7.3% to 9.2%. A further increase in temperature led to swelling of the samples and deformation.

Thus, as a result of a comprehensive study, it was found that the clay of the Gurlen deposit has a high content of hydromica with an insignificant content of montmorillonite, kaolinite, biotite, chlorite and feldspar minerals and a relatively high content of iron oxide, alkali and alkaline earth oxides. It also has a fine dispersion and a small amount of finely dispersed free quartz, which impart fusibility and swelling of clay and the possibility of using it in the development of expanded clay compositions.

To obtain expanded clay in the laboratory, a standard method was used according to GOST 32026-2012. "Raw material clay for the production of expanded clay gravel, crushed stone and sand. Specifications "[10]. The prototypes were molded according

to the plastic method and dried in a drying oven. Then the dried samples were subjected to thermal treatment in a laboratory muffle furnace at temperatures of 200 ° C, 300 ° C, 400 ° C and 500 ° C. Then the samples were fired to determine the optimal swelling temperature at temperatures of 990 ° C, 1020 ° C, 1050 ° C and 1080 ° C, with an interval of 30 ° C. It has been established that the optimum temperature for thermal preparation of prototypes is 500 ° C, and the firing temperature is 1050 ° C.

Experiments on obtaining expanded clay in laboratory conditions were carried out as follows: Experimental samples from M-1 masses were prepared only on the basis of clay from the Gurlen deposit using the plastic method.

Experimental samples from the masses M-2, M-3, M-4, M-5 and M-6 were also prepared according to the plastic method based on clay from the Gurlen deposit with the addition of cotton tar 1, 2, 3, 4 and 5%, respectively.

Studies have shown, that the introduction of cotton tar into the raw mixture within the specified limits of the content significantly increases the swelling and leads to an increase in the porosity of the prototypes.

As a result of the study of the microstructure of the prototypes, it was determined that, in the samples of mass M-1, there are many small and few medium pores, in the samples of mass M-2 and M-3, there are many small and medium pores, in the samples of mass M-4 and M-5, there are many medium and large pores. In samples of mass M-6, medium and large pores are evenly distributed over the volume of the material, but also rare large voids up to 1 - 2 mm in size were found in it. According to the results of determining the physical and mechanical properties of these prototypes, the M-3 mass is optimal.

The physical and mechanical properties of the fired samples were determined in accordance with GOST 9758-86. "Porous inorganic aggregates for construction work. Test methods"[11].

The bulk density of expanded clay samples fired at optimal temperatures from the masses M-1 and M-3 is 864 and 375 kg / m³, respectively.

Physical and mechanical properties of expanded clay prototypes meet the requirements of GOST 9757-90. "Gravel, crushed stone and artificial porous sand. Technical conditions" [12].

Conclusion: 1) As a result of a comprehensive study, it was found that the clay of the Gurlen deposit has a high content of hydromica with an insignificant content of quartz, montmorillonite, kaolinite, biotite, chlorite, and feldspar minerals, as well as a relatively high content of iron oxide, alkali and alkaline earth oxides.

2) This clay also has a fine dispersion and a small amount of finely dispersed free quartz, which impart fusibility and swelling of the clay and the possibility of using it in the development of expanded clay compositions.

3) As a result of laboratory studies, it has been established that cotton tar can be used as an organic additive to obtain expanded clay.

References:

[1]. I.R.Boyjanov, I.Khazhiev, R.G. Allamov, N.I.Boijonov. Clay of the Gurlen deposit is a valuable raw material for obtaining expanded clay. Collection of scientific articles of the republican scientific-technical conference - Tashkent. 2014.149-150 p.



- [2]. Onatsky S.P, Production of expanded clay, M., 1987. - 312 p.
- [3]. Toropkov N.Ye. Dependence of physical and chemical properties of clay raw materials in expanded clay technology // International scientific research journal. Yekaterinburg. 2014
- [4]. Aggregates for concrete: Textbook / E.V. Tkach, M.A. Rakhimov, G.M. Rakhimov; Karaganda State Technical University. - Karaganda: Publishing house of KSTU, 2009. - 94 p.
- [5]. Knigina G.I. Complex expanding additive in the production of expanded clay // Izv. Universities. Series "Construction and Architecture". 1984.- No. 5. - S. 67-70.
- [6]. T.N.Bokovikova, D.R.Sperber, E.R.Sperber. Development of resource-saving technologies for the utilization of oil sludge. Environmental protection in the oil and gas complex. 10.2009. 35-39 pages.
- [7]. Sakybaev B.A. Obtaining anticorrosive coatings based on polymers and cotton tar for main oil pipelines. Dissertation for the degree of Doctor of Philosophy (PhD). The Republic of Kazakhstan. Shimkent, 2019.128p.
- [8]. Boyjanov I.R, Eminov A.M, Allamov R.G, Masharipova Kh.F., Safarboev J.A., "Obtaining expanded clay based on clay from the Gurlen deposit with the addition of cotton tar". Collection of reports of the II International Scientific and Practical Conference "Modern Science: Problems, Ideas, Innovations". 2020 December, Tatarstan.
- [9]. A.M. Eminov, I.R.Boyzhanov, R.G. Allamov, S.K.Duschanov. Clays of the Gurlen deposit are a new raw material for the production of ceramics. Composite materials magazine. 2019. No. 3.101-103 pages.
- [10]. GOST 32026-2012. "Raw material clay for the production of expanded clay gravel, crushed stone and sand. Technical conditions "
- [11]. GOST 9758-86. "Porous inorganic aggregates for construction work. Test methods "
- [12]. GOST 9757-90. "Gravel, crushed stone and artificial porous sand. Technical conditions."

UDC 658.235

**TERMINAL TECHNOLOGIES AS A SOLUTION TO THE PROBLEMS OF
ABANDONED TRAINS**

Ibragimova Gulshan Ruslanovna
Independent researcher (PhD), Senior lecturer,
The Department "Organization of Transport movement"
Transportation Systems Management,
The Tashkent State Transport University,
[**ibragimova.gulshana@mail.ru**](mailto:ibragimova.gulshana@mail.ru)

Annotatsiya: Maqolada Toshkent – mintaqaviy temir yo‘l uzeldagi (MTU) “tashlandiq” poyezdlar tahlili berilgan, shuningdek, poyezdlarning tark etilishi sabablari tizimlashtirilgan, asosiylari yoritilgan, muammoni terminal texnologiyalari yordamida hal qilish yo‘llari taklif qilinmoqda.

Kalit soʻzlar: tashlandiq poezdlar, yuk terminallari, logistika xizmatlari, terminal texnologiyalari.

Abstract: The article provides an analysis of the “abandoned” trains at the regional railway junction (RRJ) - Tashkent, as well as systematized the reasons for the abandonment of trains, highlighting the main ones, a solution to the problem with the help of terminal technologies is proposed.

Keywords: Abandoned trains, cargo terminals, logistics services, terminal technologies.

Аннотация: В статье приведен анализ “брошенных” поездов по регионально-железнодорожному узлу (РЖУ) – Ташкент, а также систематизированы причины бросания поездов, с выделением главных из них, предложено решение проблемы с помощью терминальных технологий.

Ключевые слова: “брошенные” поезда, грузовые терминалы, логистические услуги, терминальные технологии.

Introduction. The key condition for economic growth, increasing the competitiveness of the national economy and the quality of life of the population is to ensure the efficiency and reliability of the transport system.

Due to the geographical features of Uzbekistan, the role of transport is a priority in the development of the country’s competitive advantages in terms of realizing its transit potential [1].

However, the state of the transport complex in Uzbekistan is currently characterized by a number of acute problems associated with outdated technology and organization of transportation. At the same time, the demand for integrated logistics services is constantly growing, which is not able to provide rail transport due to the lack of modern warehouse complexes, transshipment warehouses and modern cargo terminals.

Meanwhile, goods are always transported from one warehouse to another, so the lack of well-organized warehouses on rail transport is one of the reasons for the loss of freight flows, which are transferred to road transport [2].

In addition, the reason for the downtime of loaded rolling stock, so to speak, the problem of “abandoned trains” also negatively affects development and current state of the system of organizing the delivery of goods by rail in Uzbekistan.

An abandoned train for railway workers is a train that is set aside from traffic, stands without a locomotive on the side track of the station (that is, does not interfere with the movement of other trains) and is secured with brake shoes, while the train index is preserved [3]. The increase in the number of abandoned trains negatively affects the operational work of the railway, seriously disrupts the technological process for the supply of wagons for loading and unloading, which entails the carrier’s failure to fulfill obligations on the delivery time of other goods, as well as a decrease in the volume and pace of the railway. The problem of abandoned trains is also having a negative impact on the industry.

The reasons and the search for ways to solve the problem of “abandoned” trains were occupied by many scientists who have devoted their works to this study [4-11].

Material and research methods. Change in the number of abandoned trains on the RRJ -Tashkent direction from 2017 to 2021 shown in Fig. 1, from which it is clear

that over the past two years, the situation with abandoned trains has become more complicated.

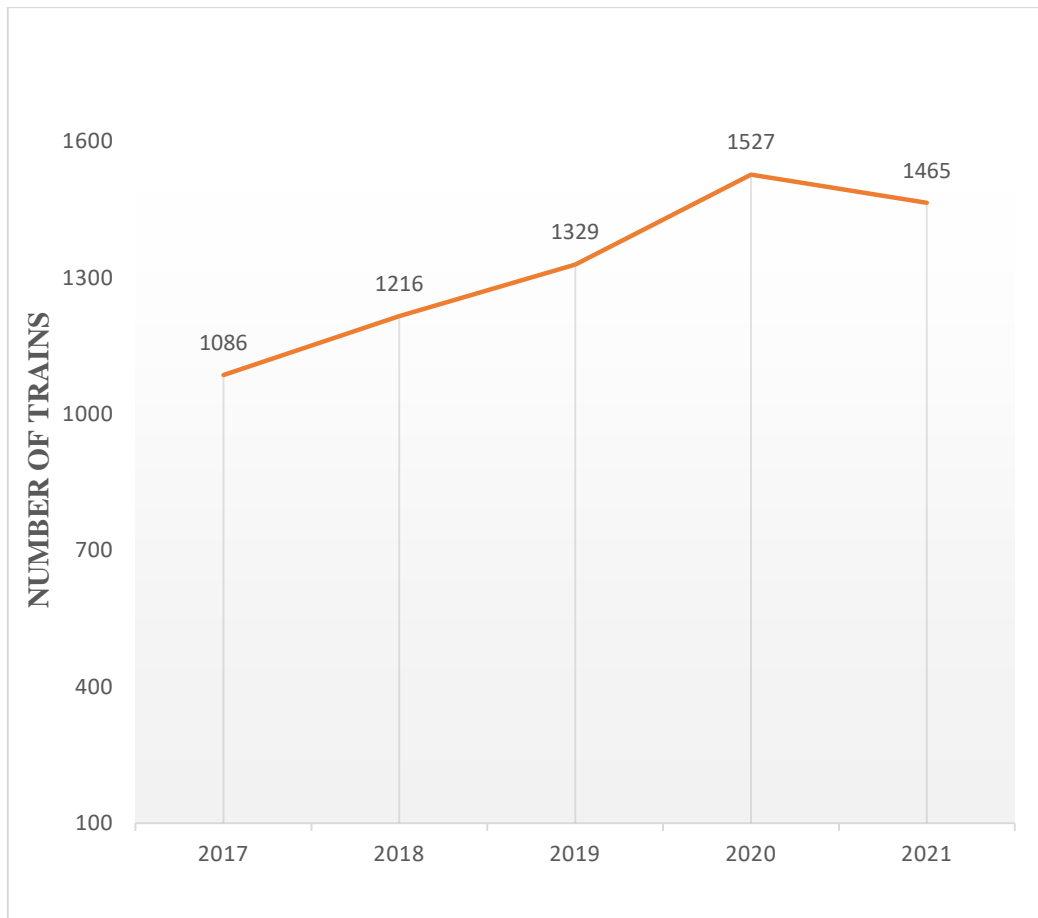


Figure 1. Change in the number of abandoned trains on RRJ -Tashkent JSC “UTY”

Analysis of abandoned trains for the period of 2021 on the RRJ -Tashkent direction, made using the Poreto schedule (see Fig. 2) for stations, revealed that the bulk of these trains were destined for the Chukursay marshalling station.

