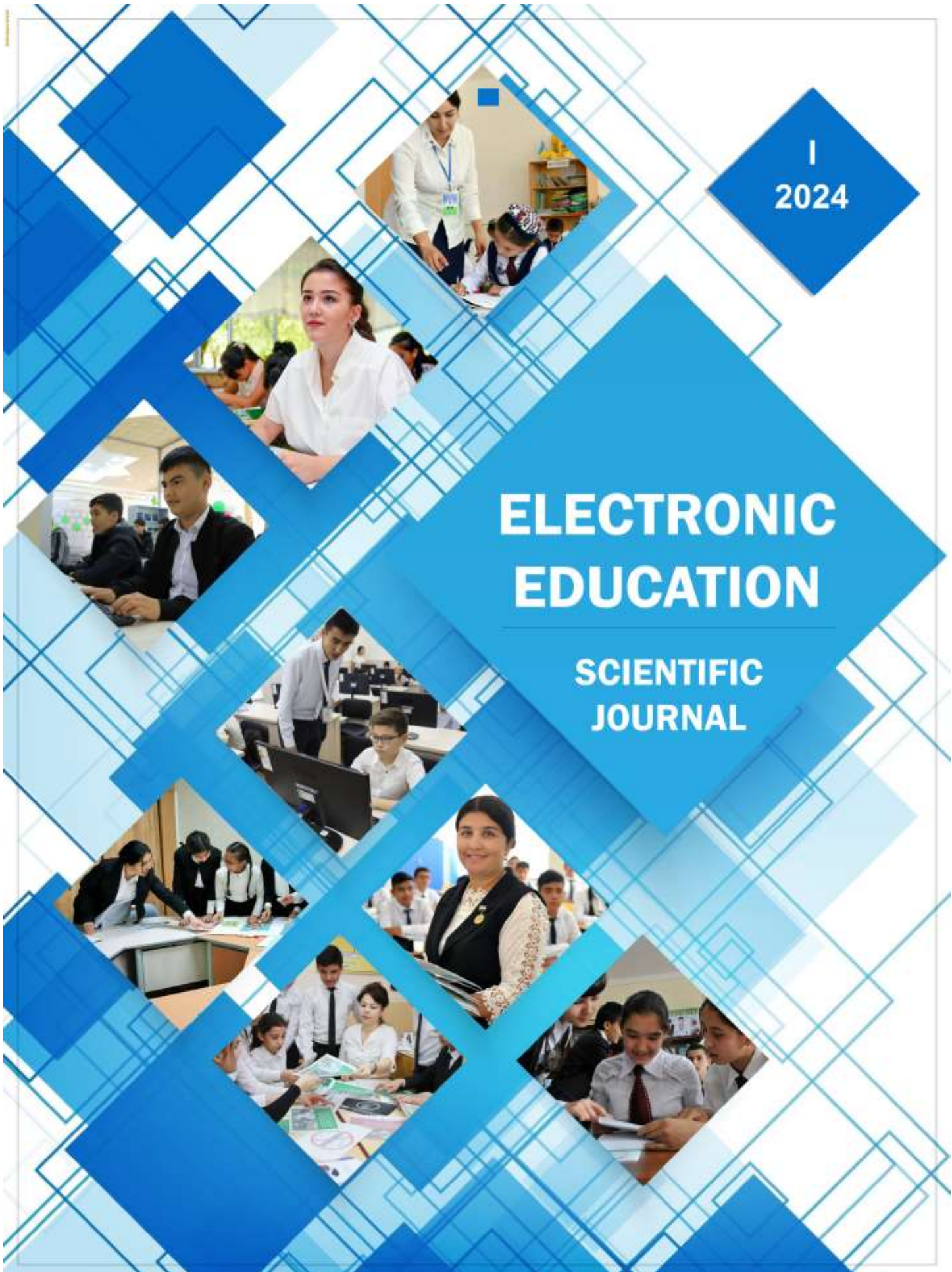


I  
2024

# ELECTRONIC EDUCATION

SCIENTIFIC  
JOURNAL



**TAHRIRIYAT**

**Bosh muharrir**

**Laqayev Saidaxmad Norjigitovich**  
fizika-matematika fanlari doktori, akademik

**Bosh muharrir o‘rinbosari**

**Ro‘ziyev Rauf Axmadovich**  
fizika-matematika fanlari nomzodi, dotsent

**Mas’ul muharrir**

**Mirsanov Uralboy Mukhammadiyevich**  
pedagogika fanlari doktori DSc, dotsent

**Editor-in-Chief**

**Saidaxmad Norjigitovich Lakayev**  
doctor of physical and mathematical sciences,  
academician

**Deputy Editor-in-Chief**

**Ruziyev Raup Akhmadovich**  
Candidate of Physical and Mathematical Sciences,  
Associate Professor

**Responsible editor**

**Mirsanov Uralboy Mukhammadiyevich**  
doctor of Pedagogical Sciences DSc, Associate  
Professor

**TAHRIRIYAT A’ZOLARI**

**Sobirov Baxodir Boypulatovich** – NavDPI rektori,  
texnika fanlari doktori, professor (O‘zbekiston)

**Djurayev Risbay Xaydarovich** – akademik  
(O‘zbekiston)

**Shokin Yuriy Ivanovich** – akademik (Rossiya)

**Negmatov Sayibjon Sodiqovich** – akademik  
(O‘zbekiston)

**Aripov Mersaid Mirsiddikovich** – fizika-matematika  
fanlari doktori, professor (O‘zbekiston)

**Turabdjano Sadritdin Maxamatdinovich** – texnika  
fanlari doktori, akademik (O‘zbekiston)

**Raximov Isomiddin Sattarovich** – fizika-matematika  
fanlari doktori, professor (Malayziya)

**Shariy Sergey Petrovich** – fizika-matematika fanlari  
doktori, professor (Rossiya).

**Ajimuxammedov Iskandar Maratovich** – texnika  
fanlari doktori, professor (Rossiya).

**Ibraimov Xolboy** – pedagogika fanlari doktori,  
akademik (O‘zbekiston)

**Yunusova Dilfuza Isroilovna** – pedagogika fanlari  
doktori, professor (O‘zbekiston)

**Aloyev Raxmatillo Djurayevich** – fizika-matematika  
fanlari doktori, professor (O‘zbekiston)

**Abdullayeva Shaxzoda Abdullayevna** – pedagogika  
fanlari doktori, professor (O‘zbekiston)

**Mo‘minov Bahodir Boltayevich** – texnika fanlari  
doktori, professor (O‘zbekiston)

**Korshunov Igor Lvovich** – texnika fanlari nomzodi,  
dotsent. (Rossiya)

**Kolbanyov Mixail Olegovich** – texnika fanlari  
doktori, professor. (Rossiya)

**Verzun Natalya Arkadyevna** – texnika fanlari  
nomzodi, dotsent. (Rossiya)

**Maxmudova Dilfuza Mileyevna** – pedagogika  
fanlari doktori, professor (O‘zbekiston)

**Xudjayev Muxiddin Kushshayevich** – texnika  
fanlari doktori, dotsent (O‘zbekiston).

**Xolmurodov Abdulhamid Erkinovich** – fizika-  
matematika fanlari doktori, professor (O‘zbekiston)

**Stelmashonok Yelena Viktorovna** – iqtisod fanlari  
doktori, professor. (Rossiya)

**Tatarnikova Tatyana Mixaylovna** – texnika fanlari  
doktori, professor. (Rossiya)

