III SHO'BA

INNOVATSION TA'LIM TEXNOLOGIYALARINING IMKONIYATLARI: MUAMMO, AMALIYOT VA YECHIMLAR

USE OF DIGITAL TECHNOLOGIES IN GENERAL EDUCATION: ADVANTAGES AND DISADVANTAGES

Ilham Javadov,
Doctor of Philosophy in Pedagogy, Associate Professor,
Deputy Director of the Institute of Education of the Republic of Azerbaijan
i.cavadov@arti.edu.az
https://orcid.org/0009-0004-8522-320X

Abstract. *This study examines the application and use of digital technologies in Azerbaijani secondary schools, as well as their impact on the quality of teaching, student motivation in the learning process, and educational management. The study comprehensively assesses the current state of digitalization in schools, encompassing the analysis of both local and foreign literature and empirical data obtained from a survey among teachers. The results show that digital tools such as electronic journals, presentations, and interactive whiteboards are widely used and allow lessons to be conducted in an interactive, visual, and interesting way. Teachers report that digital technologies facilitate the study of complex topics, increase students' interest in the lesson, and support the development of critical thinking, problem-solving, and creative skills.*

However, the study found that unstable internet connections, limited technical infrastructure, and lack of methodological support are the main obstacles limiting the effective use of digital technologies. This situation highlights the importance of continuous professional development of teachers, strengthening technological skills, and additional methodological support. The study also shows that digital literacy is an important competence in terms of lifelong learning, knowledge acquisition, and new

product production. The practical significance of the study is that the results provide recommendations for school leaders, teachers, and education policymakers to effectively organize the use of digital technologies. Future studies should systematically assess the impact of digital technologies on student learning outcomes and implement pilot projects to integrate innovative technologies such as artificial intelligence into the educational process.

Overall, the study comprehensively reveals the current state, challenges, and development opportunities of digitalization in Azerbaijani secondary schools and puts forward proposals for improving the quality of education.

Keywords: *digital technologies, improving the quality of education, comprehensive schools, electronic journal, electronic diary, digital skills of teachers, educational management, student motivation.*

UMUMIY TA'LIMDA RAQAMLI TEXNOLOGIYALARDAN FOYDALANISH: AFZALLIKLARI VA KAMCHILIKLARI

Ilhom A. Javodov

Ozarbayjon Respublikasi Ta'lim Instituti direktorining o'rinbosari,

pedagogika bo'yicha falsafa doktori (PhD), dotsent

i.cavadov@arti.edu.az

https://orcid.org/0009-0004-8522-320X

Annotatsiya. *Mazkur tadqiqotda Ozarbayjon umumta'lim maktablarida raqamli texnologiyalarning qo'llanilishi va ulardan foydalanish masalalari, shuningdek, ularning o'qitish sifati, o'quvchilarning ta'lim jarayonidagi motivatsiyasi hamda ta'limni boshqarishga ta'siri ko'rib chiqilgan. Tadqiqotda maktablardagi raqamlashtirishning hozirgi holati har tomonlama baholanib, mahalliy va xorijiy adabiyotlar tahlili hamda o'qituvchilar o'rtasida o'tkazilgan so'rovnoma natijasida olingan empirik ma'lumotlar asosida o'rganilgan. Natijalar shuni ko'rsatdiki, elektron jurnallar, taqdimotlar va interaktiv doskalar kabi raqamli vositalar keng*

qo'llanilmoqda hamda darslarni interaktiv, vizual va qiziqarli tarzda o'tkazish imkonini bermoqda. O'qituvchilar ta'kidlashicha, raqamli texnologiyalar murakkab fanlarni o'rganishni osonlashtiradi, o'quvchilarning ta'lim jarayonidagi faolligini oshiradi hamda tanqidiy fikrlash, muammolarni hal qilish va ijodiy qobiliyatlarni rivojlantirishga yordam beradi. Biroq tadqiqot natijalari shuni ham ko'rsatdiki, internet aloqasining beqarorligi, texnik infratuzilmaning cheklanganligi va metodik yordamning etarli emasligi raqamli texnologiyalardan samarali foydalanishga to'sqinlik qilayotgan asosiy omillar hisoblanadi. Ushbu holat o'qituvchilarning uzluksiz kasbiy rivojlanishi, ularning texnologik ko'nikmalarini mustahkamlash hamda qo'shimcha metodik yordam ko'rsatish zarurligini ta'kidlaydi. Tadqiqot shuningdek, raqamli savodxonlik uzluksiz ta'lim, bilimlarni egallash va yangi mahsulotlar yaratish nuqtai nazaridan muhim kompetensiya ekanligini ko'rsatadi. Tadqiqotning amaliy ahamiyati shundaki, uning natijalari maktab rahbarlari, o'qituvchilar hamda ta'lim siyosati bo'yicha qaror qabul qiluvchi shaxslar uchun raqamli texnologiyalardan samarali foydalanishni tashkil etish bo'yicha tavsiyalar beradi. Kelgusidagi tadqiqotlarda raqamli texnologiyalarning o'quvchilar ta'lim natijalariga ta'siri tizimli ravishda baholanishi hamda sun'iy intellekt kabi innovatsion texnologiyalarni ta'lim jarayoniga integratsiya qilish bo'yicha pilot loyihalar amalga oshirilishi lozim.