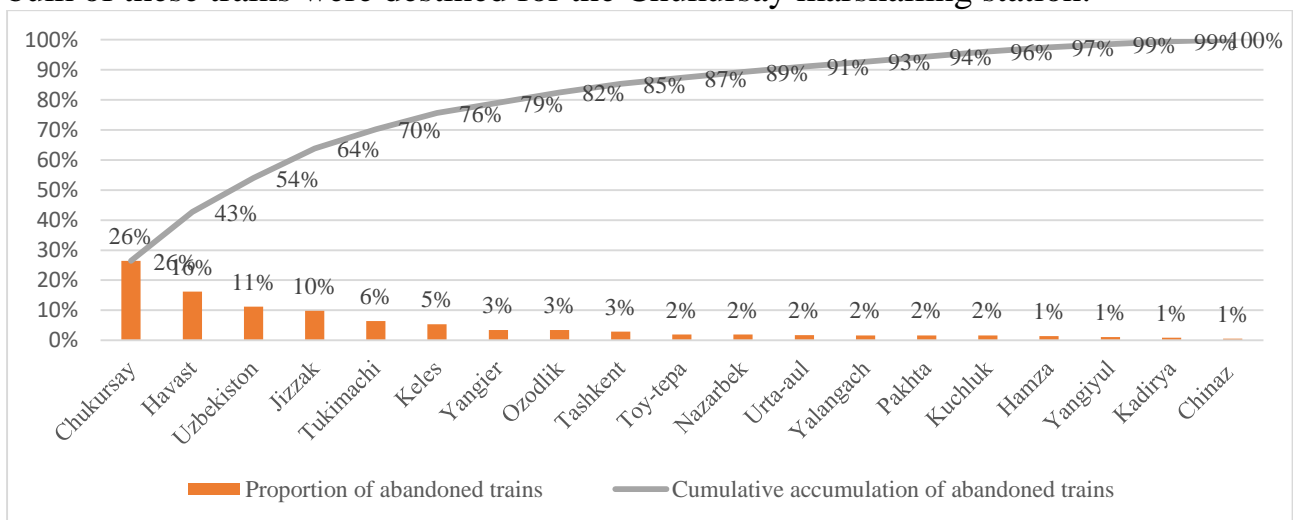


Figure 2. Poreto’s graph of the analysis of “abandoned trains” by stations of the direction RRJ -Tashkent for 2021

The number of abandoned trains is increasing due to the fact that arriving trains at the marshalling yard are idle waiting for the accumulation of cargo, in addition, there

is no coordination of the supply of wagons with the cargo that the rolling stock arriving at the station plans to take out.

Let's consider the main reasons for the "abandonment of trains" in more detail,

So there is an urgent problem – "abandoned train", let's conduct a causal analysis of the reasons that contribute to its appearance:

A. Technical reasons:

- lack of voltage in the contact network, including due to power outages;
- failures of technical means on the balance sheet of the electrification and power supply service (E);
- failures of technical means for the economy of automation and telemechanics;
- limiting the throughput of sections, stations when carrying out planned "time for railroad works" and the provision of unplanned "time for railroad works" (S);
- failures of technical means under the jurisdiction of the traction rolling stock repair department;
- insufficient maintenance of the operated locomotive fleet in relation to the established plan;
- locomotive malfunction;
- the absence of locomotives due to the excess of the established standards for the maintenance of locomotives on scheduled types of repair and maintenance;
- failures of technical means under the jurisdiction of the Track Repair Directorate;
- limiting the throughput of sections, stations during scheduled "time for railroad works" and the provision of unscheduled "time for railroad works";
- malfunction of track machines, leading to overexposure of the "time for railroad works".

B. Technological reasons:

- uneven addressing of empty own wagons to the consignor, incl. in the absence of the GU-12 application approved by the carrier;
- uneven loading;
- loading in excess of the established technical plan;
- non-scheduled warning, which entailed the suspension from the movement of the train;
- untimely or incorrect execution of transportation documents;
- occupation of station tracks by non-working carriages arriving for scheduled repairs;
- exceeding the standard time for customs, sanitary inspection;
- exceeding the established dimensions of movement;
- improper regulation of train traffic by the dispatcher;
- non-acceptance of a train by a neighboring station;
- violation of the train formation plan;
- occupation of station tracks with faulty freight cars;
- lack of a locomotive crew;
- non-acceptance of the train by the destination railway station for reasons depending on the consignees, owners or users of non-public railways;
- exceeding the norm for the processing of compounds.



Let's take a closer look at some of them:

1. Receiving the train by the consignee. With the difference between the actual and planned traffic volumes, the development of the infrastructure of the participants in the transportation process does not always allow accepting cargo for further transportation. This reason is caused by a number of circumstances, such as:

- lack of free warehouse space;
- unsatisfactory quality of the arriving cargo;
- insufficient technical equipment of the infrastructure;
- not timely informing the infrastructure about the approach of the cargo;
- lack of interaction and technology between partner of the transportation

process.

2. Rejection of the neighboring station. This reason is associated with the special technology of a particular road or station, as well as insufficient technical and track equipment.

3. Lack of locomotives and locomotive crews. The locomotive fleet currently leaves a lot to be desired in terms of both quantity and innovation. Also, one of the main problems of this factor is the untimely preparation of the locomotive for work and locomotive crews.

4. Technological "time for railroad works". As a rule, the planned technological "time for railroad works" are taken into account when forming the transportation plan, but sometimes traffic interruptions occur not prudently (for example, a track failure, an obstacle on the way, etc.), which negatively affects the throughput and processing capacity of the line.

Results and discussion. We now present this causal analysis in Idea of the Ishikawa diagram (see Fig. 3), by grouping and ranking the circumstances that contribute to the "abandonment of trains" by separating them into subgroups of technological and technical reasons.

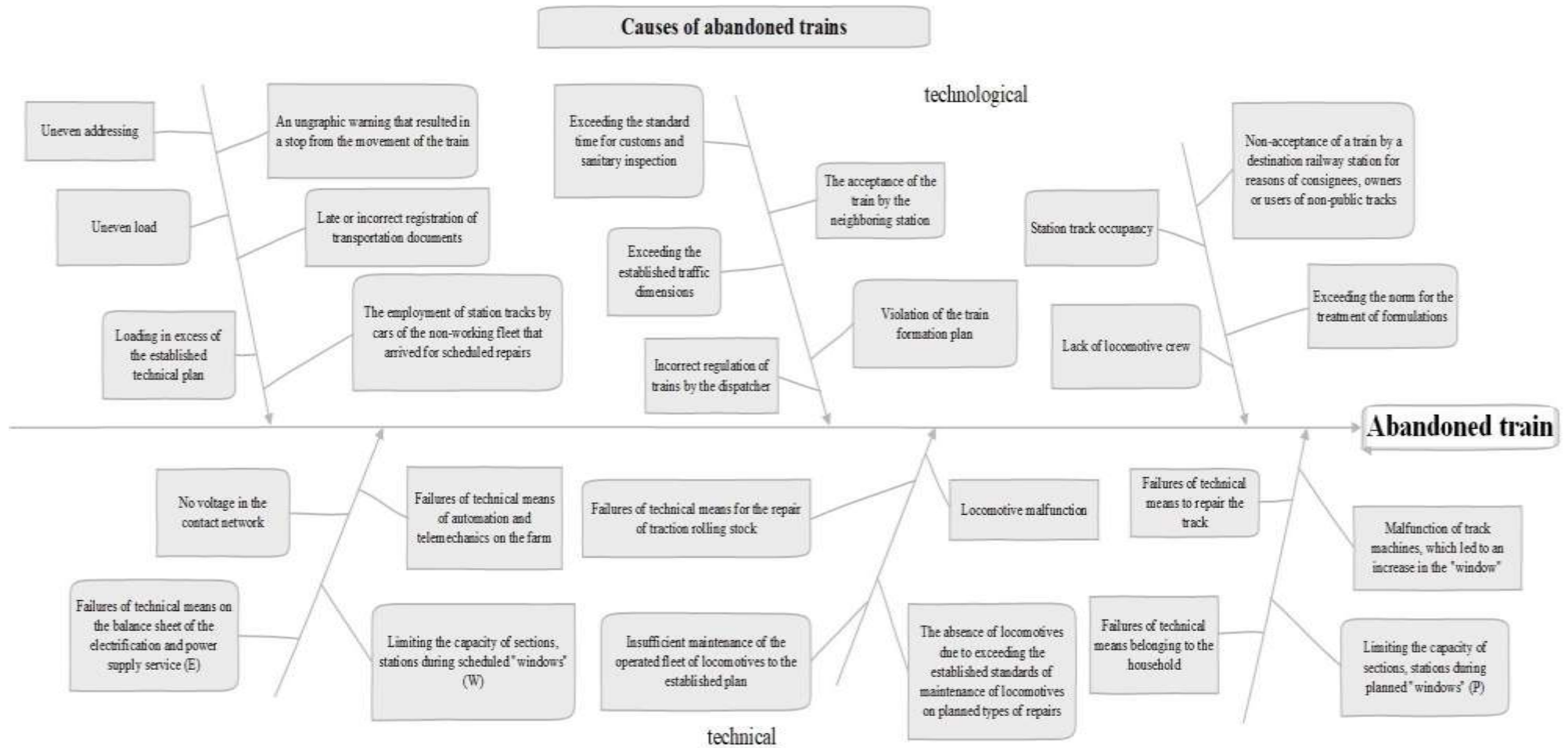


Figure 3. Causal Analysis of Abandoned Trains

From fig. 3, it can be seen that along with the reasons that need to be solved in JSC “Uzbekiston Temir Yullari”, such as failures of track services, locomotive facilities, failures of technical means, it is possible to solve the problem of abandoning trains, the reasons for which are rejection of consignees, uneven loading, excess time for customs inspection by creating a logistics structure capable of managing complex interaction processes at the junctions of the transport corridor.

Conclusion. A terminal network can be represented as such a structure. For the development of the terminal system, the most urgent problem is the organization of efficient operation of terminals in conditions of multimodal transport: a car - a railroad. A well-developed network of freight forwarding enterprises with a terminal system, in addition to the carriage of goods and “docking” of the railway with another mode of transport, makes it possible to provide a range of customs services, maintenance of rolling stock, storage and distribution of goods on the instructions of their owners, as well as a wide range of services.

The greatest effect can be obtained with a comprehensive solution to the problem of “abandoned” trains. Due to the complexity of the task at hand, it is advisable to use simulation. The use of a simulation model that describes the structure and technology of the terminal network in time will make it possible to evaluate the efficiency of the options for solving the problem without resorting to complex mathematical dependencies.

References:

- [1]. Ibragimov U., Ibragimova D. Interconnection of Central and South Asia - a new trend of economic development of Eurasia / U. Ibragimov, D. Ibragimova // *Silk Road Transport*. 2021. No. 2. S. 5-10.
- [2]. Balalaev A.S. Methodology of transport and logistics interaction in multimodal transportation. Balalaev. - M., 2010. - 274 p.
- [3]. Malikov O.B. Freight terminals in the system of organizing train flows / O.B. Malikov // *Railway transport*. 2011. No. 9. S. 74-77.
- [4]. Velieva E.A. Velieva // *Scientific, technical and economic cooperation of the Asia-Pacific countries in the XXI century*. 2014. Vol. 2. S. 65-69.
- [5]. Kovalenko M.O. The problem of abandoned trains / M.O. Kovalenko // *Trends in the development of modern science. Proceedings of the scientific-practical conference of students and graduate students of Lipetsk State Technical University*. Lipetsk, 2020. S. 222-224.
- [6]. Organization of work with "abandoned" trains at the station GVOZDEVO PTO KHASAN / I.I. Lapteva, E.A. Karnakov, Ya. V. Zhatchenko // *Bulletin of the Institute of Traction and Rolling Stock*. 2021. No. 17. S. 14-16.
- [7]. Tashlykova A.I. On the solution of the problem of "abandoned" trains on the Far East railway / A.I. Tashlykova // *Scientific, technical and economic cooperation of the Asia-Pacific countries in the XXI century*. 2015. Vol. 1. S. 116-122.
- [8]. Tashlykova A.I. On the solution of the problem of "abandoned" trains on the Far Eastern Railway / A.I. Tashlykova // *Current state and development paths*. 2016. No. 2-2 (62). S. 179-185.
- [9]. Malikov O.B. Direct option or cargo terminal / O.B. Malikov // *Railway transport*. 2016. No. 3. S. 2-5.

- [10]. Abduvakhidov Sh. R., Azimov F.K., Ibragimova G.R., Ilesaliev D.I., Ismatullaev A.F. Containerization as a factor in the development of the organization of cargo transportation // Logistic systems in the global economy. - 2020. - No. 10. - S. 49-52.
- [11]. Ilesaliev D.I., Azimov F.K., Ibragimova G.R., Svetasheva N.F., Abduvaxitov S.R., Tursunov Z.SH. Development of mathematical models of the relationship between the main parameters of a container depot // IOP Conference Series: Materials Science and Engineering. - IOP Publishing, 2021. - T. 1151. - No. 1. - S. 012026.