**Alekseyev Vladimir Vasilyevich** – texnika fanlari  
doktori, professor. (Rossiya)

**Satikov Igor Abuzarovich** – fizika-matematika fanlari  
nomzodi, dotsent. (Belarus)

**Boyarshinova Oksana Aleksandrovna** – fizika-  
matematika fanlari nomzodi, dotsent. (Belarus)

**Makarenya Sergey Nikolayevich** – texnika fanlari  
nomzodi, dotsent. (Belarus)

**Sednina Marina Aleksandrovna** – texnika fanlari  
nomzodi, dotsent. (Belarus)

**Ibragimov Abdusattar Turgunovich** – texnika fanlari  
doktori, dotsent (O‘zbekiston)

**Kabiljanova Furuza Azimovna** – fizika-matematika  
fanlari nomzodi, dotsent. (O‘zbekiston)

**Lutfillayev Maxmud Xasanovich** – pedagogika fanlari  
doktori, dotsent (O‘zbekiston).

**Ergasheva Gulruksor Surxonidinovna** – pedagogika  
fanlari doktori (DSc), dotsent (O‘zbekiston).

**Norov Abdusait Muradovich** – texnika fanlari  
bo‘yicha falsafa doktori, dotsent (O‘zbekiston).

**Yuldoshev Ismoil Abriyevich** – pedagogika fanlari  
bo‘yicha falsafa doktori, dotsent (O‘zbekiston).

**Karaxonova Oysara Yuldoshevna** – pedagogika fanlari  
bo‘yicha falsafa doktori, (O‘zbekiston).

**Kurbaniyazova Zamira Kalbaevna** – pedagogika  
fanlari doktori, dotsent (O‘zbekiston).

**Nasirova Shaira Narmuradovna** – texnika fanlari  
doktori, professor (O‘zbekiston).

**Nasridinov Ilxam Burxanidinovich** – texnika fanlari  
nomzodi, dotsent (O‘zbekiston).

**Xujjiyev Sodiq Oltiyevich** – biologiya fanlari nomzodi,  
dotsent (O‘zbekiston).

**Suvonov Olim Omonovich** – texnika fanlari nomzodi,  
dotsent (O‘zbekiston).



**O‘tapov Toyir Usmonovich** – pedagogika fanlari nomzodi, dotsent (O‘zbekiston).

**Ibragimov Alimjon Artikbayevich** – fizika-matematika fanlari nomzodi, dotsent (O‘zbekiston).

**Yodgorov G‘ayrat Ro‘ziyevich** – fizika-matematika fanlari nomzodi, dotsent (O‘zbekiston).

**Xudoyorov Shuxrat Jumaqulovich** – fizika-matematika fanlari nomzodi, dotsent (O‘zbekiston)

**Baxodirova Umida Baxodirovna** – pedagogika fanlari bo‘yicha falsafa doktori (O‘zbekiston).

**Toxirov Feruz Jamoliddinovich** – pedagogika fanlari bo‘yicha falsafa doktori (O‘zbekiston).

**Xamroyeva Dilafro‘z Namozovna** – fizika-matematika fanlari bo‘yicha falsafa doktori (O‘zbekiston).

**Jo‘rakulov Tolib Toxirovich** – texnik muharrir

© Mazkur jurnal O‘zbekiston Respublikasi Vazirlar Mahkamasi huzuridagi Oliy Attestatsiya komissiyasi rayosatining 2022-yil 28-fevraldagi 312/6 qaroriga asosan Pedagogika fanlari bo‘yicha falsafa doktori (PhD) va fan doktori (DSc) ilmiy darajasiga talabgorlarning dissertatsiya ishlari yuzasidan dissertatsiyalari asosiy ilmiy natijalarini chop etish uchun tavsiya etilgan ilmiy nashrlar ro‘yxatiga kiritilgan