Umuman olganda, tadqiqot Ozarbayjon umumta'lim maktablarida raqamlashtirishning hozirgi holati, muammolari va rivojlanish imkoniyatlarini har tomonlama yoritib beradi hamda ta'lim sifatini oshirish yo'llarini taklif qiladi.

Kalit so'zlar: *raqamli texnologiyalar, ta'lim sifatini oshirish, umumta'lim maktablari, elektron jurnal, elektron kundalik, o'qituvchilarning raqamli ko'nikmalari, ta'limni boshqarish, o'quvchilar motivatsiyasi.*

ИСПОЛЬЗОВАНИЕ ЦИФРОВЫХ ТЕХНОЛОГИЙ В ОБЩЕМ ОБРАЗОВАНИИ: ПРЕИМУЩЕСТВА И НЕДОСТАТКИ

Ильхам А. Джавадов

Заместитель директора Института Образования Азербайджанской Республики, доктор философии по педагогике, доцент
E-mail: i.cavadov@arti.edu.az
https://orcid.org/0009-0004-8522-320X

Аннотация. *В данном исследовании рассматривается применение и использование цифровых технологий в азербайджанских общеобразовательных школах, а также их влияние на качество преподавания, мотивацию учащихся в процессе обучения и управление образованием. В исследовании всесторонне оценивается текущее состояние цифровизации в школах, включая анализ как местной, так и зарубежной литературы, а также эмпирические данные, полученные в ходе опроса учителей. Результаты показывают, что цифровые средства, такие как электронные журналы, презентации и интерактивные доски, широко используются и позволяют проводить уроки в интерактивной, визуальной и увлекательной форме. Учителя отмечают, что цифровые технологии облегчают изучение сложных предметов, повышают вовлеченность учащихся в процесс обучения и способствуют развитию критического мышления, навыков решения проблем и творческих способностей. Однако исследование показало, что нестабильные интернет-соединения, ограниченная техническая инфраструктура и недостаток методической поддержки являются основными препятствиями, ограничивающими эффективное использование цифровых технологий. Эта ситуация подчеркивает важность непрерывного профессионального развития учителей, укрепления технологических навыков и дополнительной методической поддержки. Исследование также показывает, что цифровая грамотность является важной компетенцией с точки зрения непрерывного обучения, приобретения знаний и создания новых продуктов. Практическая значимость исследования заключается в том, что его результаты предоставляют рекомендации руководителям школ, учителям и лицам, принимающим решения в области образовательной политики, по эффективной организации использования цифровых технологий. В будущих*

исследованиях следует систематически оценивать влияние цифровых технологий на результаты обучения учащихся и реализовывать пилотные проекты по интеграции инновационных технологий, таких как искусственный интеллект, в образовательный процесс.

В целом, исследование всесторонне раскрывает текущее состояние, проблемы и возможности развития цифровизации в азербайджанских общеобразовательных школах и предлагает способы повышения качества образования.

Ключевые слова: *цифровые технологии, повышение качества обучения, общеобразо-вательные школы, электронный журнал, электронный дневник, цифровые навыки учителей, управление образованием, мотивация учащихся*

Introduction. In the modern world, where digital commerce, digital marketing, digital banking, etc. services are rapidly increasing, the education system, as in all service areas, faces new goals and tasks. Because innovations in various areas of social life make it inevitable for the younger generation to receive education and upbringing in line with these challenges. It is no longer enough for teenagers and young people to simply learn knowledge, but how they learn the knowledge they have and apply it in real life is of vital importance.