UDK 51-37.004. 004.42:004.383

USING NUMERICAL METHODS OF NAVIER – STOKES AND DIVERGENT FORM OF FLUID MODEL FOR BLOOD VESSEL WALLS

Nurjabova Dilafruz Shukrullaevna
Tashkent University of Information Technologies
Karshi branch
“Software Engineering”
[**dilyaranur1986@gmail.com**](mailto:dilyaranur1986@gmail.com)

Annotatsiya. Maqolada Navier-Stokesning raqamli usullaridan foydalangan holda qon aylanish tizimining matematik modeli va qon tomirlari devorlari uchun suyuqlik modelining divergent shakli keltirilgan. Navier-Stokes tenglamasi yurak-qon tomir tizimi uchun maxsus suyuqlikda chuqur tahlil etiladi va Eyler tenglamasiga aylanadi. Tomirning yon tomoni, arteriya, qon bosimi, qon oqimi, qon quyqalari kabi barcha tibbiy ko'rsatkichlar matematik model orqali tavsiflanadi. Matematik tushunchalarning chiziqli bog'liqliklari, differensial, integral differensial, shuningdek, mantiqiy-dinamik tenglamalar, Navier-Stoks masalalari va ularni amaliy qo'llash uchun asosiy matematik tushunchalar, shuningdek, ushbu matematik modelga asoslangan dasturning ishlash prinsipi hamda UML diagrammalari orqali qo'llaniladi, ular Navier-Stokes tenglamasi natijalaridan iborat. Dasturda U, V, W, P boshlang'ich diagrammalarining parametrlari uchun ikki o'lchovli va uch o'lchovli integral va differentsial Navier-Stokes tenglamalarining raqamli natijalari keltirilgan. Hidrodinamik tizimning matematik va quyidagi atamaları qo'llaniladi: uzluksizlik tenglamasi, tromblar, to'g'ri chiziqli divergent shakl, tezlik vektorlari, Navier-Stoks tenglamalari tizimi, monomer suyuqligi, manometr.

Аннотация. В статье представлена математическая модель системы кровообращения с использованием численных методов Навье - Стокса и дивергентной формы модели жидкости для стенок кровеносных сосудов. Уравнение Навье-Стокса глубоко запоминается в специальной жидкости для сердечно-сосудистой системы и преобразуется в уравнение Эйлера. Все медицинские параметры, такие как со стороны сосуда, артерия, давление крови, кровоток, тромбы описываются математической моделью. Приведены линейные зависимости математических понятий, дифференциальные, интегральные дифференциальные, а также логико-динамические уравнения, задачи Навье-

Стокса и математический аппарат для их практического применения, а также принцип работы программы, основанной на этой математической модели, используются диаграммы UML, которые состоят из результатов Навье-Стокса. В программе представлены численные результаты двумерных и трехмерных интегральных и дифференциальных уравнений Навье-Стокса по параметрам базовой диаграммы U, V, W, P. В математических терминах и терминах гидродинамической системы используются следующие: уравнение неразрывности, тромбы, прямолинейная, дивергентная форма, векторы скорости, система уравнений Навье-Стокса, мономерная жидкость, манометр.

Ключевые слова: уравнение непрерывности, тромбы, прямая расходящаяся форма, векторы скорости, система уравнений Навье-Стокса, мономерная жидкость, манометр.

Abstract. This article presents the mathematical model of the circulatory system for using numerical methods of Navier – Stokes and divergent form of fluid model for blood vessel walls. Navier-Stokes equation learning deeply in the special liquid for cardiovascular system and transforms into the Euler equation. All medical parameters such as vessel side, artery, pressure of blood, blood flow, thrombus describes with mathematical model. Linear dependence of mathematical concepts, differential, integral differential, as well as logical-dynamic equations, Navier-Stokes problems and mathematical apparatus for their practical application are given and the principle of operation of the program based on this mathematical model is used UML diagrams which consist of results of Navier-Stokes. In program given are numerical results of Navier-Stokes 2D and 3D integral and differential equations on the basic diagram U,V,W,P parameters. In mathematical terms and hydrodynamic system terms following : continuity equation, blood clots, straight-line, divergent form, velocity vectors, Navier-Stokes system of equations, monomeric liquid, pressure gauge are used.

Key words: continuity equation, blood clots, straight-line, divergent form, velocity vectors, Navier-Stokes system of equations, monomeric liquid, pressure gauge

Introduction. Cardiovascular diseases are the leading cause of death in the world. Atherosclerosis is the most common among them. Because of the disease, several arteries are often affected at once, therefore the influence and development of the pathological process must be considered in the vascular network. To eliminate stenosis, stenting of the arteries is performed. Another serious complication of cardiovascular disease is pulmonary embolism. The cause of thromboembolism is floating blood clots that form in the lower extremities and move with the blood flow. To prevent this complication (to stop blood clots) special implants cava filters are placed in the inferior vena cava [1,2,4,6].

The main equations in the problem of fluid dynamics are: continuity equation, equation of motion (equation of impulses) and energy equation. The effect of fluid viscosity is reflected in the last two equations, but most importantly in the equation of motion, which is written in the form of the Navier - Stokes equation:

$$\frac{D\vec{W}}{dt} = \vec{J} - \frac{1}{\rho} \text{grad } p + \nu \nabla^2 \vec{W} + \frac{1}{3} \nu \text{grad}(\text{div} \vec{W}), \quad (1.1)$$

where the left-hand side is the substantial derivative of the velocity with respect W to time t ; J - acceleration of mass force; ρ is the density of the liquid; p - pressure; ν - kinematic viscosity [7,12]. For analysis, this equation is usually written in projections on the axis coordinates (1.1). For example, projected onto the x -axis, the equation is:

$$\frac{\partial u}{\partial t} + u \frac{\partial u}{\partial x} + v \frac{\partial u}{\partial y} + w \frac{\partial u}{\partial z} = j_x - \frac{1}{\rho} \frac{\partial p}{\partial x} + v \left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} \right) + \frac{1}{3} \frac{\nu \partial}{\partial x} \left(\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} + \frac{\partial w}{\partial z} \right) \quad (1.2)$$

where u, v, w are the corresponding velocities along the x, y, z axes. With regard to gas flows close to straight-line, usually put $J = 0$, In this case, for an incompressible fluid, i.e., for $div W = 0$ we can write

$$\frac{\partial u}{\partial t} + u \frac{\partial u}{\partial x} + v \frac{\partial u}{\partial y} + w \frac{\partial u}{\partial z} + \frac{1}{\rho} \frac{\partial p}{\partial x} - \nu \left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} \right) = 0 \quad (1.3)$$

In this expression, the first term is called the local derivative and the next three are convective components. However, equations in this kind of usual form turned out to be practically unsuitable for the implementation of numerical methods on a computer [1,6]. For many types of problems, this form of equations leads to violation of the conservation law in terms of total parameters along the flow. Doing this avoid, the original equations are written in the so-called divergent form (otherwise, in a conservative form). The transition from one form to another is carried out using the equation continuity. You can get acquainted with these procedures, using the book [1,12]. Here we will illustrate a similar procedure as applied to the Euler equation (projected onto the x -axis) following from (1.3) assuming the absence of viscosity

$$\frac{\partial U}{\partial t} + U \frac{\partial U}{\partial x} + v \frac{\partial U}{\partial y} + w \frac{\partial U}{\partial z} + \frac{1}{\rho} \frac{\partial p}{\partial x} = 0 \quad (1.4)$$

In divergent form, this equation is written in the form [5]

$$\frac{\partial(\rho U)}{\partial t} + div(\rho U \vec{W}) + \frac{\partial p}{\partial x} = 0 \quad (1.5)$$

Let's make the transition from this form to the usual one. We have

$$\frac{\partial(\rho U)}{\partial t} = \rho \frac{\partial U}{\partial t} + U \frac{\partial \rho}{\partial t},$$

and also, given that the divergence is a scalar, we write

$$div(\rho U \vec{W}) = U \vec{W} \cdot div \rho + \rho div(U \vec{W}) \quad (1.6)$$

where $U \vec{W} \cdot div \rho = U \left(\frac{\partial \rho}{\partial x} + v \frac{\partial \rho}{\partial y} + w \frac{\partial \rho}{\partial z} \right)$; (1.7)

$$\rho div(U \vec{W}) = \rho \left(\frac{\partial(UW)_x}{\partial x} + \frac{\partial(UW)_y}{\partial y} + \frac{\partial(UW)_z}{\partial z} \right) =$$

$$\rho \left[\frac{\partial U}{\partial x} W_x + \frac{\partial U}{\partial y} W_y + \frac{\partial U}{\partial z} W_z + U \left(\frac{\partial W_x}{\partial x} + \frac{\partial W_y}{\partial y} + \frac{\partial W_z}{\partial z} \right) \right], \text{ but}$$

$$W_x = U; W_y = v; W_z = w; \text{ and } \frac{\partial W_x}{\partial x} + \frac{\partial W_y}{\partial y} + \frac{\partial W_z}{\partial z} = div \vec{W}$$

$$\rho \frac{\partial U}{\partial t} + U \frac{\partial \rho}{\partial t} + U \left(\frac{\partial \rho}{\partial x} + \frac{\partial \rho}{\partial y} + \frac{\partial \rho}{\partial z} \right) + \rho \left(U \frac{\partial U}{\partial x} + v \frac{\partial U}{\partial y} + w \frac{\partial U}{\partial z} \right) + \rho U div \vec{W} + \frac{\partial p}{\partial x} = 0 \quad (1.8)$$

Here the sum of the second and third terms forms the total time derivative of density

$\frac{\partial \rho}{\partial t}$ multiplied by U , and in addition

$$U \frac{\partial \rho}{\partial t} + \rho U \operatorname{div} \vec{W} = U \left(\frac{\partial \rho}{\partial t} + \rho U \operatorname{div} \vec{W} \right) = 0 \quad (1.9)$$

due to the fact that $\frac{\partial \rho}{\partial x} + \rho U \operatorname{div} \vec{W} = 0$ according to the continuity equation

$$\rho \frac{\partial U}{\partial t} + \rho \left(U \frac{\partial U}{\partial x} + v \frac{\partial U}{\partial y} + w \frac{\partial U}{\partial z} \right) + \frac{\partial \rho}{\partial x} = 0 \quad (2)$$

which corresponds to the usual form of the Euler equation. The divergent form provides the following property: after summation of the corresponding ratios over adjacent volumes only flows through the outer surface of the total volume remain, and flows through the contacting surfaces of the volumes are mutually destroyed. A similar property is attached to the difference system, obtained on the basis of the divergent form of the original differential equations [12,15].

Methods And Materials. In the flow of a real fluid, both normal and tangential voltage. Consider first the idealized case of unidirectional motion incompressible viscous fluid, in which all velocity vectors have the same directions. In a fluid flow moving parallel to the z axis, we select an elementary a parallelepiped whose faces are oriented along the coordinate axes (Fig.1.1).

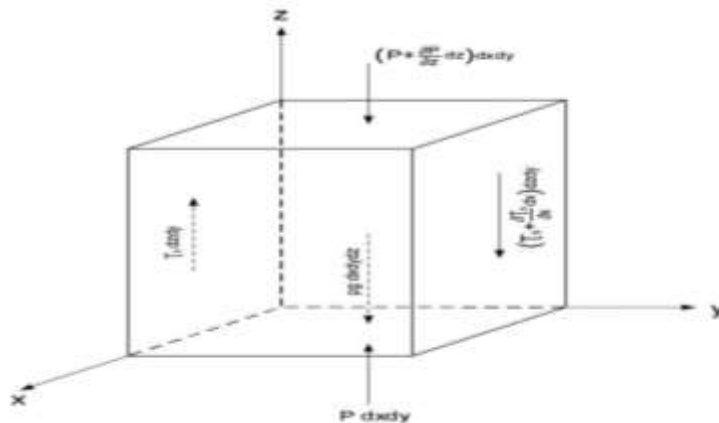


Figure 1.1. To the derivation of the force balance equation for one-dimensional motion of a viscous incompressible liquids

We will assume that the velocity vector v_z decreases along the x and y axes. Taking into account unidirectionality conditions, we have $v_x = v_y = 0$ [13,15].