Adress: Navoiy sh., Janubiy ko‘chasi, 1-A uy. (1-A, South Street, Navoi city) URL: <http://www.el-nspi.uz>

## MUNDARIJA

### *Aniq fanlarda axborot texnologiyalari*

<b>Davlatov Sh.O., Achilov I. A.</b> TO‘G‘RI TO‘RTBURCHAKLI SOHADA ISSIQLIK TENGLAMASINI TO‘R METODI BILAN SONLI YECHISH	10
<b>Norov A. M., Murodov Sh. A., Abdullayev Sh. Sh., Sa'dullayeva M. L.</b> SILLABEMA MODELINING TURKIY TILLARGA TATBIQI (QIRG‘IZ TILI MISOLIDA)	21
<b>Ro‘ziyev R. A.</b> BO‘LAJAK O‘QITUVCHILARNI TAYYORLASHDA RAQAMLI TEXNOLOGIYALARNING DIDAKTIK IMKONIYATI	32
<b>Toxirov F. J.</b> TALABALARNING MOBIL ILOVALARNI YARATISHGA OID KOMPETENTLIGINI RIVOJLANTIRISHDAGI MUAMMOLAR	41
<b>Absalamov T. T.</b> ELEKTRON TA‘LIMDA TALABA VA O‘QITUVCHINING O‘ZARO MUNOSABATLARIDA SUN‘IY INTELLEKTNING O‘RNI	48
<b>Mirsanov U. M., Jo‘rakulov T. T., Sadritdinova D. A.</b> BO‘LAJAK MATEMATIK VA INFORMATIKA O‘QITUVCHILARINING KASBIY KOMPETENTLIGINI RIVOJLANTIRISHDA BULUTGA ASOSLANGAN TA‘LIM MUHITLARIDAN FOYDALANISH	60
<b>Maxsetova M. M.</b> UMUMIY O‘RTA TA‘LIM MAKTAB O‘QUVCHILARINI KOMPYUTER GRAFIKASIGA OID KOMPETENSIYALARINI SHAKLLANTIRISH MODELI	70
<b>Xalikov A. T.</b> O‘QUVCHILARNING FRILANSERLIKKA OID KOMPETENSIYALARINI SHAKLLANTIRISHDA AXBOROT-TA‘LIM MUHITLARINING AMALIY SAMARADORLIGI	80
<b>Djumabaev K. N.</b> C++ TILINI O‘QITISH MUAMMOLI TA‘LIMNING TEXNOLOGIYASIDAN FOYDALANISH USULI	90
<b>Xamroyev U. N.</b> PEDAGOGIKA OLIY TA‘LIM MUASSASALARI TALABALARINING ALGORITMLASHGA OID KOMPETENTLIGINI RIVOJLANTIRISH MODELI	101
<b>Jumayeva D. N.</b> KASB-HUNAR MAKTABI O‘QUVCHILARINING MUSTAQIL TA‘LIMINI TASHKIL ETISH USULI	111
<b>Ruziyev R. A., Donayev N. Y.</b> TA‘LIM JARAYONIDA BULUTLI TEXNOLOGIYALARDAN FOYDALANISHNING USLUBIY VA TEXNOLOGIK JIHATLARI	119

---

<b>Qulmurodov I. E.</b> UMUMIY O‘RTA TA’LIM MAKTAB O‘QUVCHILARNING GEOMETRIK TASAVVURLARINI SHAKLLANTIRISHDA UCH O‘LCHOVLI O‘QUV VOSITALARNING IMKONIYATLARI	127
<b>Esanbayev B. I.</b> TALABALARNI FRAKTAL GRAFIKAGA OID KOMPETENTLIGINI RIVOJLANTIRISHNING PEDAGOGIK SHARTLARI	136
<b>Juraboyev A. J.</b> O‘QUVCHILARNING DARS DAN TASHQARI O‘QUV FAOLIYATIDA KOMPYUTERNING TEXNIK VA DASTURIY TA’MINOTIGA OID KOMPETENSIYALARINI SHAKLLANTIRISH	146
<b>Ruziyeva D. R.</b> TA’LIM JARAYONINING SAMARALILIGINI OSHIRISHDA KOMPYUTER O‘QUV DASTURIY TA’MINOTINING IMKONIYATLARI	155
<b>Mirsanov J. M.</b> UMUMIY O‘RTA TA’LIM MAKTAB O‘QUVCHILARINI DASTURLASHGA OID ALGORITMIK FIKRLASHINI RIVOJLANTIRISHDA UCHLIK METODDAN FOYDALANISH	164

### **Tabiiy fanlarda axborot texnologiyalari**

---

<b>Abralov O Sobirovich</b> BO‘LAJAK BIOLOGIYA O‘QITUVCHILARINI TAYYORLASHDA ARALASH TA’LIM TEXNOLOGIYASINING AMALIY SAMARADORLIGI	171
<b>Jurayeva D. Y.</b> BIOLOGIYA O‘QITISH METODIKASI FANIDAN MUSTAQIL TA’LIMNI BULUTLI TEXNOLOGIYALAR ASOSIDA TASHKIL ETISHNING SAMARADORLIGINI ANIQLASHDA PEDAGOGIK TAJRIBA-SINOV USULLARI VA TAHLILLARI	179