The Law of the Republic of Azerbaijan "On Education" [1], which entered into force by the Decree of the President of the Republic of Azerbaijan No. 833-IIIQ dated June 19, 2009, and the "State Strategy for the Development of Education in the Republic of Azerbaijan" [2], approved by the Decree of the President of the Republic of Azerbaijan dated October 24, 2013, have identified the creation of an educational infrastructure based on information and communication technologies in educational institutions and the expansion of opportunities to use digital educational resources as priority areas. In addition, the "Digital Development Concept in the Republic of Azerbaijan" [3] approved by the Decree No. 287 of the President of the Republic of Azerbaijan dated January 16, 2025 and the "Artificial Intelligence Strategy of the Republic of Azerbaijan for 2025-2028" [4] approved by the Decree No. 530 dated

March 19, 2025 aim to strengthen specialist training in information and communication technologies and information security specialties in educational institutions, increase knowledge about artificial intelligence and data science at the academic and practical levels, improve and expand relevant educational programs, promote research in the field of artificial intelligence, support the application of artificial intelligence and cloud technologies, and create a strategic framework for the responsible use of artificial intelligence within the framework of ethical values.

Based on the listed legal and regulatory framework and strategies, a number of commendable measures have been taken in Azerbaijan to introduce digital technologies (computers, electronic whiteboards, e-journals, e-diary, presentation programs (PowerPoint, Prezi, etc.), e-textbooks, e-assessment, etc.) and artificial intelligence in educational institutions. Thus, in the 2021-2022 academic ear, the e-journal and e-diary system was implemented in 204 general educational institutions in Baku, Sumgayit and 11 other regions of the country [10-12]. Currently, the network of these schools has been expanded to include 453 schools across the country. 39,000 teachers and 585,000 students benefit from this service. At the same time, the "Digital School" platform has been gradually implemented in Azerbaijan from the 2024-2025 academic ear [13]. From the 2025-2026 academic ear, access to the e-journal system in Baku city schools will be via this platform.

Theoretical foundations of the research.

The integration of digital technologies into the education system, their impact on the quality of teaching and management mechanisms have been extensively studied in the scientific and theoretical literature. Local researchers N.H. Hajiyeva, R.T. Huseynov and M.R. Hasanova analyzed in their studies the role of digital teaching tools in the formation of students' knowledge and skills, their contribution to the creation of an interactive and personalized learning environment [5]. These studies emphasize the positive impact of digital resources on the development of competencies in accordance with modern educational requirements.

G. Musayeva's research on "Trends in Azerbaijani Education during the Fourth Industrial Revolution" covers the transformations taking place in the Azerbaijani

education system, the impact of digitalization on the quality of education and management [6]. The author particularly notes the strengthening of the integration of digital technologies into management and assessment mechanisms in educational institutions and justifies that this process serves to increase transparency and flexibility in education.

International studies have taken a more cautious approach to assessing the impact of digital technology use on learning outcomes. OECD studies have shown that intensive use of digital technologies does not automatically guarantee high academic outcomes, and that teachers' pedagogical and methodological training is crucial in this process [8]. At the same time, a report by L. Boeskens and K. Meyer highlights the issues of teacher training for digital education, gaps in technological skills, and how to address these gaps through continuous professional development [7]. In the study "Computer-based technologies and student engagement: a critical review of the scientific literature" by L.A. Schindler and colleagues, the mechanisms of the impact of the application of digital technologies in education on students' behavioral, emotional, and cognitive skills were systematically evaluated [9]. The study shows that purposeful and pedagogically justified use of technology can increase students' interest in the lesson and their active participation. In addition, the article emphasizes that technology does not automatically ensure engagement, its impact directly depends on the teacher's teaching strategies, the relevance of the technology to the lesson objectives, and the context of application. The authors also note that excessive and unplanned use of technology can lead to distraction and a decrease in the quality of learning.

In addition, in most of the existing literature, the application of digital technologies is analyzed more in a normative, strategic and conceptual framework, while the actual use of digital tools in teachers' daily teaching practice, the difficulties they encounter and practical needs are covered by limited theoretical data. This point is one of the main factors determining the relevance of the current study. In this regard, the purpose of the presented study is to analyze the use of digital technologies in Azerbaijani secondary schools based on empirical data, to determine the frequency of use of teachers, the digital tools they apply, the difficulties they encounter and their

views on improving digital teaching. At the same time, the study aims to put forward practical recommendations for more effective use of digital technologies in the teaching process based on the results obtained.