Let's define the projection of external forces on the z-axis, acting on the elementary volume. In the general case, when the velocity vector is directed arbitrarily, the equations of motion of an incompressible viscous Newtonian fluid (balance of forces) in projections on the coordinate axes have the form.

$$\begin{aligned} Z: \rho \frac{\partial v_z}{\partial t} &= -\frac{\partial P}{\partial z} - pg + \mu \left(\frac{\partial^2 v_z}{\partial x^2} + \frac{\partial^2 v_z}{\partial y^2} + \frac{\partial^2 v_z}{\partial z^2} \right) \\ X: \rho \frac{\partial v_x}{\partial t} &= -\frac{\partial P}{\partial x} - pg + \mu \left(\frac{\partial^2 v_x}{\partial x^2} + \frac{\partial^2 v_x}{\partial y^2} + \frac{\partial^2 v_x}{\partial z^2} \right) \\ Y: \rho \frac{\partial v_y}{\partial t} &= -\frac{\partial P}{\partial y} - pg + \mu \left(\frac{\partial^2 v_y}{\partial x^2} + \frac{\partial^2 v_y}{\partial y^2} + \frac{\partial^2 v_y}{\partial z^2} \right) \end{aligned} \quad (2.1)$$

These equations are called the Navier-Stokes system of equations. Navier-Stokes equation in vector form:

$$\rho \frac{\partial \vec{v}}{\partial t} = -\rho g - \text{grad}P + \mu \Delta \vec{v}$$

Where Δ is the Laplace operator

The joint solution of Eq. (2.1) and the continuity equation (1.4) makes it possible to obtain the field of velocities and pressures in a moving incompressible Newtonian liquids. Due to its nonlinearity, exact analytical solutions of this system can be found only for a small number of simple symmetric flows. For $\mu = 0$, the Navier-Stokes equation transforms into the Euler equation. The equation of motion for an ideal Euler fluid. In the flow of an ideal fluid, only normal stresses act. Select an arbitrary volume V limited by the surface S with a single external normal n and find the sum of external forces acting on a given volume, then we get in vector form, an equation similar to (2.1), but without the term taking into account the influence friction forces:

$$\rho \frac{\partial \vec{v}}{\partial t} = -\rho g - \text{grad}P$$

This equation is called the equation of motion of an ideal Euler fluid. We write down the equation of motion of Euler in projections on the coordinate axis

$$\begin{aligned} \rho \frac{\partial v_x}{\partial t} &= -\frac{\partial P}{\partial x} \\ \rho \frac{\partial v_y}{\partial t} &= -\frac{\partial P}{\partial y} \\ \rho \frac{\partial v_z}{\partial t} &= -\frac{\partial P}{\partial z} - \rho g \end{aligned} \quad (2.2)$$

The solution of this system is carried out together with the continuity equation when using expressions for the substantial derivatives of the velocity projections

$$\begin{aligned} \frac{\partial v_x}{\partial t}, \frac{\partial v_y}{\partial t}, \frac{\partial v_z}{\partial t} \text{ are found by formulas of the type (1.7).} \\ \frac{\partial v_x}{\partial t} = \frac{\partial v_x}{\partial t} + v_x \frac{\partial v_x}{\partial x} + v_y \frac{\partial v_x}{\partial y} + v_z \frac{\partial v_x}{\partial z} \end{aligned} \quad (2.3)$$

For example, for the projection of the speed on the x-axis, we get For incompressible ideal fluids, the solution to the system of equations (2.1) together with the continuity equation (1.4) allows one to determine four unknowns V_x, V_y, V_z

Equilibrium in the field of gravity. Basic equation of hydrostatics.

Equation (2.2), when equating the speed to zero, can be transformed into the equation of equilibrium of a liquid in a gravity field:

$$\text{grad}P = \rho \vec{g}$$

You can also consider the projections on the coordinate axes (2.2), which turn into the system of equations

$$\begin{aligned} \frac{\partial P}{\partial x} &= 0 \\ \frac{\partial P}{\partial y} &= 0 \\ \frac{\partial P}{\partial z} &= -\rho \vec{g} \end{aligned} \quad (2.4)$$

Since the derivatives of pressure with respect to x and y are equal to zero, for an incompressible fluid get

$$d(P + \rho g z) = 0$$

From this we obtain the basic hydrostatic equation $P + \rho gz = \text{const}$

or in another form $\frac{P}{\rho g} + z = \text{const}$

Let us write equation (2.5) for a number of sections of a fluid at rest

$$P_0 + \rho gz_0 = P_1 + \rho gz_1 = \dots = P_i + \rho gz_i \quad \text{or}$$
$$\frac{P_0}{\rho g} + z_0 = \frac{P_1}{\rho g} + z_1 = \dots = \frac{P_i}{\rho g} + z_i$$

All components of equation (2.1) have the dimension of pressure [Pa], all the components of equation (2.1) have the dimension of length [m]. Equation (2.5) is called Pascal's law: the pressure created in any to the point of the fluid at rest, is transmitted in all directions evenly. The basic hydrostatic equation is used to determine the pressure values, the positions of the phase separation in liquids at rest, as well as to determine the forces, acting on the bottom and walls of the apparatus.

Discussion. The simplest U-shaped differential pressure gauge is a device in the form a transparent tube filled with a monomeric liquid. The pressure gauge is connected to an apparatus containing a liquid, the density of which is ρ lower than the density of the gauge fluid ρ_m . The liquid levels in the U-tube are the same prior to measurement. At the appearance of a pressure drop in the apparatus, the levels of the gauge liquid come to movement, and then a new position is set: on the left, the pressure is higher, therefore the level of the gauge fluid is lower, in the right knee, on the contrary, the level is higher, the pressure is lower (Fig 1.2). Let's write down the pressure values at the left level and right level gauge fluid, applying the hydrostatic equation (2.1) to the working and gauge liquids:

$$P_{left} = P_1 + \rho g(h + h_m)$$
$$P_{right} = P_2 + \rho gh$$
$$P_{left} = P_{right} + \rho_m g h_m$$

We obtain an expression for determining the pressure drop through the readings of the U shaped differential pressure gauge h_m :

$$P_1 - P_2 = (\rho_m - \rho) g h_m$$

When using a U shaped differential pressure gauge for gases, you can neglect the values of ρ due to the low values of the density of gases. Then equation (2.1) takes the form:

$$P_1 - P_2 = \rho_m g h_m$$

Equation (2.1) also implies the rule of communicating vessels: in open or closed, under the same pressure, communicating vessels, filled with a homogeneous liquid, its levels are located at the same height regardless of the shape and cross-section of the vessels. An example of using this rule for practical purposes is the use of a device for measuring the level in closed vessels, called "Water-measuring glass". As a result, the piston in the cylinder with a larger diameter will transmit the pressure force, in so many times greater than the force applied to the piston in a cylinder with a smaller diameter, how many times is the cross section of cylinder 1 larger than cylinder. The pressure on the horizontal bottom at any point does not depend on the shape of the vessel, but determined only by the height of the liquid column in it.

The bottom pressure force is defined as $F = PS = (P_0 + \rho gH)S$, where S- is the area of the horizontal bottom. The pressure on the vessel walls changes linearly in height

and is determined by the height of the liquid column above the pressure measurement point.

Results

Taking into account such parameters as "Radius", the cubes with 1 unit (0,0,0) are centralized and are calculated with the values of parameter $a = \text{PI}/4$ and $d = \text{PI}/2$ in the time interval from $t = 0$ to $t = 0,1$ which with Dirichlet boundary conditions on all faces of the cube after [4,5,6]. The table provides a description of the minimum, maximum and U, V, V, P pressure solution. Using the area where the center of the cube (0,0,0) is 1,0 "Radius" , the viscosity $\text{NU} = 0,25$ [4,5,6], calculate the speed and pressure range at the time of starting $T = 0$.

Magnitude	Minimum	Maximum
U:=x	-3,08103	1,39472
V:=y	-3,06036	1,32415
W:=z	-3,06278	1,41037
P:	0,0250229	5,31825

Table1. Estimate the range of velocity

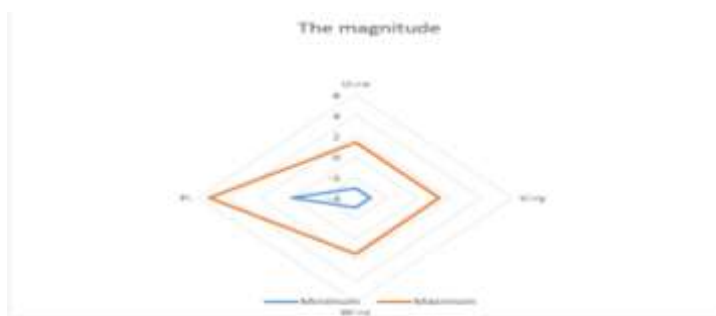


Fig.1.3. Estimate the range of velocity

Conclusion. An important advantage of this approach to modeling blood flow is the absence of an assumption $u \cdot n \leq 0$ at the inflow boundary into the three-dimensional region at all times, where u is the three-dimensional velocity and n is the outward normal to the surface. The resulting equation simultaneously expresses both the balance of forces and the balance of momentum (momentum), since the left side of equation (the product of acceleration by the mass of a unit of volume) is equal to the rate of change of the momentum in a unit of volume, and the right side of this equation is equal to the flow of momentum, included in the unit of volume, due to the action of external forces. In the designation of the usual question, a limited space sphere and the initial time are selected then by reference to the specific solution, boundary and initial conditions are set. As a result, the piston in the cylinder with a larger diameter transmits a pressure force several times greater than the force applied to the piston in the cylinder with a smaller diameter, how many times greater is the cross section of the cylinder 1 in relation to the cylinder [12,15].

References

[1]. Formaggia L., Gerbeau J. F., Nobile F., Quarteroni A. On the coupling of 3D and 1D Navier-Stokes equations for flow problems in compliant vessels // Computer Methods in Applied Mechanics and Engineering. 2001. V. 191. P. 561–582

- [2]. Formaggia L., Moura A., Nobile F. On the stability of the coupling of 3D and 1D fluid-structure interaction models for blood flow simulations // *ESAIM: Mathematical Modelling and Numerical Analysis*. 2007. V. 41 (4). P. 743–769.
- [3]. Papadakis G. Coupling 3D and 1D fluid-structure-interaction models for wave propagation in flexible vessels using a finite volume pressure-correction scheme // *Commun. Numer. Meth. Engng*. 2009. V. 25. P. 533–551.
- [4]. Martin Bazant, Henry Moffatt, Exact solutions of the Navier-Stokes equations having steady vortex structures, *Journal of Fluid Mechanics*, Volume 541, pages 55-64, 2005.
- [5]. Martin Bazant, Henry Moffatt. Exact solutions of the Navier-Stokes equations having steady vortex structures, *Journal of Fluid Mechanics*, Volume 541, pages 55-64, 2005.
- [6]. Johannes Burgers, A mathematical model illustrating the theory of turbulence, *Advances in Applied Mechanics*, Volume 1, pages 171-199, 1948.
- [7]. C. Ross Ethier, David Steinman, Exact fully 3D Navier-Stokes solutions for benchmarking, *International Journal for Numerical Methods in Fluids*, Volume 19, Number [5]. March 1994, pages 369-375.
8. Hadjinicolaou, Maria & Protopapas, Eleftherios. (2020). Separability of Stokes Equations in Axisymmetric Geometries. *Journal of Applied Mathematics and Physics*. 08. 315-348. 10.4236/jamp.2020.82026. https://www.researchgate.net/publication/339482274_Separability_of_Stokes_Equations_in_Axisymmetric_Geometries
- [9]. Pernice M., Walker H. F. NITSOL: a Newton iterative solver for nonlinear systems // *SIAM J. Sci. Comput*. 1998. V. 19. P. 302–318. 72.
- [10]. Electronic resource: Advanced Numerical Instruments 3D. URL: <http://sourceforge.net/projects/ani3d/>.
- [11]. Formaggia L., Gerbeau J. F., Nobile F., Quarteroni A. On the coupling of 3D and 961D Navier-Stokes equations for flow problems in compliant vessels // *Computer Methods in Applied Mechanics and Engineering*. 2001. V. 191. P. 561–582.
- [12]. Koshelev V.B., Mukhin S.I., Sosnin N.V., Favorsky A.P. *Mathematical models of quasi-one-dimensional hemodynamics*. Moscow: MAKS Press, 2010
- [13]. Quarteroni A., Formaggia L. *Mathematical Modelling and Numerical Simulation of the Cardiovascular System* // *Handbook on numerical analysis*, Ed. By P. G. Ciarlet, J. L. Lions. *Modelling of Living Systems*. Amsterdam: Elsevier, 2004.
- [14]. Blanco P. J., Feijoro R. A., Urquiza S. A. A unified variational approach for coupling 3D–1D models and its blood flow applications // *Comput. Methods Appl. Mech. Engrg*. 2007. V. 196. P. 4391–4410.
- [15]. Urquiza S. A., Blanco P. J., Vernere M. J., Feijoro R. A. Multidimensional modelling for the carotid artery blood flow // *Comput. Methods Appl. Mech. Engrg*. 2006. V. 195. P. 4002–4017. Formaggia L., Moura A., Nobile F. On the stability of the coupling of 3D.