## СОДЕРЖАНИЕ

### *Информационные технологии в точных науках*

<b>Давлатов Ш. О., Ачилов И. А.</b> ЧИСЛЕННОЕ РЕШЕНИЕ УРАВНЕНИЯ ТЕПЛОПРОВОДНОСТИ МЕТОДОМ СЕТКА НА ПРЯМОУГОЛЬНОЙ ОБЛАСТИ	10
<b>Норов А.М., Муродов Ш.А., Абдуллаев Ш. Ш., Садуллаева М. Л.</b> ПРИМЕНЕНИЕ МОДЕЛИ СИЛЛАБЕМЫ К ТУРЕЦКИМ ЯЗЫКАМ (НА ПРИМЕРЕ КЫРГЫЗСКОГО ЯЗЫКА)	21
<b>Рузиев Р. А.</b> ДИДАКТИЧЕСКИЕ ВОЗМОЖНОСТИ ЦИФРОВЫХ ТЕХНОЛОГИЙ В ПОДГОТОВКЕ БУДУЩИХ УЧИТЕЛЕЙ	32
<b>Тохиров Ф. Д.</b> ПРОБЛЕМЫ РАЗВИТИЯ КОМПЕТЕНТНОСТИ ПО СОЗДАНИЯ МОБИЛЬНЫХ ПРИЛОЖЕНИЙ СТУДЕНТОВ	41
<b>Абсаламов Т. Т.</b> ВЛИЯНИЕ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА О ВЗАИМОДЕЙСТВИИ ОБУЧАЮЩЕГОСЯ И ПРЕПОДАВАТЕЛЯ В ЭЛЕКТРОННОМ ОБУЧЕНИИ	48
<b>Мирсанов У. М., Журакулов Т. Т., Садриддинова Д.А.</b> ИСПОЛЬЗОВАНИЕ ОБЛАЧНЫХ ОБРАЗОВАТЕЛЬНЫХ СРЕД ДЛЯ РАЗВИТИЯ ПРОФЕССИОНАЛЬНОЙ КОМПЕТЕНТНОСТИ БУДУЩИХ УЧИТЕЛЕЙ МАТЕМАТИКИ И ИНФОРМАТИКИ	60
<b>Махсетова М. М.</b> МОДЕЛЬ ФОРМИРОВАНИЯ КОМПЕТЕНЦИЙ УЧАЩИХСЯ ОБЩЕОБРАЗОВАТЕЛЬНЫХ ШКОЛ ПО КОМПЬЮТЕРНОЙ ГРАФИКЕ	70
<b>Халиков А. Т.</b> ПРАКТИЧЕСКАЯ ЭФФЕКТИВНОСТЬ ИНФОРМАЦИОННО-ОБРАЗОВАТЕЛЬНОЙ СРЕДЫ В ФОРМИРОВАНИИ ФРИЛАНСЕРСКИХ КОМПЕТЕНЦИЙ УЧАЩИХСЯ	80
<b>Джумабаев К. Н.</b> ОБУЧЕНИЕ ЯЗЫКУ C++ С ИСПОЛЬЗОВАНИЕМ ТЕХНОЛОГИИ ПРОБЛЕМНОГО ОБУЧЕНИЯ	90
<b>Хамроев У. Н.</b> МОДЕЛЬ РАЗВИТИЯ АЛГОРИТМИЧЕСКОЙ КОМПЕТЕНТНОСТИ СТУДЕНТОВ ПЕДАГОГИЧЕСКИХ ВУЗОВ	101
<b>Жумаева Д. Н.</b> МЕТОДИКА ОРГАНИЗАЦИИ САМОСТОЯТЕЛЬНОГО ОБУЧЕНИЯ УЧАЩИХСЯ В ПРОФЕССИОНАЛЬНЫХ ШКОЛАХ	111
<b>Рузиев Р. А., Донаев Н. Ю.</b> МЕТОДОЛОГИЧЕСКИЕ И ТЕХНОЛОГИЧЕСКИЕ АСПЕКТЫ ИСПОЛЬЗОВАНИЯ ОБЛАЧНЫХ ТЕХНОЛОГИЙ В ОБРАЗОВАТЕЛЬНОМ ПРОЦЕССЕ	119

---

<b>Гулмуродов И.Э.</b> ВОЗМОЖНОСТИ ТРЕХМЕРНЫХ ОБРАЗОВАТЕЛЬНЫХ СРЕДСТВ В ФОРМИРОВАНИИ ГЕОМЕТРИЧЕСКОГО ВОООБРАЖЕНИЯ УЧАЩИХСЯ ОБЩЕОБРАЗОВАТЕЛЬНЫХ ШКОЛЫ	127
<b>Эсанбаева Б.Х.</b> ПЕДАГОГИЧЕСКИЕ УСЛОВИЯ РАЗВИТИЯ КОМПЕТЕНЦИИ СТУДЕНТОВ ПО ФРАКТАЛЬНОЙ ГРАФИКЕ	136
<b>Джурабоев А. Д.</b> ФОРМИРОВАНИЕ КОМПЕТЕНЦИЙ СТУДЕНТОВ В ОБЛАСТИ ТЕХНИЧЕСКОГО И ПРОГРАММНОГО ОБЕСПЕЧЕНИЯ КОМПЬЮТЕРА ВО ВНЕУЧЕБНОЙ ОБРАЗОВАТЕЛЬНОЙ ДЕЯТЕЛЬНОСТИ	146
<b>Рузиева Д. Р.</b> ВОЗМОЖНОСТИ КОМПЬЮТЕРНОГО ОБРАЗОВАТЕЛЬНОГО ПРОГРАММНОГО ОБЕСПЕЧЕНИЯ В ПОВЫШЕНИИ ЭФФЕКТИВНОСТИ ОБРАЗОВАТЕЛЬНОГО ПРОЦЕССА	155
<b>Мирсанов Д. М.</b> ИСПОЛЬЗОВАНИЕ МЕТОДА ТРИНИТИ В РАЗВИТИИ АЛГОРИТМИЧЕСКОГО МЫШЛЕНИЯ О ПРОГРАММИРОВАНИИ УЧАЩИХСЯ ОБЩЕЙ СРЕДНЕЙ ШКОЛЬНИКА	164