Research materials. In order to study the level of use of digital technologies, the advantages of this process and the difficulties faced by teachers, an anonymous survey was conducted among 295 teachers working in 10 secondary schools in Baku on a voluntary basis. The survey mainly consisted of closed-ended questions, which allowed for the analysis of the results based on quantitative indicators.

Research methods. A mixed method was used in the study. In the theoretical part of the study, local and foreign scientific literature, regulatory and legal documents and the results of previous studies on the topic were analyzed. Through theoretical analysis, the main directions, advantages and existing problems of the application of digital technologies in the educational process were identified. In the empirical part, a survey was used as a data collection tool. The collected data were processed using Microsoft Excel, the results were summarized based on percentages and presented in the form of diagrams. Appropriate generalizations were made based on the analysis of the results. Due to geographical accessibility and the efficiency of the data collection process, the survey was conducted only among teachers in Baku. Although the study of the digital skills of Baku teachers does not allow for a general conclusion about the activities of all teachers across the country, the results obtained can serve as a comparative basis for future studies in other cities and regions of the country.

Results. The distribution of teachers participating in the survey by gender was as shown in Diagram 1.

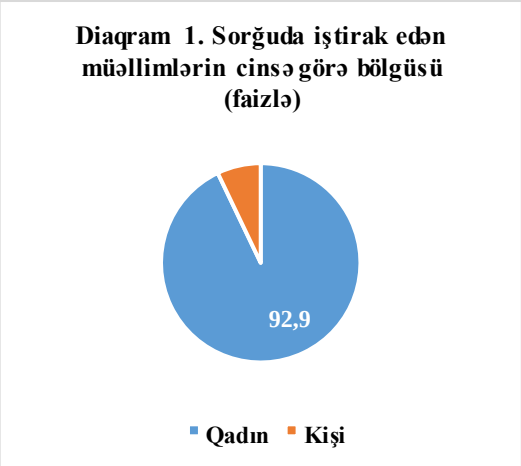
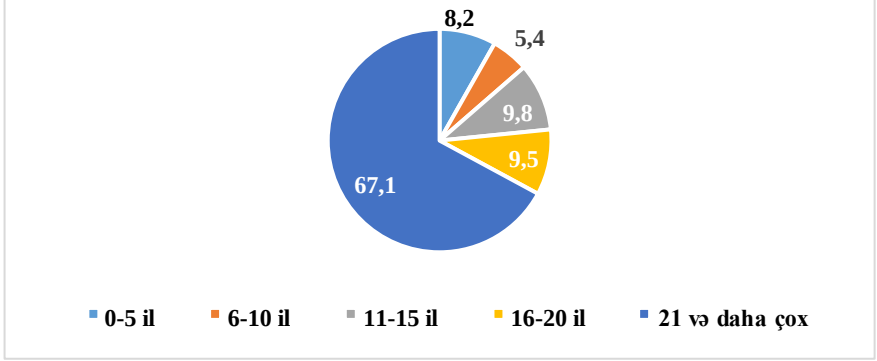


Diagram 2 shows the distribution of teachers participating in the survey by length of service. The lack of gender proportionality of respondents is due to the small number of male teachers in Azerbaijani schools, which led to the reflection of natural demographic differences in the survey.

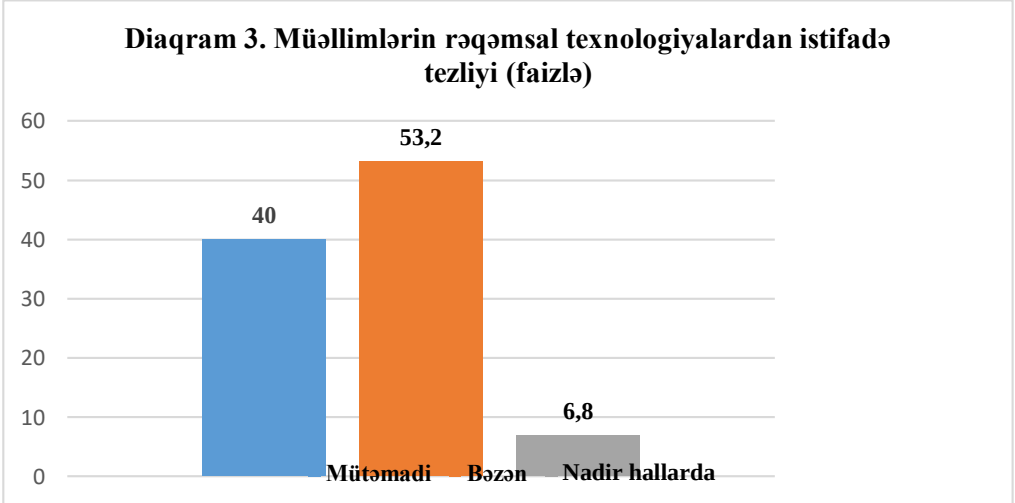
Diagram 2 shows that 255 (67.1%) of the teachers participating in the study have 21 ears or more of work experience. This indicates that the majority of the survey participants have a certain level of professionalism. The conducted analyses show that both new teachers (with 0-5 ears of experience) and experienced teachers (with 21 ears or more of experience) generally find the use of digital technologies comfortable. This confirms that there is no direct relationship between age and work experience and attitude towards technology, and that both new teachers and experienced teachers are successfully integrated into the digital environment.