UDC: 666.3.016

USE OF CLAY OF THE KULATAU DEPOSIT FOR OBTAINING FACADE SLABS

Eminov Ashrap Mamurovich
Doctor of Technical Sciences,
prof. Head of the laboratory of
"Fan va taragiyot"

Tashkent State Technical University

Boyjanov Islom Razhabboevich
Ph.D., Assoc. Doctoral student of the Department
of Chemical Technologies,
Urgench state university

Jabberganov Jagongir Sabirboyevich.
PhD student of the Department
of Chemical Technologies,
Urgench state university

Allamov Rakhmatulla Gulmirzaevich
PhD student of the Department
of Chemical Technologies,
Urgench state university
sduschanov@bk.ru

Annotasiya: Kulatau koni gilini xarakteristikalarini tekshirish natijasida Kulatau gili past temperaturada pishuvchi kuchli pishadigan gillar turkumiga kirishi aniqlandi. Laboratoriya izlanishlari natijasida Kulatau gili va boshqa mahalliy xom-ashyolar kompozitsiyasida GOST 13996-93. "Plitki keramicheskie fasadnie i kovri iz nix. Texnicheskie usloviya" talablariga javob beruvchi tajriba namunalari olindi.

Kalit soʻzlar: Gidroslyudali gil, yengil suyuqlanuvchan gil, yengil suyuqlanuvchan flyus, barخان qumi, keramik koshin, fasadbop koshin, kimyoviy-mineralogik tarkib.

Аннотация: В результате исследования характеристики глины Кулатауского месторождения установлено что, Кулатауская глина относится к классу сильноспекающим сырьям с низкотемпературным спеканием. В результате лабораторных исследований в композиции Кулатауской глины и других местных сырьевых материалов получены опытные образцы отвечающие требованиям ГОСТа 13996-93. "Плитки керамические фасадные и ковры из них. Технические условия".

Ключевые слова: Гидрослюдистая глина, легкоплавкая глина, легкоплавкий флюс, барханный песок, керамическая плитка, фасадная плитка, химико-минералогический состав.

Abstract: As a result of the study of the characteristics of the clay of the Kulatau deposit, it was established that, Kulatau clay belongs to the class of highly sintered raw materials with low-temperature sintering. As a result of laboratory studies in the composition of Kulatau clay and other local raw materials, prototypes were obtained

that meet the requirements of GOST 13996-93. “Facade ceramic tiles and floor slabs from them. Technical conditions”.

Key words: Hydromica clay, low-melting clay, low-melting flux, dune sand, ceramic tiles, facade tiles, chemical and mineralogical composition.

Introduction. After the Independence of the Republic of Uzbekistan, the volume of production of ceramic slabs is expanding from year to year. But despite this, today, for the needs of the Republic, high-quality ceramic tiles necessary such as floor tiles, facade tiles and porcelain stoneware are imported in large quantities at the cost of hard currency. In addition, despite the fact that the Lower Amudarya region has sufficient reserves of raw mineral resources, until now, no ceramic tile manufacturing enterprises have been established in this region.

Based on this study, the physicochemical properties of local mineral raw materials available in this region, suitable for the production of ceramic slabs and the development of ceramic compositions, including facade slabs based on them, sintering at low firing temperatures is very relevant.

Literature review. Ceramic tiles occupy a fairly large place in the production of building materials [1]. As you know [2] ceramic tiles are obtained by means of semi-dry pressing. Optimization of their physical and technical properties and technological parameters with a semi-dry pressing method [3] is the main task. In ceramic masses prepared on the basis of clay, the quality of the final product is influenced by the content of the temporary bond and the technological parameters of semi-dry pressing, such as pressing pressure, time and place of load application, etc. [4,5]. The amount and granulometric composition of quartz contained in ceramic slabs, has a significant effect on the processes of sintering, phase formation and formation of the structure of the ceramic material [6]. Ceramics with a high content of free silica are known to be sintered at high temperatures.

Therefore, fluxing components are introduced into the slabs to reduce the sintering temperature, forming a significant amount of the liquid phase during burning [7,8]. Researches on the fluxing role of low-melting clays in ceramic masses was carried out by V.F. Pavlov [9, 10].

Based on the data from [11, 12], it was determined that for the production of ceramic materials of low-temperature burning, the highest values of mechanical strength are achieved with a quartz-feldspar product content of up to 30%. The author [13] investigated the prospects for the use of silica-containing mineral raw materials - quartz sand and sand flask, "tails" of concentration of vermiculite and apatite-nepheline ores for the production of ceramic materials and products from them.

The author of [14] identified the sintering mechanism and optimal technological parameters for obtaining composite ceramic facade tiles for wall and basement purposes (GOST 13996-93) based on a filler with a high content of quartz and nepheline sludge. Composite ceramic materials on the basis of quartz filler have been obtained with bending strength from 18 to 27 MPa and water absorption from 4 to 7% with an optimal ratio of the content of free silica to the sum of flux-forming oxides equal to 0.8–1.1. When using nepheline sludge as a filler, the ceramic composite material is characterized by a flexural strength of 22 MPa and water absorption from 4

to 12%, while observing the optimal molar ratio in the ceramic mass CaO / SiO₂ in the range of 0.4–0.8.

Research Methodology. Modern methods of physical and chemical analysis, such as chemical, X-ray, etc., GOST 9169-75, GOST 13996-93 and GOST 27180.

Analysis and results. Clay of the Kulatau deposit, located in the Tuprakkala district of the Khorezm region, is a part of new deposits, not previously used in the ceramic industry. Related to this, in this work, we set the goal of studying the physicochemical properties of clay from the Kulatau deposit and developing the compositions of facade plates based on them.

The clay from the Kulatau deposit, in total, has a sufficient industrial reserve and has favorable mining and technical conditions for extraction. The sandy-argillaceous overburden of this deposit is 1-2 meters. This allows open-pit mining of raw materials in the field [15].

Kulatau clay, depending on the location and depth of occurrence, is macroscopically represented in three colors - light green, light gray and dark gray color, with brown blotches of iron-containing minerals. The texture is dense, the fracture is rough, uneven. When the sample is exposed to a 10% hydrochloric acid solution, boiling is not observed, which indicates the absence of carbonates in it.

The chemical composition of the investigated samples of the Kulatau clay is presented in Table 1, which shows that the chemical composition of three varieties are close to each other.

Table 1

The chemical composition of the clay from the Kulatau deposit

№ test	Color sample	Content of oxides, wt%										
		Si O ₂	Al ₂ O ₃	Fe ₂ O ₃	Ti O ₂	P ₂ O ₅	Ca O	Mg O	SO ₃	Na ₂ O	K ₂ O	П.П. П.
1	Dark grey	57,92	16,80	4,88	0,83	0,10	1,30	1,61	0,15	2,80	2,85	9,82
2	Light gray	57,91	17,65	4,58	0,83	0,10	0,81	1,52	0,20	2,86	2,75	9,95
3	Light green	57,90	17,03	4,60	0,82	0,08	0,78	1,52	0,20	2,80	2,55	10,88

According to the classification of GOST 9169-75. "Clay raw materials for the ceramic industry" [16], the studied clay, according to the content of free silica, belongs to the group with a low content of free quartz, in terms of plasticity, the sample belongs to the group of high-density clay raw materials (plasticity number is higher than 25) and in terms of refractoriness, the studied clay is fusible (the fire resistance index of the sample is below 1300 °C).

According to the results of X-ray analysis, the presence of the following minerals was established: muscovite with $d = 0.256; 0.212; 0.181; 0.137$ nm, hydromuscovite with $d = 0.199; 0.138; 0.129$ nm, montmorillonite with $d=0,345; 0,257; 0,255; 0,165; 0,149; 0,138; 0,128$ nm, quartz with $d=0,424; 0,334; 0,245; 0,228; 0,223; 0,212; 0,197; 0,154$ nm, illite with $d=0,446; 0,256$ nm, kaolinite with $d=0,714; 0,446; 0,228$ nm, sericite with $d=0,245; 0,223; 0,199$ nm.

Thus, according to the data of X-ray analysis (Fig. 1.) Kulatau clay belongs to the class of hydromica-montmorillonite type, with a significant content of quartz and kaolinite. In addition, the mineralogical composition of this clay contains admixtures of minerals of feldspar and hematite.