### **Информационные технологии в естественных науках**

---

<b>Абралов О. С.</b> ПРАКТИЧЕСКАЯ ЭФФЕКТИВНОСТЬ СМЕШАННОЙ ОБРАЗОВАТЕЛЬНОЙ ТЕХНОЛОГИИ В ПОДГОТОВКЕ БУДУЩИХ УЧИТЕЛЕЙ БИОЛОГИИ	171
<b>Джураева Д. Ю.</b> ПЕДАГОГИЧЕСКИЕ ЭКСПЕРИМЕНТАЛЬНЫЕ МЕТОДЫ И АНАЛИЗ ПРИ ОПРЕДЕЛЕНИИ ЭФФЕКТИВНОСТИ ОРГАНИЗАЦИИ САМОСТОЯТЕЛЬНОГО ОБРАЗОВАНИЯ ПО НАУКЕ БИОЛОГИЯ МЕТОДИКА ПРЕПОДАВАНИЯ НА ОСНОВЕ ОБЛАЧНЫХ ТЕХНОЛОГИЙ	179

## CONTENT

### *Information technologies in exact sciences*

<b>Davlatov Shakir, Achilov Islam</b> NUMERICAL SOLUTION HEAT EQUATIONS USING THE MESH METHOD ON A RECTANGULAR AREA	10
<b>Norov Abdisait, Muradov Shukrilla, Abdullayev Sherzod, Sadullayeva Maftuna</b> APPLICATION OF SYLLABEMA MODEL TO TURKISH LANGUAGES (IN THE EXAMPLE OF KYRGYZ LANGUAGE)	21
<b>Ruziyev Raup</b> DIDACTIC POSSIBILITY OF DIGITAL TECHNOLOGIES IN TRAINING FUTURE TEACHERS	32
<b>Tokhirov Feruz</b> PROBLEMS OF DEVELOPING COMPETENCE IN CREATING MOBILE APPLICATIONS FOR STUDENTS	41
<b>Absalamov Tolib</b> THE IMPACT OF ARTIFICIAL INTELLIGENCE ON LEARNER-TEACHER INTERACTION IN E-LEARNING	48
<b>Mirsanov Uralboy, Jurakulov Tolib, Sadritdinova Dinora</b> USE OF CLOUD EDUCATIONAL ENVIRONMENTS FOR THE DEVELOPMENT OF PROFESSIONAL COMPETENCE OF FUTURE MATHEMATICS AND COMPUTER SCIENCE TEACHERS	60
<b>Makhsetova Mukhabbat</b> GENERAL SECONDARY EDUCATION MODEL FOR THE FORMATION OF COMPETENCIES OF SCHOOLCHILDREN ON COMPUTER GRAPHICS	70
<b>Khalikov Akbar</b> PRACTICAL EFFECTIVENESS OF THE INFORMATION AND EDUCATIONAL ENVIRONMENT IN FORMING FREELANCING COMPETENCIES OF STUDENTS	80
<b>Dzhumabaev Kuanishbai</b> TEACHING THE C++ LANGUAGE USING PROBLEM-BASED LEARNING TECHNOLOGY	90
<b>Khamroyev Utkir</b> MODEL OF DEVELOPMENT OF ALGORITHMIC COMPETENCE OF STUDENTS OF PEDAGOGICAL UNIVERSITIES	101
<b>Jumayeva Dilafruz</b> METHODS OF ORGANIZING INDEPENDENT EDUCATION FOR VOCATIONAL SCHOOL STUDENTS	111
<b>Ruziyev Raup, Donayev Nuriddin</b> METHODOLOGICAL AND TECHNOLOGICAL ASPECTS OF THE USE OF CLOUD TECHNOLOGIES IN THE EDUCATIONAL PROCESS	119



---

<b>Kulmurodov Islambek</b> <i>POSSIBILITIES OF THREE-DIMENSIONAL EDUCATIONAL TOOLS IN FORMING GENERAL SECONDARY SCHOOL STUDENTS' GEOMETRIC IMAGINATION</i>	127
<b>Esanbayev Bunyod</b> <i>PEDAGOGICAL CONDITIONS FOR THE DEVELOPMENT OF STUDENTS' COMPETENCE IN FRACTAL GRAPHICS</i>	136
<b>Juraboev Almir</b> <i>FORMING THE COMPETENCIES OF STUDENTS IN COMPUTER HARDWARE AND SOFTWARE EQUIPMENT IN ADDITION TO CLASSROOM LEARNING ACTIVITIES</i>	146
<b>Ruzieva Dilafruz</b> <i>POSSIBILITIES OF COMPUTER EDUCATIONAL SOFTWARE IN INCREASING THE EFFECTIVENESS OF THE EDUCATIONAL PROCESS</i>	155
<b>Mirsanov Dzhurabek</b> <i>USING THE TRINITY METHOD IN THE DEVELOPMENT OF ALGORITHMIC THINKING ABOUT PROGRAMMING OF GENERAL SECONDARY SCHOOL STUDENTS</i>	164