Daiqram 2. Sorğuda iştirak edən müəllimlərin iş stajına görə bölgüsü (faizlə)



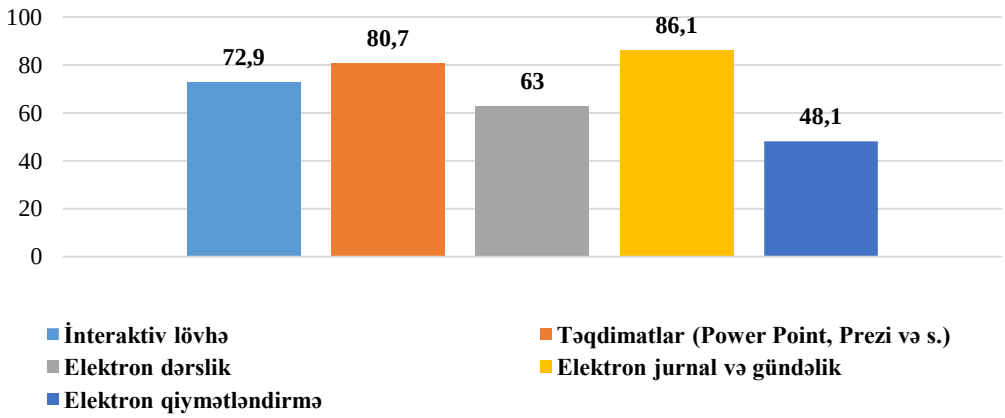
This section presents the results of a survey conducted to find out teachers' impressions of using digital technologies in the teaching process. First, in order to determine how often teachers use digital technologies in their lessons, they were asked the question "How often do you use digital technologies in your lessons?". Diagram 3 shows the frequency of use of digital technologies by teachers participating in the survey.

Diaqram 3. Müəllimlərin rəqəmsal texnologiyalardan istifadə tezliyi (faizlə)



As can be seen from Diagram 3, 40% of the teachers participating in the study reported that they use digital technologies "regularly", 53.2% "sometimes", and 6.8% "rarely" in class. Therefore, the vast majority of the teachers participating in the survey (93.2%) use digital technologies intensively in class. In order to determine what content activities the teachers participating in the survey carried out using digital technologies at school, they were asked the question "What digital tools do you use in the teaching process?" Because of the question was multiple-choice, the percentages of respondents' answers may exceed 100% in total and the use of each digital tool was analyzed individually.

Diaqram 4. Müəllimlərin tədrisdə rəqəmsal vasitələrdən istifadə göstəriciləri (faizlə)