< Group: Standard Data: SERAYA-GLINA-XORAZM-2 >

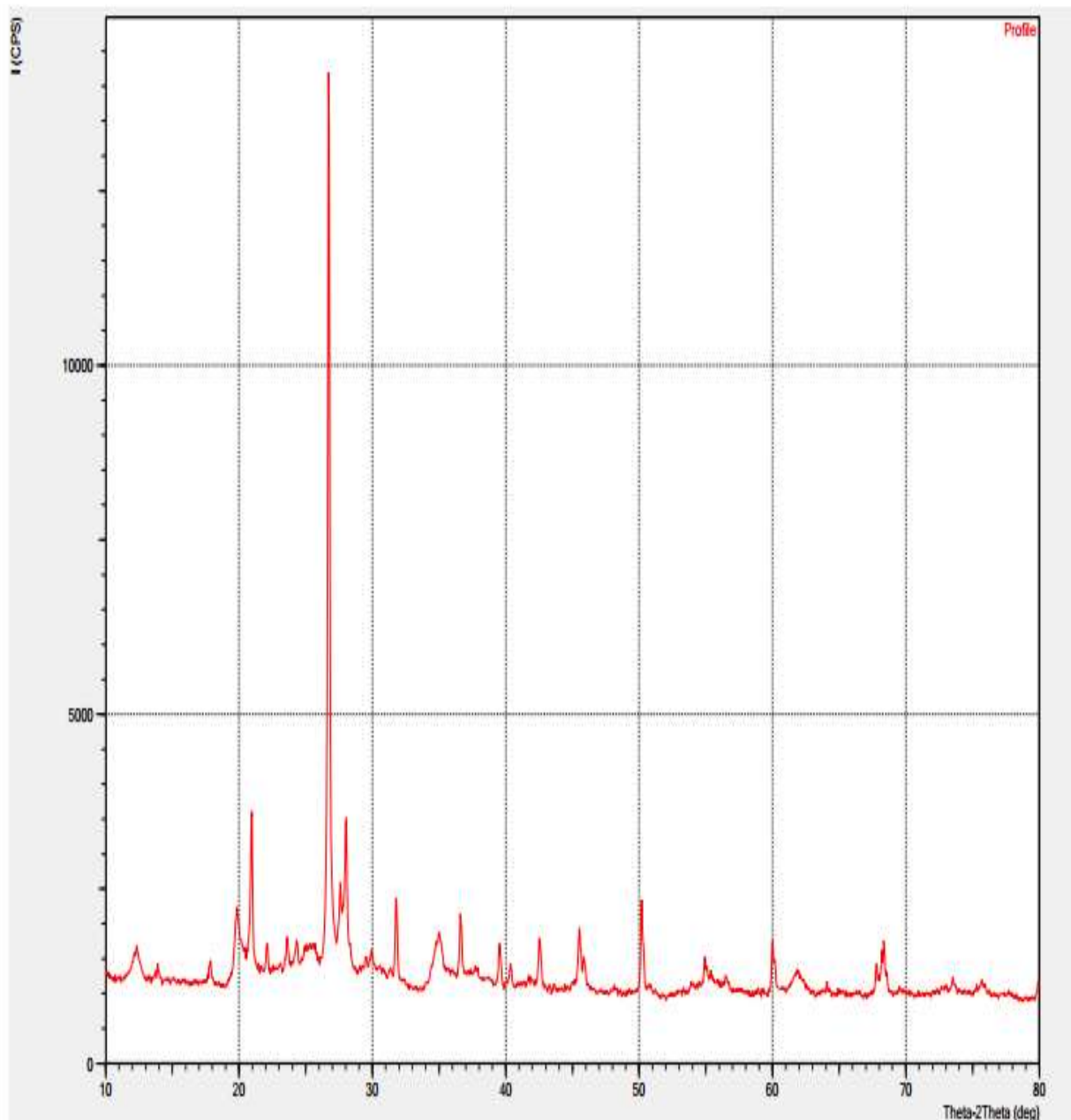


Fig. 1. X-ray diffraction pattern of clay from the Kulatau deposit

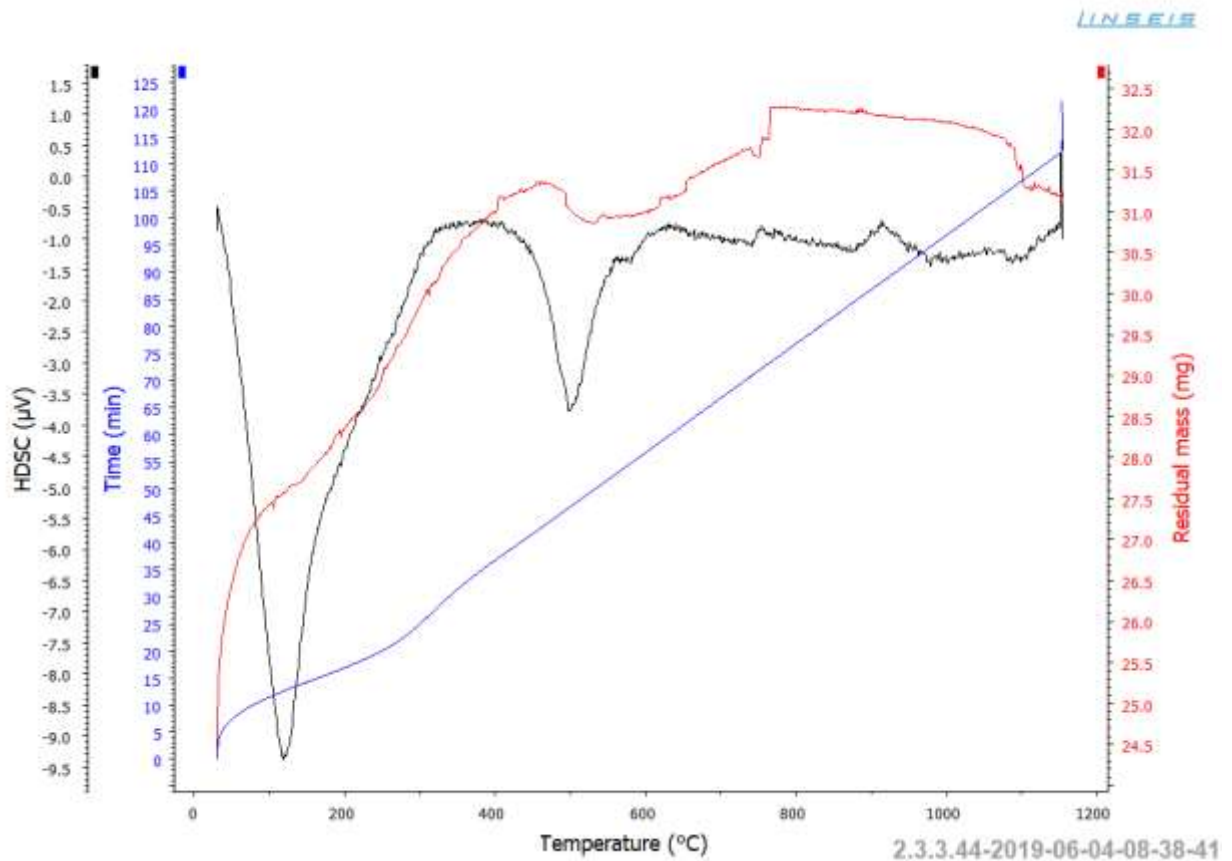


Fig. 2. Complex thermogram of the clay from the Kulatau deposit

Three periods are observed on the TG and HDSC curves, which record the loss of weight and the amount of energy during heating. The first strong period at a temperature of 140 ° C is characterized by the presence of an endothermic effect and is associated with the process of removing the loss of hygroscopic and interlayer water of clay minerals. The second period in the temperature range of 400-610 ° C with a maximum of 490 ° C is characterized by the presence of an endothermic effect, indicating the decomposition of the crystal lattice of clay minerals with the release of hydroxyl groups. The exothermic effect at 950 ° C is associated with intensive processes of formation of new crystalline phases, mainly mullite (Fig. 2).

The water absorptive samples prepared from Kulatau clay by the plastic method and burned at 950 ° C is about 5%, the water absorption of samples from this clay burned at 1000 ° C is less than 1%, and in the samples of Kulatau clay burned at 1050 ° C shows signs of burnout. It shows that, according to GOST 9169-75, this clay belongs to the class of highly sintered raw materials with low temperature sintering.

Thus, in terms of technological parameters, these clays are characterized by some short sintering interval. Therefore, when using it in the production of ceramic tiles, it is necessary to select corrective additives that extend the sintering interval. Based on this, to obtain low-shrinkage masses in the composition of the facade slabs, the local dune sand of the Tuprakkala massif was used.

Besides, taking into account that quartz sand increases the sintering temperature in the experimental masses, limestone of the Uch-Uchak deposit was also added, observing the ratio RO / R2O = 1-2 in the charge to obtain sintered products.

Obtaining prototypes from the above raw materials was carried out according to the accepted methodology in the production of ceramic plates. Experimental masses were prepared by the slip method. The grinding was carried out to a residue of less than 1.0% on a sieve No. 0.056. Further, a press powder was prepared by spraying water onto a dry charge with continuous stirring to a moisture content of 7-10%. Samples with a tile size of 50x50x10 mm were molded by a semi-dry method on a laboratory hydraulic press at a pressure MP and dried in a drying oven, at a temperature of 110 ° C. Then the prototypes were fired in laboratory muffle furnaces at different temperatures (from 900-1150 ° C with an interval of 50 ° C) with holding at the final temperature for 1 hour.

As a result of laboratory studies, it was established that, to obtain samples of satisfactory quality, the optimum moisture content of the masses is 8%, pressing pressure 30 MPa, and burning temperature 1100 ° C. Table 2 shows the physical and mechanical properties of facade slabs from the optimal masses M-3.

Table 2**Physical and mechanical properties of facade slabs**

Indicators	M-3	Requirements of GOST 13996-93 (wall)
Water absorption,%: - not less - no more	7	2 9
Frost resistance, cycles, not less	More than 50	40
Flexural strength, MPa, not less	18	16

As a result of studying the structure of burned prototypes from optimal masses M-3, using X-ray analysis, it was found that the phase compositions of the synthesized materials are represented by mullite, residual quartz, anorthite, an insignificant amount of gehlenite and wollastonite crystals, as well as a glassy phase filling the gaps between crystals.

Conclusion:

- 1) Based on the foregoing, we can say that, Kulatau clay belongs to the class of highly sintered raw materials with low-temperature sintering according to GOST 9169-75,
- 2) Due to this, it can be used as part of ceramic, including floor and facade slabs as a low-melting component.
- 3) As a result of laboratory studies in the Kulatau clay composition, dune sand of the Tuprakka massif and limestone of the Uch-Uchak deposit, at a temperature of 1100 ° C, prototypes were obtained that meet the requirements of GOST 13996-93. "Плитки керамические фасадные и ковры из них. Технические условия". "Facade ceramic tiles and floor slabs from them. Technical conditions".

References:

- [1]. Alekseeva L.L. Innovative technologies and materials in the construction industry. -Angarsk: AGTA, 2010 - 104 p.
- [2]. Augustinnik A.I. Ceramics. M. - L., Stroyizdat. 1975



- [3]. Kondratenko V.A. Ceramic wall materials: optimization of their physical and technical properties and technological parameters of production. M.: Composite, 2005. - 512 p.
- [4]. R.Sokolar, L.Smetanova. Dry pressed ceramic tiles based on fly ash – clay body: Influence of flyash granulometry and pentasodium triphosphate addition //Ceramics international. – 2010. – V. 36. – № 1. – P. 215–221.
- [5]. H. Cislagai da Cilva, F.A. Corbellini de Souza, N. Schwartz da Suva, D. Hotza. An application of mixture design to ceramic tile formulation // Inrerceram. –2010. – V. 59. – № 3–4. – P. 221–225.
- [6]. J.L. Amoros, M.J. Orts, S. Mestre, J. Garcui-Ten., C. Feliu. Porous single fired wall tile bodies: Influence of quartz particle size on tile properties// Journal ofThe European Ceramic Society. – 2010. – V. 30. – № 1. – P. 17–28.139.
- [7]. F.Andreola, L. Barbieri, F. Bondioli, I. Lancellotti, P. Miselli, A. Ferrari. Recycling of screen glass into new traditional ceramic materials// International Journal of Applied Ceramic Technology. – 2010. – V. 7. – № 6. – P. 909–917.
- [8]. A.M.Eminov, I.R.Bazhenov, R.G.Allamov, S.K.Duschanov. Clay from the Gurlensky deposit is a new raw material for the production of ceramics. Composite Materials magazine. 2019. No. 3. pp.101-103.
- [9]. V.F.Pavlov. "Fusible clays in ceramic masses" // Zh.Glass and ceramics. 1985. No. 9. pp.17-18.
- [10]. E.N.Verichev, V.F.Pavlov. "Acid-resistant masses with the addition of fusible clays" // Zh.Glass and ceramics. 1981. No. 2. pp.15-16.
- [11]. V.I.Vereshchagin, A.E.Buruchenko, I.V.Kashchuk. Possibilities of using secondary raw materials for the production of building ceramics and sitals// Building materials. - 2000. - No. 7. - pp. 20-22.
- [12]. V.P.Ilyina, G.P.Ozerova, G.A.Lebedeva. Facing tiles based on feldspar raw materials and Cambrian clay of the Chekalovsky deposit // Glass and ceramics. - 2005. - No. 3. - pp. 22-23.
- [13]. V.V.Sirota, O.N.Ivanov, A.G.Chigarev, E.A.Bocharov. Ceramic materials based on silicon-containing mineral raw materials// Glass and ceramics. - 2010. - No. 7. - pp. 17-19.
- [14]. R.G.Eromasov. "Composite ceramic materials based on coarse-grained technogenic filler". Abstract of the dissertation for the degree of Candidate of Technical Sciences. Krasnoyarsk. 2014 Page 24.
- [15]. A.M.Eminov, I.R.Baizhanov, J.S.Zhabbergenov, H.F.Masharipova. "Kulatau koni gili keramik koshinlar olish uchun kimmatli hom-ashe". ((The clay of the Karatau deposit is a valuable raw material for the production of ceramic plates). Collection of abstracts of the Republican conference "innovative technologies in the chemical and construction industries and the solution of urgent environmental problems".Tashkent. 2021
- [16]. GOST 9169-75. Clay raw materials for the ceramic industry. Classification. IPK Publishing House of Standards. Moscow. 2001

UDK: 910.1.378

**THE ROLE AND IMPORTANCE OF STATISTICS IN TEACHING
ECONOMIC AND SOCIAL GEOGRAPHY**

Djumabaeva Salomat Komiljonovna
Chirchik State Pedagogical Institute,
Faculty of Natural Sciences
Department of Geography
S.djumabayeva@cspi.uz

Annotasiya: Maqolada Iqtisodiy va ijtimoiy geografiyani o'qitishda statistik ma'lumotlarning o'rni va ahamiyati yoritilgan. Shuningdek, talabalariga statistik bilim va ko'nikmalarni rivojlantirish metodikasi bo'yicha xorijiy mamlakatlarda olib borilgan tadqiqotlar tahlil etilgan.

Kalit so'zlar: iqtisodiy-ijtimoiy geografiya, statistika, metodika, statistik ma'lumotlar, tadqiqotlar, statistik bilim va ko'nikmalar.

Аннотация: В статье раскрывается роль и значение статистики в преподавании экономической и социальной географии. Он также анализирует исследования, преподаваемый в зарубежных странах по методом развития, статистические знания и навыков у студентов.

Ключевые слова: экономическая социальная география, статистические данные, статистика, методика, статистические знания и навыки.

Abstract: The article describes the role and importance of statistics in the teaching of economic and social geography. It also analyzes research conducted in foreign countries on methods of developing statistical knowledge and skills for students.

Keywords: economic and social geography, statistics, methodology, statistical data, research, statistical knowledge and skills.

Introduction. Statistics are widely used in economic and social geography lessons. Statistical data describe geographical events and processes, which are used to study the laws of development of nature and society, comparing one indicator of one region with another. In particular, as the science of economic and social geography deals with the problems of formation, development and management of socio-economic systems in countries and regions, it is impossible to explain these processes without statistics. Therefore, in the teaching of this subject, first of all, it is important to develop a methodology for teaching students statistical data.

In addition, in order for students to successfully master the science of economic and social geography, it is necessary to develop the skills of correctly interpreting quantitative data, drawing conclusions based on its analysis. Modern economic and social geography should focus on students not only to

master the system of knowledge about the specific features of the geographical space, but also to identify and evaluate changes in geographical phenomena and processes using traditional and new pedagogical technologies.