***Information technologies in natural sciences***

---

<b>Abralov Olim</b> <i>PRACTICAL EFFECTIVENESS OF MIXED EDUCATIONAL TECHNOLOGY IN TRAINING FUTURE BIOLOGY TEACHERS</i>	171
<b>Juraeva Dildora</b> <i>PEDAGOGICAL EXPERIMENTAL METHODS AND ANALYSIS IN DETERMINING THE EFFICIENCY OF ORGANIZING INDEPENDENT EDUCATION IN THE SCIENCE OF BIOLOGY TEACHING METHODOLOGY BASED ON CLOUD TECHNOLOGIES</i>	179

---

---

*Aniq fanlarda axborot texnologiyalari*

---

**DIDACTIC POSSIBILITY OF DIGITAL TECHNOLOGIES IN TRAINING  
FUTURE TEACHERS**

**Ruziyev Raup**

*Associate Professor of Navoi State Pedagogical Institute*

**Abstract:** *This article discusses education the effective use of digital technologies in system development and the role of digital tools in increasing student activity in the educational process, as well as the study of spatial thinking in learning, holistic subjective images of spatial objects. or events that clearly reflect the capabilities of the educational environment in the process of activity.*

**Key words:** *continuing education, competence, digital technologies, virtual, modeling, interactive, knowledge, skills, software.*

---

---

**BO‘LAJAK O‘QITUVCHILARNI TAYYORLASHDA RAQAMLI  
TEXNOLOGIYALARNING DIDAKTIK IMKONIYATI**

**Ro‘ziyev Raup Axmadovich**

*Navoiy davlat pedagogika instituti, dotsent*

**Annotatsiya.** *Ushbu maqolada ta’lim tizimini rivojlantirishda raqamli texnologiyalardan samarali foydalanish hamda talabalarni dars jarayonidagi faolligini oshirishda raqamli vositalarning o‘rni hamda o‘qitishda fazoviy fikrlash, fazoviy obyektlar yoki hodisalarning yaxlit subyektiv tasvirlarini o‘rganish, ular faoliyat jarayonida vizual asoslangan ta’lim muhiti imkoniyatlari tahlil qilingan.*

**Tayanch so‘zlar:** *uzluksiz ta’lim, kompetentsiya, raqamli texnologiya, virtual, modellashtirish, interaktiv, bilim, ko‘nikma, dasturiy vositalar.*

---

---

**ДИДАКТИЧЕСКИЕ ВОЗМОЖНОСТИ ЦИФРОВЫХ ТЕХНОЛОГИЙ В  
ПОДГОТОВКЕ БУДУЩИХ УЧИТЕЛЕЙ**

**Рузиев Рауп Ахмадович**

*Associate Professor of Navoi State Pedagogical Institute*

**Аннотация.** *В данной статье рассматривается образования эффективное использование цифровых технологий при разработке системы и роль цифровых инструментов в повышении активности учащихся в учебном процессе, а также исследование пространственного мышления в обучении, целостных субъективных образов пространственных объектов. или события, которые наглядно отражают возможности образовательной среды в процессе деятельности.*

**Ключевые слова:** *непрерывное образование, компетентность, цифровые технологии, виртуальный, моделирование, интерактивный, знания, навыки, программные средства.*

**Introduction.** A high level of development of the future teacher's vision of digital technologies at all stages of my continuous education system remains one of the necessary conditions for successful mastering of various general education subjects. In this, working with digital technologies is one of the most popular areas of using information, communication and multimedia technologies, and not only professionals, but also beginners are widely engaged in this work. For example, none modern multimedia software does not work without computer graphics. The tasks before students are interesting and often difficult to solve, which allows to increase the educational motivation of students, to develop their spatial imagination, as well as computer skills. Therefore, it is an important component of education for future teachers to develop their competence in digital technologies.

Another advantage of computer technologies in the educational process is their ability to create a more lively interactive environment that affects several channels of information perception at the same time. Information technologies in education, unlike traditional technical means, in addition to the ability to get more information, develop the intelligence, creativity and independence of students in the process of acquiring new knowledge while working with various information sources.

One of the manifestations of digital technologies presented in our work is 3D technologies. 3D technologies in the field of education, in addition to widening the topics of computer didactic visits and electronic textbooks based on this, develop the creative abilities of students, as well as attract their attention and make the educational process interesting and makes it possible to demonstrate.

**Literature analysis.** As you know, 3D technology (modeling) is a process of creating virtual models that allows you to display the size, shape, appearance and other characteristics of an object with high accuracy. The main thing is to create three-dimensional images and graphics using computer programs [1,2,3]. Today, the research conducted by our republic and foreign scientists on the importance of spatial understanding based on 3D technologies and the use of three-dimensional graphics can be a proof of our above opinion. In particular, methodological features of

learning animation and "3D graphics" in the course of computer science during research, A.V. Firer[1], I.G. Semakina, E.K. Henner[2], A.V. Kerlow[3] and others, three-dimensional modeling teaching methodology and the future M.H. Lutfillayev [4], A.A. on the role of computer technologies in the training of informatics teachers. Omonov[5], A.I. Tillayev [6], O. The works of V. Nass [7], V. I. Kolykhmatov [8], M. M. Abdurazakov [9], R. A. Ruziev [10] can be cited.

Thus, the formation of the ability to create new educational products, interactive educational materials using digital technologies, and the development of information conditions is not only the readiness of early childhood teachers to effectively interact with him as a subject of educational activities. raises the issue, but also the issue of increasing the level of his didactic competence. Therefore, it allows us to talk about the feasibility of teaching the problem of using three-dimensional computer modeling in educational institutions.