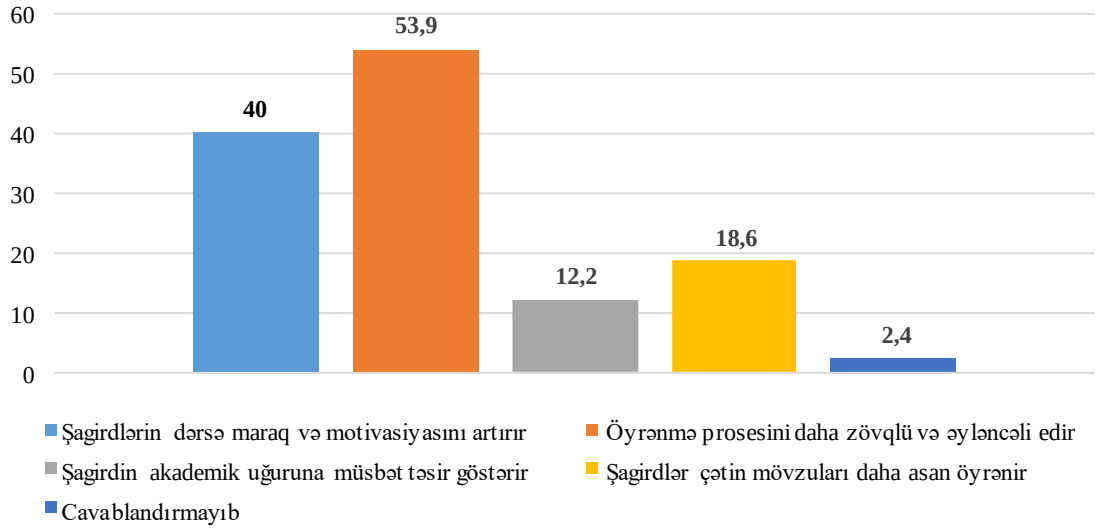


As shown in Diagram 4, the analysis of the survey results shows that teachers widely use various digital tools in the teaching process. The highest indicator was recorded for electronic journals and diaries (86.1%), which indicates that digital technologies are being integrated into the school's management and assessment processes more rapidly. Presentations (Power Point, Prezi, etc.) were used by 80.7% of teachers, which confirms that digital tools play an important role in the visual and structured presentation of teaching materials. The share of teachers using interactive whiteboards was 72.9%, which indicates that the application of interactive teaching methods is quite widespread. At the same time, the share of teachers using electronic textbooks was 63%, which indicates that digital content has partially replaced traditional textbooks. Electronic assessment tools were used relatively less (48.1%), which indicates that the digitalization of the assessment process has not et been fully

formed and that additional methodological and technical support is needed. In order to study the attitude of the survey participants towards the advantages of using digital technologies in teaching, they were asked the question "What are the advantages of digitalizing the teaching process?" Since the question is also multiple-choice, it is considered normal and possible for the percentage of respondents' answers to exceed 100% during the analysis.

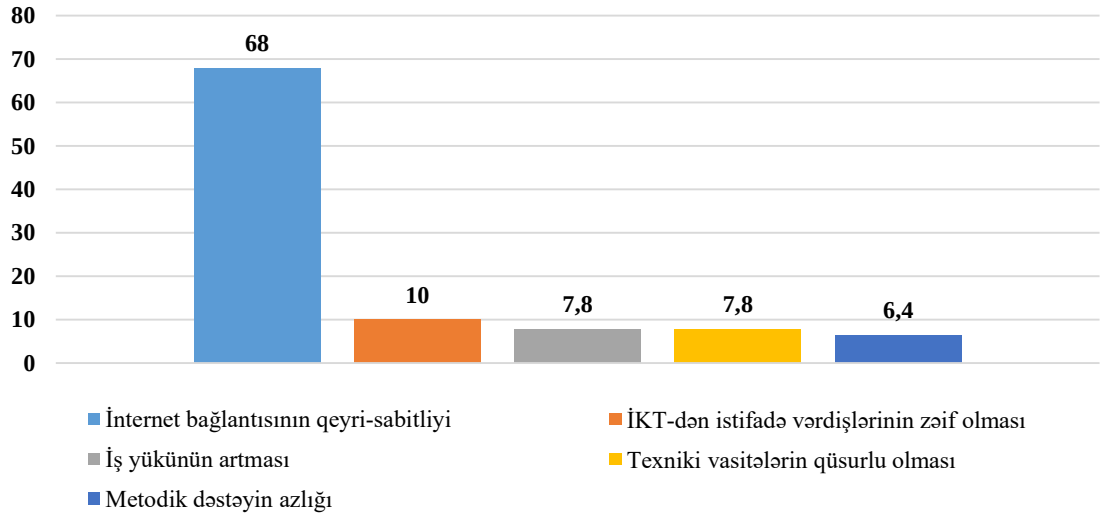
As can be seen from Diagram 5, 53.9% of the teachers participating in the survey noted that the advantage of using digital technologies in the teaching process is that "the learning process is more enjoyable and fun." This shows that teachers highly appreciate the positive emotional impact of digital technology on the teaching environment. 40% of the survey participants stated that the use of digital technologies "increases students' interest and motivation in the lesson" as an advantage. This indicator clearly indicates that the use of modern technology increases students' interest in the lesson. According to 55 (18.6%) teachers participating in the survey, "students learn difficult topics more easily" as a result of using digital technologies. This allows us to say that teachers believe that the visual and interactive features of digital technology facilitate the explanation of complex topics and their assimilation by students. This can be especially important in teaching abstract and technical topics. The "Impact on Students' Academic Success" of using digital technologies in the classroom was highlighted as a positive aspect by relatively few respondents (12.2%). This indicates that teachers are focusing more on the emotional and motivational aspects of the lesson.