Many quantitative data used in the teaching of economic and social geography are summarized and analyzed using statistical methods. In the scientific literature, statistical methods are generally described as a set of methods for collecting, summarizing, presenting, analyzing, and interpreting digital data. In the process of teaching this subject, it is difficult to understand and interpret different data without statistical training. It follows that mastering statistical methods is a prerequisite for successful mastering of the course of economic and social geography [1].

Especially in today's globalization, the rapid changes taking place in countries and regions require a reconsideration of attitudes to statistical methods, increasing their importance and more active use of statistical tools. In addition, students can independently plan geographical research, collect the necessary data, organize and summarize them, analyze and present the results directly through statistical data.

Literature review. It should be noted that a lot of research has been conducted in foreign countries to analyze the statistical knowledge and skills of students, to determine the level of mastery of the essence of quantitative indicators used in the study of geography. For example, the problems of using statistical methods in the teaching of mathematics and physics were discussed by foreign scientists G.S. Evdokimova, V.D. Selyutin, E.A. Bunimovich, V.A. The general issues of the use of statistical indicators in the teaching of geography, as well as the formation of statistical knowledge and skills are covered in the research work of S.P.Arjanov, N.N.Baranskiy, A.V.Darinskiy [1], V.P.Maksakovskiy [3], V.A.Juchkevich [2], N.N.Petrova [6], M. K.Kovalevskaya, V.P.Dronov. The method of using statistical indicators in the study of population geography was studied as the object of study of S.A. Sukhin [8].

Their research has a scientific and methodological character in the teaching of comprehensive geography. Therefore, the attention of these scholars is focused on the study of statistical indicators, their content, consistent use in individual courses and topics. However, their research problem is related to the use of statistical indicators in the course of school geography, practical methods and methodological conditions, the problems of teaching economic and social geography have not been sufficiently studied in the example of higher education. In our country, no research has been conducted on the teaching of statistics to students in the classes of economic and social geography and statistical training of future teachers of geography.

Materials and methods. It is known that statistics is a field of knowledge that defines the general issues of collecting, calculating and analyzing mass statistical (quantitative or qualitative) data, in other words, the study of quantitative indicators of mass social phenomena in numerical form.

The word "statistics" is derived from the Latin word "status". The term "statistics" was introduced to science in 1746 by the German scientist Gottfried Achenwall, who proposed to change the name of the subject "Country Studies" taught in German universities to "Statistics" and laid the foundation for the formation of this science. It should be noted, however, that we know that statistics were available long before this date, e.g., in ancient China, when a census was conducted, comparing the military capabilities of states based on population.

In the science of statistics, there are special methods of research and processing of data, such as statistical observations, grouping method, averages, indices, balance

method, graphical method and other methods. Originally, statistics described the economic and political situation of a state or part of it, but today statistics describe the state of a particular state or region in a given period. However, statistical methods are used not only for administrative management, but also at the individual enterprise level. According to the well-known geographer Vladimir Pavlovich Maksakovsky, "the purpose of statistics is to show the facts as briefly as possible." [4].

However, the term "statistics" is used in two senses. First, in everyday life, "statistics" is often understood as a set of quantitative data about an event or process, and second, statistics is a function of the results of observations used to evaluate and verify indicators.

Therefore, statistical methods of analyzing various data are currently used in almost all areas of human activity. They are widely used to obtain and justify information about a group (objects or subjects) of any internal diversity. 3 different statistical methods of data analysis are applied in practice:

1. Development and research of general-purpose methods without taking into account the specifics of the field of application;
2. Development and research of statistical models of real events and processes in accordance with the needs of a particular field of activity;
3. Use of statistical methods and models for statistical analysis of accurate data [8].

Statistical materials are the basis of the science of economic and social geography. V.P.Maksakovsky in his book "Geographic Culture", included this method in the category of general geographical methods, noting that statistical methods are a combination of quantitative methods for collecting, processing and analyzing mass data [4]. He also commented on the widespread use of mathematical statistics and socio-economic statistics in economic and social geography. Mathematical statistical methods allow the evaluation of the reliability and accuracy of conclusions drawn from limited statistical materials. Indeed, in geography, mathematical and statistical methods, including correlation and regression analysis, multidimensional statistical methods, statistical modeling, etc., events and processes are widely used in regional conditions.

Analysis Ant Results. In socio-economic geography, economic and social statistics are widely used, which describe the quantitative side of the events and processes of the location and territorial organization of productive forces and, more broadly, society. Economic statistics is a science that studies the quantitative side of economic events and processes, their content, closely related to the qualitative aspect. Economic statistics examines the laws of economic development that occur in certain spatial and temporal conditions and are expressed in quantitatively measurable changes. Quantitative description of economic processes and events, the laws of their development is a distinctive feature of economic statistics that distinguishes it from other social sciences. In addition, economic statistics as a factor in the production of natural resources, secondly, studies the impact of human economic activity on natural conditions and natural resources [10].

In statistics, the method of multidimensional analysis is used to study a large number of indicators that vary by country or region. The study of population geography

is based on the use of complete statistical materials, for example, the method of statistical grouping is used as a basis for scientific processing of all data on settlements, composition, number. In the system of geographical education, the knowledge of the population that students gain during the study of science plays an important role. The study of population geography is based on complete statistics. The population is a subject of economic activity and social relations, an important factor in changing nature. For this reason, the science of geography is an in-depth study and analysis of population characteristics based on statistical sources. On the basis of the statistical method, the composition and territorial aspects of the population are revealed, as well as knowledge about the number, dynamics, reproduction, composition and location of the population is formed and developed [6].

Conclusion: Therefore, statistics play a special role in shaping the scientific outlook of future teachers of geography, expanding their knowledge of nature, population and the economic system, the formation of skills and abilities to apply theoretical knowledge in practice. The content of economic and social geography and, in connection with it, the process of teaching this subject has been constantly improved and updated in recent years on the basis of scientific achievements, which requires the use of fast and accurate statistical materials in teaching students.

References:

- [1]. Darinsky A.V. New approaches to teaching economic and social geography in Russia in the context of the transition to a market economy. // *Geography at school*. 2000. - No. 1. - P. 48-52.
- [2]. Zhuchkevich V.A. On the methods of teaching geography at school. Minsk: Narodna osvita, 1967. -- 144 p.
- [3]. Maksakovsky V.P. Modern and promising problems of school geography. // *Geography at school*. 1996. - No. 4, pp. 35 - 40.
- [4]. Maksakovsky V.P. "Geographic culture", M., 1998, p. 212-213.
- [5]. Ivanova S.A. The system of statistical methods in teaching geography. Russia: dis. Cand. ped. sciences. St. Petersburg, 2009. 167 p.
- [6]. Petrova N.N., Sukhin S.A. "Statistical method" // "*Geography at school*". - 2004 - No. 5.-P. 39-46.
- [7]. Soliev A. Economic geography: theory, methodology of and practice. Tashkent, 2013. 180 p.
- [8]. Sukhinin S.A. Methodology for the use of statistical indicators in the study of the population in the school geography course. - Moscow, 2009. -167 p.
- [9]. Sukhin SA, Postgraduate student of the laboratory of geographic education. "Statistical method" // "*Geography at school*". - 2004 - No. 4.-p. 51-55.
- [10]. Tozhieva Z.N. Economic and demographic statistics. Curriculum. Tashkent, 2001.-115 p.

UDC: 57

IMPACT OF THE ANTHROPOGENIC FACTOR ON INVASIVENESS BY HELMINTHS

Koschanova Roza Erejepovna
Karakalpak State University
named after Berdakh
Associate Professor of
General Biology and Physiology
Koshchanova_r@gmail.com

Annotasiya. Maqolada bazi gel'mintlarning parazitlanishi: enterobioz, gimenolepidoz, teniarinxoz, askaridoz, exinokokkoz- kattalar va bolalar organlarida turli yuqumli kasalliklarining qo'zg'atuvchisi, ularning paydo bo'lishi sabablari va ularga qarshi kurashish choralari o'rganildi.

Kalit so'zlar: gel'mintlar, invaziya, ostrisa, askarida, mal g'yshti tasmasi, ch'ychqa tasmasi.

Аннотация. В статье исследуется паразитирование некоторых гельминтов: энтеробиоза, гименолепидоза, тениаринхоза, аскаридоза, эхинококкоза - возбудителей различных инфекционных заболеваний органов взрослых и детей, причины их возникновения и меры борьбы с ними.

Ключевые слова: гельминты, инвазия, острицы, аскариды, бычий цепень, свиной цепень.

Abstract. The paper studies the parasitization of some helminths for: enterobiosis, hymenolepiasis, taeniarhynchosis, ascariidosis, echinococcosis - the causative agents of various infectious diseases in adults', children's organs, the causes of their occurrence and measures to combat them.

Keywords: helminths, invasion, pinworm, ascarid, beef tapeworm, swine tapeworm.

Introduction. Helminths are the causative agents of many infectious diseases, detrimental to health care, the livestock economy. By the definition of academician K.I. Skryabin, helminthology is the science of parasitic worms and diseases caused by them in humans and animals.

Helminthology is closely related to biological sciences: zoology, medicine, veterinary science and phytopathology and solves various problems of both theoretical and applied disciplines.

Literary review. The first information about parasitic worms dates back to ancient times, as science was formed in the 18th century and continues to this day. Outstanding zoologists, helminthologists E.N. Pavlovsky (1948), V.A. Dogel (1962), K.I. Skryabin (1967), R.S. Schulz (1976) and other authors tried to satisfy the emerged need for studying, describing helminth species, developing measures to combat them.

Helminthology as a science developed in Central Asia, including in Uzbekistan in the second half of the last century, begun with the work of the Russian researcher A.P. Fedchenko.

The work of K.I. Skryabin, E.N. Pavlovsky, who for the first time made repeated expeditionary trips to Central Asia on deworming helminths, continued in different regions of Uzbekistan under the direction of prof. M. A. Sultanova (1971).

In the Republic of Karakalpakstan, students of M. Sultanov studied the fauna of helminths of wild mammals, Koshchanov (1970), and some soil invertebrates - intermediary hosts of helminths in pasture biocenoses, Kabilov (1984).

The interest in the study of human parasites does not decrease, apparently, due to the fact that there are several billion helminths affected people in the world, and over the course of a long evolution they have developed adaptations to the parasitic lifestyle, their habitation in almost all human organs.

In recent years, due to the deterioration of the ecological condition in the Republic of Karakalpakstan, there has been an increase in the number of significant diseases in humans, and the anthropogenic process is becoming a powerful factor in its transformation, where conditions are created for the development of certain types of helminths.

The purpose of this work is to identify the cause of the spread and transmission of infectious diseases among residents of Nukus, the Republic of Karakalpakstan, among the adult population and children from 5 to 14 years old.

Materials and Methods. Helminthiasis are caused by multicellular parasites, which use their host as natural habitat to feed off and reproduce. Geogelmints enter into person's organ from water, soil, surrounding objects orally, and biogelmints penetrate into the human body at the stage of larvae from infected blood or meat, and symptoms in helminthosis are diverse and laboratory diagnostics are specified by instrumental studies (ultrasound, X-ray) and histological examination of feces for the presence of helminths.

This work uses information for 2019-2020 of sanitary-epidemiological station, Nukus, the examination was carried out according to generally accepted parasitological methods of laboratory diagnostics for the presence of: enterobiasis (*Enterobius vermicularis*), hymenolepiasis (*Hymenolepis nana*), taeniarrhynchosis (*Taeniarrhynchus saginatus*), ascariidosis (*Ascaris lumbricoides*), echinococcosis (*Echinococcus granulosus*).

Results and discussion

The prevalence of invasive diseases is shown in the following table.

Table 1

Indicators of invasive diseases among the population of Nukus, the Republic of Karakalpakstan for 2019-2020.

№	Examined	Year	Examined	Invasiveness on parasitology									
				Enterobiasis		Hymenolepiasis		Taenia saginata		Ascariidosis		Echinococcosis	
				Number	%	Number	%	Number	%	Number	%	Number	%
1.	Among adults	2018	95306	1521	1,5	1390	1,4	1,05	0,005	1	0,001	2	0,004
		2019	94973	1050	1,1	766	0,8	1,05	0,005	1	0,001	1	0,001

2.	Children from 5 to 14 years old	2018	1236	1430	3,1	33	2,7	1	0,004	-	-	1	0,001
		2019	661	955	2,2	10	1,5	1	0,004	-	-	-	-
3	Total:	2018	96542	2951	3	1423	1,4	-	-	-	-	3	0,003
		2019	95634	2005	2	776	0,8	-	-	-	-	1	0,001

The table 1 shows that the surveyed population is more invaded by enterobiasis (*Enterobius vermicularis*), and by the frequency of occurrence - hymenolepiasis (*Hymenolepis nana*), where adults were most affected, and children from 5 to 14 years old in single cases. The causative agent of hymenolepiasis is the dwarf tapeworm (*Hymenolepis nana*), the final host of humans, passing through the entire life cycle in the body.