**Research methodology.** Today, in the field of education, digital technology tools that allow deep penetration into the studied topic are widely used at the level of opportunity.

The results of studies and conducted research [1, 4-10] show that a future teacher should have the following digital skills:

- general digital skills (for example, searching for information on the Internet, using office programs, data processing and analysis tools, etc.);
- additional digital skills related to the performance of new tasks (for example, using social networks and other digital messengers to communicate with students and parents);
- special skills in using the latest services of the digital economy (for example, using cloud technologies and storage to host educational content).

In the conditions of unlimited use of large and diverse data and the high speed of data exchange, methodological support for students in selecting, assessing the reliability of available data, interpreting and analyzing it is of particular importance [5,6]. A modern teacher must be able to act confidently in today's digital



environment, be "aware of everything", search for new forms of knowledge and information, interpretations and ways of working with them.

Of course, in the process of forming these skills, it is also very important to develop spatial thinking, learning of holistic subjective images of spatial objects or events, their reflection and consolidation in memory based on the perception of visual material in the process of activity.

Due to the development of digital computer technology tools, a sufficient number of software systems for virtual modeling on various topics have been developed, and the possibility of creating visual models for the user is expanding. This methodology allows the researcher to focus on his tasks on a specific topic without getting involved in the field of mathematics and programming to develop a mathematical model and algorithm. The computer is changing from an elite tool for programmers to a tool for the mass user. Therefore, the task of developing a unified formalized approach to building and learning models comes to the fore.

Therefore, teaching students and using digital tools should be done in the following sequence:

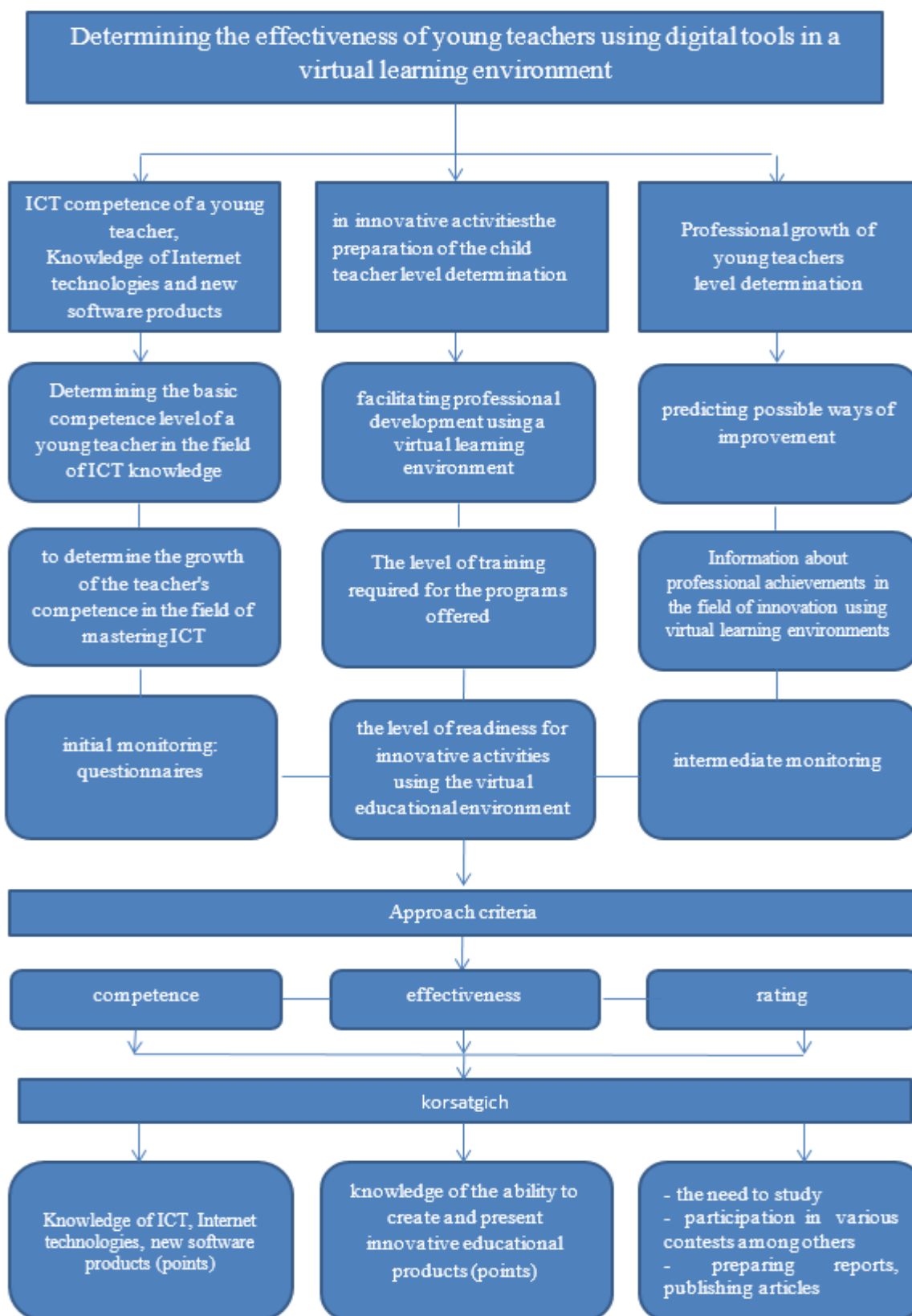
- 1) training in three-dimensional software modeling by developing objects based on basic forms;
- 2) transferring acquired knowledge, skills and abilities to the fields of science aimed at developing students' spatial thinking;
- 3) must realize his creative ideas.