Diaqram 5. Müəllimlərin dərsdə rəqəmsal texnologiyalardan istifadənin üstünlükləri barədə rəyləri (faizlə)



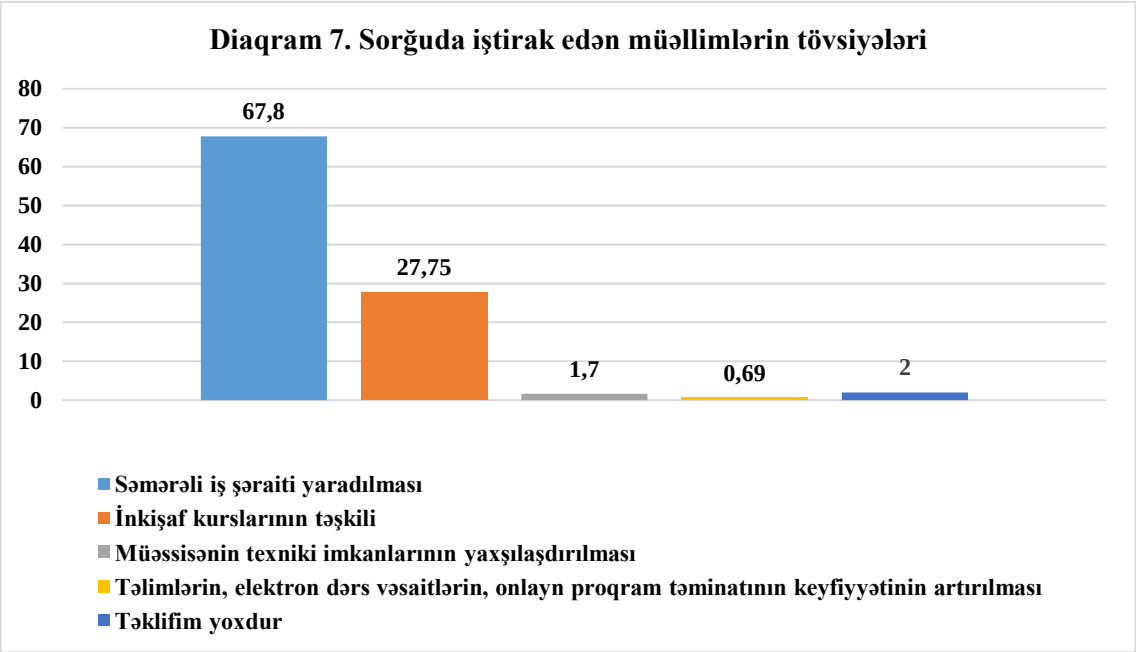
The results obtained show that the use of digital technologies in the education system is both a motivating and effective tool in terms of learning. Then, in order to identify the difficulties that teachers face when using digital technologies, they were asked the question "What difficulties do you face when using digital technologies in lessons?"

Diaqram 6. Müəllimlərin rəqəmsal texnologiyalardan istifadə zamanı qarşılaşdıqları çətinliklər (faizlə)



As can be seen from Diagram 6, 68% of the teachers participating in the survey mentioned "internet connection instability", 10% "poor ICT usage habits", 7.8% "increased workload", 7.8% "poor technical infrastructure", and 6.4% "lack of methodological support" as difficulties they faced when using digital technologies.

Finally, the teachers participating in the survey were asked the question "What recommendations do you have for improving the organization of the use of digital technologies in teaching?".



As can be seen from Diagram 7, 67.65% of teachers participating in the survey recommended the creation of effective working conditions in educational institutions to improve the organization of the use of digital technologies in teaching. This result indicates that teachers have a high need for a favorable organizational and technical environment in their professional activities.

The survey results show that the use of digital technologies in secondary education institutions allows for more interesting and interactive lessons. They increase students' motivation and facilitate the study of difficult topics. Teachers most often use electronic journals, presentations and interactive whiteboards. Although teachers face some difficulties in applying digital technologies, in general, the integration of these technologies into the teaching process is positively received by them. Eliminating these difficulties and improving technical capabilities will ensure a more efficient and comprehensive implementation of the assessment process.