The causative agent of taeniarhynchosis is the beef tapeworm (*Taeniarrhynchus saginatus*), where adults and children are equally invaded. It is interesting to note that there is no information about the invasion of teniasis by the causative agent, which is the swine tapeworm. Although the life cycle of these helminths is very similar, both parasites use humans as their final host. Apparently, the reason for the spread of taeniarhynchosis in urban residents is possible due to the frequent consumption of insufficiently processed beef meat products than pork.

The causative agent of ascaridosis (*Ascaris lumbricoides*) is geogelminth, which develops with migration in the human body, where hyperendemic foci are not noted and were detected sporadically. The hyperendemic foci of echinococcosis were also observed sporadically.

Conclusion. Overall, we can draw the following conclusions; the examined population of Nukus is more invaded by enterobiasis, hymenolepiasis. Apparently, the main reason for the spread of invasive diseases is not following the rules of personal hygiene among children of preschool institutions, primary school students, untimely treatment and an anthropogenic factor that led to the aridization of the Aral Sea region to a shortage of benign water, due to the low level of sanitation and environmental pollution.

In the summer, due to the high temperature and dry air, water consumption in children sharply increases, which leads to the development of acute intestinal and invasive diseases.

Therefore, special attention should be paid to compliance with sanitary standards of drinking water, sanitary supervision in retail outlets, catering services, thermal treatment of fish and meat products, protection of the environment, pastures, water bodies from contamination with human and animal excrement, which could contribute to the reduction of parasitic diseases caused by invertebrates.

References:

- [1]. Dogel V. A. General parasitology. - L., 1962.
- [2]. Kabilov T.K. Some soil invertebrates are intermediary hosts of helminths in pasture biocenoses of Uzbekistan. "In conf. materials on soil zoology. Ashgabat, 1984.
- [3]. Koshchanov E.K. Gelminths of wild animals. – Astarct on PhD thesis. - T. 1970.

UDC: 101. (075.8)

THE INFLUENCE OF THE PHENOMENA OF BEING ON THE DEVELOPMENT OF PERSONALITY SPIRITUALITY

Ashrapov Ravil Ramzaevich
Senior Lecturer of the Department
"General Pedagogy and Psychology"
Navoi State Pedagogical Institute
aqvarius.66@mail.ru

Annotatsiya: Maqolada ma'naviyat, ong va inson xulq-atvoriga ta'sir etuvchi ijtimoiy voqelik hodisalarining falsafiy tahlili berilgan. Muallif "mutolaa madaniyati" hodisasining tuzilishini, uning vazifalari va shaxs ma'naviy hayotining rivojlanishiga ta'sir etish usullarini tadqiq qiladi. Mutolaa madaniyatining ijtimoiy-falsafiy hodisasi bilan uni o'rab turgan tabiiy-ijtimoiy muhit o'rtasidagi bog'liqlikning mohiyati, uning «inson – jamiyat – tabiat» sxemasida tutgan o'rnini ko'rib chiqiladi. Zamonaviy jamiyatda o'qish madaniyatining dolzarbligi to'g'risida xulosa tuzilgan.

Kalit so'zlar: borliq, jamiyatning falsafiy tushunchasi, madaniyat, ma'naviyat, axloq, ijtimoiy-falsafiy tahlil, ijtimoiy falsafa.

Аннотация: В статье проводится философский анализ феноменов социальной реальности, воздействующие на духовность, сознание и поведение человека. Автором исследуется структура феномена «культура чтения», его функции и способы влияния на развитие духовной жизни человека. Рассматривается сущность связей социально-философского феномена культуры чтения с окружающей природной и социальной средой, его место в схеме «человек – общество – природа». Сформулирован вывод о востребованности культуры чтения в современном обществе.

Ключевые слова: бытие, философское осмысление общества, культура, духовность, нравственность, социально-философский анализ, социальная философия.

Annotation: The article provides a philosophical analysis of the phenomena of social reality that affect spirituality, consciousness and human behavior. The author investigates the structure of the phenomenon of "reading culture", its functions and ways of influencing the development of a person's spiritual life. The essence of the relationship between the socio-philosophical phenomenon of reading culture and the surrounding natural and social environment, its place in the scheme "man - society - nature" is considered. The conclusion about the relevance of the culture of reading in modern society is formulated.

Key words: being, philosophical understanding of society, culture, spirituality, morality, socio-philosophical analysis, social philosophy;

Introduction. The philosophical understanding of society and its individual spheres was first put forward in ancient times by Socrates and Plato. They were the first to describe society, its laws, historical forms and social processes from the perspective of philosophy. [1] According to Plato, the participation of a person in all

sorts of activities and events of society meant the most important component of the self-disclosure of the individual. Plato believed that the state should be governed by philosophers, as it is the philosophers who have real knowledge about the norms of life, and due to the lack of this knowledge, many states have problems of managing the people. [2]

Aristotle also considered man to be a social being and did not represent him outside of society. A person living outside the state, isolated from society, Aristotle called "an isolated pawn on the playing board." [3]

The world religions, already well-formed in the Middle Ages, only contributed to the development of philosophical ideas about the moral and spiritual life of man. The idea was admitted that the absolute, ultimate characteristic of being can coexist with the historical and cultural evolution of society.

During the Renaissance, philosophy was focused on the knowledge of the laws of the surrounding reality, on the study of the "nature" of man.

The new time for philosophy has turned into a complex of scientific disciplines about being, cognition and logic. An intensive increase in natural and social knowledge has led to the fact that philosophy, as a science, which includes the study of being, thought processes, cognition, laws of logic, nature and social phenomena, was unable to meet the requirements and demands of society and receive specific results, like other scientific disciplines. It seemed that "Philosophy, as a system generalizing human knowledge about the world and knowledge about various types of activities, has lost its scientific perspective". [4] Is that so?

Literature Review. As a separate branch of social philosophy was formed by the middle of the 19th century. At that time, it only supplemented epistemology, anthropology, ethics, ontology. [5,6,7] The object of social philosophy is social life and social processes. Social psychology studies society from a bird's eye view. Its subject is public life. Social philosophy constantly shows the possibilities of endless development of the very existence of people. Social philosophy in this sense invites people to look at their thinking as if from the outside. [8]

The most important task of social philosophy is to identify phenomena (phenomena) and methods of cognition of reality. At all stages of its development, philosophy offered many different approaches to understanding the world, including in the knowledge of man and society. However, more fundamental approaches to the knowledge of social phenomena proper were developed by philosophy gradually, step by step. One of these social phenomena, simultaneously contributing to the discovery and development of new principles of cognition of social reality and, at the same time, uniting people and society, is the phenomenon of reading culture.

Socio-philosophical research of the phenomenon of reading culture is facilitated by the socio-historical characteristics of its existence. The phenomenon of reading is a cultural process, on the one hand, and on the other hand, reading is a phenomenon that contributes to the development and enhancement of the culture of a person and, accordingly, society. Reading, being part of the culture of society, plays a huge role in the formation of the personality, culture of a person, inner world and his spiritual maturation. The culture of reading is a part of the general culture, which includes the

worldview, attitudes, intelligence, knowledge, skills and feelings of the reader, which provide a deep perception of the work.

Research Methodology. In a philosophical context, the culture of reading is a special way of forming and expanding universal human cultural activity, manifested in the results of spiritual and material practice, in the structure of social norms, relations and organizations, spiritual values, in the complex of people's relations to the world around them, to others and to themselves.

The culture of reading should be understood as "an integral part of the general culture of the individual, which characterizes the degree of development and implementation of the essential forces of a person, his abilities and talents in mastering the cultural potential of written texts based on traditional and innovative information technologies and determining the effectiveness of the socio-cultural interaction of a person in the modern information environment". [9]

The unifying feature of interpretations of the culture of reading is that the culture of reading depends on the level of knowledge, culture and upbringing of the individual himself. The need for regular reading, study, analysis and evaluation of the information read, the aesthetic and emotional attitude to the read work are invariably important components of the reader's culture of the reader, whether he deals with book products or electronic media. The listed qualities of reading activity speak of a mature, well-formed, competent and independent reader.

Analysis And Results. The culture of reading is the most important perspective of morality, spirituality, intellect, creative vitality and self-realization of a person. In his wonderful work "The Birth of a Citizen" V. Sukhomlinsky noted that real reading is reading that captivates the mind and heart. That the book "heals the soul and body", pleases, reveals the beauty of the world, teaches. [10]

Morality and spirituality are inseparable. As V. Bezrukova noted: "Morality rules a person, and spirituality rules morality. Spirituality allows you to distinguish good from evil and determine the merits of each personal quality - whether it is moral or immoral. Spirituality is what makes us human, and morality is how we live. The meaning of life is determined by spirituality, and the ways of life are determined by morality". [11]

Reading topics in the social sciences and humanities have existed since their inception: in medieval Europe - from the period of early Christians and disputes about sacred books, in Russia - from the Enlightenment of the eighteenth century, when the formation of book culture began. In Central Asia, the beginning of the appearance of the first writing system, and hence reading, are the prophetic writings of Zarathushtra (the inspirer of Ahura-Mazda) in the Avesta in the seventh-eighth centuries BC and later, in the seventh century AD, the main book for reading all Muslims becomes holy, handwritten book in Arabic - the Koran.

Conclusion Recommendations. Reading as a means of learning new things and thereby allowing young people to quickly adapt in the surrounding society is an important tool for changing a person's worldview. Reading changes a person, makes him kind, understanding, sympathetic, human. It is very important to pay attention to the complex social and moral relations of young people among themselves, with

themselves and towards society. It is important for young people to raise the culture of literacy, achieve excellence, and strive for knowledge.

As M. Khairullaev writes: "In the treatise "On the merits of sciences and arts" Al-Farabi emphasizes the infinity of the process of cognition of nature, understanding the course of cognition as an ascent from ignorance to knowledge, from cognition of the effect to cognition of the cause. [12]

Even the Prophet Muhammad said: "The pursuit of knowledge is the duty of every Muslim and Muslim woman". [13]

The concept of reading culture is that the development of a harmonious personality occurs through education and independent work on oneself, which is impossible without the reading process. On the other hand, the very phenomenon of reading culture is formed due to the development of the reading process and is directly proportional to the state of society itself. "There is no doubt," notes S. N. Plotnikov, "that reading is a very sensitive, reliable and, in a certain sense, even a universal indicator of the state of society as a whole. Therefore, studying reading, we kind of feel the atmosphere, hear the tonality, the mood of the spiritual life of society and, conversely, analyzing social processes, we thereby draw the background against which the drama of reading unfolds. education in general, and reading in particular". [14]

References

- [1]. Social philosophy: Dictionary / Comp. and ed. by V. E. Kemerov, T. Kh. Kerimov, M.: Academic project, 2006, p. 624.
- [2]. Hundersmark Lawrence. Plato // Great Thinkers of the West / Edited by Ian McGill. M.: Kron-Press, 1999, p. 36.
- [3]. Aristotle. Politics // The Thinkers of Greece. From myth to logic: Works. M.: Eksmo-Press, 2001, p. 444.
- [4]. Social philosophy: Dictionary / Comp. and ed. by V. E. Kemerov, T. Kh. Kerimov, M.: Academic project, 2006, p. 591.
- [5]. Hegel G. Science of Logic, St. Petersburg, 1997.
- [6]. Kant I. Course of positive philosophy. M. 1995.
- [7]. G. Spencer. Synthetic philosophy, K.: Nika-Center, 1997.
- [8]. Social philosophy. Textbook. - Edited by I.A. Gobozov. - M.: Publisher Savin S.A., 2003, p. 7.
- [9]. Shuler, IV Development of the reader's culture of the individual in the conditions of the modern information environment: dis ... cand. ped. sciences / I. V. Shuler. - Tyumen, 2011, p. 176.
- [10]. Sukhomlinsky V. The birth of a citizen. - M.: Molodaya gvardiya, 1979, p. 32.
- [11]. V. Bezrukova Everything about the modern lesson at school: problems and solutions. M. 2006. p. 14.
- [12]. Khairullaev M. M., Farabi - the greatest thinker of the Middle Ages, Tashkent, 1973, p. 35
- [13]. <http://dkm.gov.uz/en-US/novyj-uzbekistan-i-tretij-renessans>
- [14]. https://botana.biz/prezentaciya/russkii_yazyk_literatura/petpkhax.html