Also, the introduction of the three-dimensional software training methodology in the above sequence will help: 1) to achieve the creative level of developing the skills of using the three-dimensional computer graphics environment of most students; 2) to successfully solve educational problems in the fields of science aimed at developing students' spatial thinking; 3) practical modeling software solving problems in the supply environment and developing students' intellectual abilities based on this activity.

Today, there are many different software packages that allow creating three-dimensional graphics, that is, simulating virtual reality objects and creating images based on these models. Including 3D Studio Max, Maya, Lightwave 3D, Softimage, Sidefx Houdini, MaxonCinema 4D and relatively new Rhinoceros 3D, Nevercenter Silo or ZBrush. There are also open source products that are freely distributed, such as the Blender suite (which allows you to create 3D models and then render (computer visualization)), K-3D, and Wings3D.

The introduction of digital educational technologies into the educational system allows students not only to acquire ICT competence: to use Internet information resources in their professional activities; information seeking; analysis and evaluation, but also develops critical thinking skills, mind-building, informed decision-making, and professional communication skills. This means that teaching using digital educational technologies increases the motivation of students, as well as the desire to independently increase the level of competence.

**Analysis and results.** Thus, the use of virtual environments in the formation of digital technology competence and the improvement of educational efficiency is a special skill. As a result, based on the above thoughts and considerations, we have created a virtual educational environment for future teachers to determine the effectiveness of using digital tools as follows(fig 1.):



**Fig 1. Determining the effectiveness of the use of tools virtual educational environment**

It is known that visual images are given a lot of attention in spatial images, because their information capacity is particularly large. They allow you to instantly understand the relationship between real and imaginary situations. Spatial images are integral subjective images of spatial objects or events, which are reflected and strengthened in memory based on the perception of visual material during activity.

Also, working with 3D modeling is one of the most popular areas of using information, communication and multimedia technologies. Creating a model from its computer version to printing a real object allows students to master "modeling ideas" and real examples. allows you to get acquainted with printing technology. Visualizing an ideal part in three dimensions in your head is difficult to spot, and once the part is printed, the student can always fix it and try again and again to improve their work. Besides, it's always nice to feel the work done in your hands. The models themselves are widely used as a teaching tool in the educational process. This is an opportunity to get a visual representation of the thoughts written in the notebook[10].

Also, the use of opportunities of the virtual educational environment in the preparation of future pedagogical personnel for innovative activities is based on a certain system from the pedagogical point of view, including: the goal; content; principles; methods; objects; organizational forms of education. The research tried to analyze the following: - target component, as well as the principles of training future pedagogues for innovative activities using the virtual educational environment; - the substantive component of training the teaching staff for innovative activities using the virtual educational environment; - methods, forms, means of teaching the system under consideration.

**Summary.** Thus, the preparation of young teachers to organize the educational process based on innovative digital technologies represents the optimal balance between theoretical training and practical training, as well as the sustainable need for learning and using information and communication technologies in their



implementation and their pedagogical technological interested in understanding the possibilities.

### **References**

1. Firer A.V., Meleshko E.A., Sidorov V.V., Bezrukikh A.D. Studying the topic “3D graphics” in a computer science course through the use of digital educational resources // *Modern science-intensive technologies*. – 2021. – No. 10. – P. 214-218; URL: <https://top-technologies.ru/ru/article/view?id=38879>

2. I.G. Semakina, E.K. Henner. Informatics and ICT [Text]: ed. I. G. Semakina, E. K. Henner. - 5th ed. - Moscow: Binom. Knowledge Laboratory, 2013.T. 2. - 2013. - 294 p. : ill., table; ISBN 978-5-9963-1672-4 (Vol. 2)

3. Kerlow A.V. The art of 3D animation and special effects / Isaac W. Curlow: [Trans. from English E.V. Smolina], - M.: Vershina LLC, 2004. – 480 p.

4. Lutfillayev M.H., Fayziyev M.A. Methodology of teaching in multimedia electronic textbooks // *Continuous education*. –Tashkent, 2002. -#4. –B. 79-81.

5. Omonov A.A., Rasulov U.M. Challenges of improving the competence of participants in digital education (2022). *Pedagogists international research journal*, 2(1), 150–153. <https://doi.org/10.5281/zenodo.5919934>

6. Tillayev A.I. Use of multimedia software tools in teaching digital and information technologies. *Academic Research in Educational Sciences*, 4(4), (2023). –P. 512-518.

7. Nass, O. V. System of professional training of a future computer science teacher for organizing and conducting classes using computer teaching aids / O. V. Nass // *Subject-methodological training of a future teacher of mathematics, computer science and physics / All-Russian scientific conference: collection. Art. - Togliatti, 2003. –P. 149-152.*

8. Kolykhatov V.I. Digital skills of a modern teacher in the context of digitalization of education // *Scientific Notes of the University named after P.F. Lesgafta*. – St. Petersburg, 2018. – No. 9 (163). –P.152-158.

9. Abdurazakov M.M. Mukhidinov M.G. Designing a model for preparing a future computer science teacher for modern professional activities // Pedagogy. No. 5. 2016. – P. 71-79.

10. Ruziev R.A. Information technologies in education: approaches and principles of designing electronic resources//Scientific-methodical journal “Teacher and continuous education”. Nukus, №1, 2020. –P.111-117.