Discussion. The results of this study show that digital technologies have become an important component of the educational process in Azerbaijani secondary schools. The fact that the vast majority of teachers regularly or occasionally use digital

technologies in lessons indicates that digitalization in the education system has already moved from the conceptual stage to the practical stage. These results are consistent with modern approaches and international reports emphasizing the inevitability of digital transformation [8]. The study found that teachers use electronic journals and diaries, presentation programs, and interactive whiteboards more often. This indicates that digital technologies are mainly used for the purpose of organizing teaching, managing, and visually presenting information. G. Musayeva's study on "Trends in Azerbaijani Education during the Fourth Industrial Revolution" also notes the accelerated integration of digital technologies, especially into management and assessment mechanisms, which, although not completely identical to the results of the current study, indicates the existence of consistency and similar approaches on some points [6].

At the same time, the relatively low use of electronic assessment tools suggests that digitalization is not developing equally across all components. This result is consistent with the approach outlined in OECD reports based on the analysis of PISA 2022 data, which emphasize the importance of pedagogically purposeful application of technology rather than the intensity of its use [8]. In this regard, the limited emphasis on the direct impact of digital technologies on learning outcomes suggests that teachers perceive technology more as a means of motivation and enrichment of the learning environment. It is noteworthy that teachers' opinions on the advantages of digital technologies mainly focus on student motivation, interesting lesson organization, and easy mastering of difficult topics. These findings are consistent with the contributions of digital teaching tools to the formation of interactive learning environments and the expansion of personalized learning opportunities, as highlighted in the studies of L.A. Schindler and colleagues [9]. However, the fact that the impact on academic achievement remains in the background may indicate that teachers have difficulty assessing the long-term pedagogical consequences of digital technologies.

According to the research results, unstable internet connection, weak technical infrastructure and limited methodological support are the main obstacles to the effective use of digital technologies. These difficulties are also widely noted in international studies and highlight the importance of supporting the development of teachers' digital

skills through continuous professional learning [7]. In this regard, it is not the availability of technology, but the human and organizational factors that ensure its effective application that play a decisive role. The recommendations put forward by teachers regarding the improvement of the use of digital technologies in teaching, in particular the need to create favorable working conditions and strengthen technical and methodological support, are consistent with the goals set by the implementation of the "Digital School" platform. These results show that the success of digital transformation is possible not only through the application of technological innovations, but also through the establishment of complex support mechanisms based on the real needs of teachers. Overall, the research results confirm once again that the effective application of digital technologies in education requires a systematic approach and that teachers' experience, skills, and institutional support are the main determining factors in this process. In this regard, the survey provides an important scientific contribution to the real state of digitalization in the Azerbaijani education system, complementing existing scientific-theoretical approaches with empirical data.

Conclusion. The conducted research shows that the organization of the use of digital technologies significantly improves the quality and management of the educational process in Azerbaijani secondary schools. Analysis of local and foreign literature, international studies, as well as empirical data obtained from the conducted survey shows that digital tools increase students' motivation in the educational process, allow for interactive and visual presentation of lessons, and facilitate the mastery of complex topics [5-8]. The widespread use of electronic journals, presentations, and interactive whiteboards by teachers indicates that the development of teaching management and assessment mechanisms is accompanied by the digitalization of the educational process and emphasizes the importance of increasing technological competence in the educational process.

At the same time, the study showed that the instability of the Internet connection, the limitations of the technical infrastructure and the lack of methodological support are the main factors that prevent the full potential use of digital technologies. This situation indicates the need for continuous professional development of teachers, strengthening

their technological skills and providing additional methodological support [7-8]. The practical significance of the study is that the results provide recommendations for educational institutions to effectively organize the use of digital technologies, identify the needs of teachers and school leaders, and support decision-making based on the improvement of management and the teaching process. These results are especially useful for teachers, school leaders and institutions that formulate educational policy.

Future research should systematically assess the impact of digital technologies on student learning outcomes, conduct comparative studies across disciplines and age groups, and implement pilot projects to integrate artificial intelligence and other innovative technologies into the teaching process. This direction can make a long-term contribution to both the formulation of educational policy and the development of digital skills of teachers and students.More attention should be paid to the application of digital technologies in initial teacher training and professional development training for teachers, and their user skills and technological competences should be aligned with modern teaching methods. Mentoring and continuous methodological support mechanisms should be organized to overcome the difficulties encountered in the use of digital technologies.

Thus, the study systematically revealed the real state of digitalization in the Azerbaijani education system, teacher needs, development directions of digital skills and opportunities for improvement.

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