# Application of Digital Technologies in the Educational Process

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## ABSTRACT

Digital technologies provide changes in the educational process of Russian schools. Due to innovative solutions, the possibilities of school education are expanding - "smart" content and artificial intelligence, cloud services. Digital technologies ensure the selection of a learning path for each student, increase objectivity in assessment and radically reduce the burden on teachers.

The aim of the study is to assess the readiness of teachers to use digital technologies in the educational process, as well as to calculate the digital literacy indices of school teachers and university teachers. Based on the results of the study, recommendations were proposed for the introduction of new digital technologies in the Russian education system, which make it possible to solve the main tasks of educational activities that are not solved or poorly solved by modern Russian schools based on traditional technologies.

*Keywords: digital technologies, education, digitalization*

## 1. INTRODUCTION

The deployment of the digital revolution on a global scale is increasingly immersing us in a new reality [1]. Today, the main educational trend is the digital revolution, affecting, on the one hand, the labor market and requiring the formation of new competencies among teachers, and on the other, it leads to a restructuring of the entire educational system. Experts see the prospects for improving the educational segment precisely in technological transformations. So, as a result of the introduction of artificial intelligence tools for students, individual learning paths will be created, taking into account the abilities, knowledge and preferences of each. Big data analytics will enable you to monitor learning outcomes. The use of cloud solutions will provide the fastest access to the latest technologies and their implementation in practice.

Modern education is unthinkable without the search for new materials and methods of teaching and learning. This is partly due to the social changes caused by the widespread penetration of digital technologies into all spheres of life, including education. Scientists who, within various disciplines, explore digital media and the areas of study they affect, talk not only about digitalization, but also about mediatization, trying to understand the technical side of the issue and explain the possible transformation processes that affect social behavior in schools, universities and further education establishments [2].

When it comes to digitalization, first of all we mean the infrastructure, hardware and software, the list of Internet platforms and offers. Digital technologies are becoming everyday and merge with everyday objects, which makes them less visible than weighty computers from the recent past. Schools, universities and other educational institutions - which in the recent past have been the mainstays of written and book culture - are also facing the challenges of digital transformation. There are more and more questions about individual digital competence, resources and organizational capabilities. It is important to understand the consequences of digital transformation for the educational organization itself and how teachers should react to this [3].

One of the serious problems of the current additional education and the Russian school is the growing lag behind the main spheres of public life and the requirements of the digitalization of the economy. This lag includes several dimensions. First, educational institutions do not use effective digital tools that are already actively used by adults and children in other areas of activity. Secondly, schools do not use the possibilities of digital technologies for: increasing the motivation of students (learning games, interactive teaching materials), personalizing learning (a variety of educational materials, choosing a trajectory, assisting in learning in the event of any difficulties), simplifying the routine activities of managers and teachers (reporting, monitoring, verification of works). The latest digital technologies make it possible to solve the main tasks of educational activities that are not solved or poorly solved by modern Russian schools based on traditional technologies.

Among these tasks:

  − The achievement of "lagging" schoolchildren of sustainable educational results (students with behavioral and perceptual peculiarities);

  − Overcoming the limited educational resources in school teaching;

− Elimination of the overload of teachers with routine activities, freeing up their time for educational and creative work;

− Human development of modern digital technologies, primarily in their application, the right to choose from a wide range of technologies, as well as production and other qualifications of the real economy [10];

The teacher, like any person in any other profession, must have knowledge in digital literacy, that is, the basic knowledge, skills and attitudes necessary for development in a digital society. In developed countries today, without the necessary level of digital literacy, the very fact of employment of any person, including a teacher, seems unfeasible, not to mention that digital literacy is a key factor in improving professional ICT competencies.

Educators around the world are even better aware of the privileges that come with the skillful use of modern information and communication technologies (ICT) in general education. Information and communication technologies contribute to solving problems wherever communication and knowledge are of particular importance. This includes: an increase in the educational results of students and their educational motivation, the development of learning processes, the implementation of joint projects and communication in the school network, improving the interaction between school and parents, improving the organization and management of the educational process. This is not surprising, since the opportunities that ICT provide for improving modern society and an innovative economy are now available for education [4].

In Russia, in general, teachers are well versed in digital technologies, but in fact, in the use of digital technologies in the educational process, teachers still have a lot to learn. This is evidenced by the results of a study of the special project "Digital Literacy of Teachers" *, which was implemented by the NAFI Analytical Center in the spring of 2019. Within the framework of this project, the level of digital literacy of Russian school teachers and university teachers was first measured, and then the level of their use of communication and information technologies in teaching (hereinafter - ICT competence) [9].

## 2. METHODOLOGY OF THE STUDY

The paper contains the results of an online survey of teachers of general education schools and university teachers using a structured questionnaire. The methods of the research performed contain empirical and theoretical parts, survey methods, descriptions and are supported by graphical methods of data illustration.

## 3. RESULTS OF THE STUDY

The study involved 555 teachers (general education), as well as 634 teachers (higher education). The results of the study of the special project were weighed in order to comply with the proportions of the distribution of the number of teachers in the federal districts of the Russian Federation. The maximum statistical error of the research results is ±3.9% for a sample of higher education teachers and ±4.2% for a sample of general education teachers.

The digital literacy index for school teachers is 87 percent out of 100 possible, which demonstrates a fairly high indicator. In terms of digital literacy components, the attitude to technological innovation sub-index has the lowest value - 76 percent. This indicator measured knowledge of current technology trends, skills in modern applications and gadgets, and attitudes regarding the benefits of technological innovation. The highest level of teachers showed in computer and information literacy - the indicators show 92 and 93 percent, respectively (Figure 1).
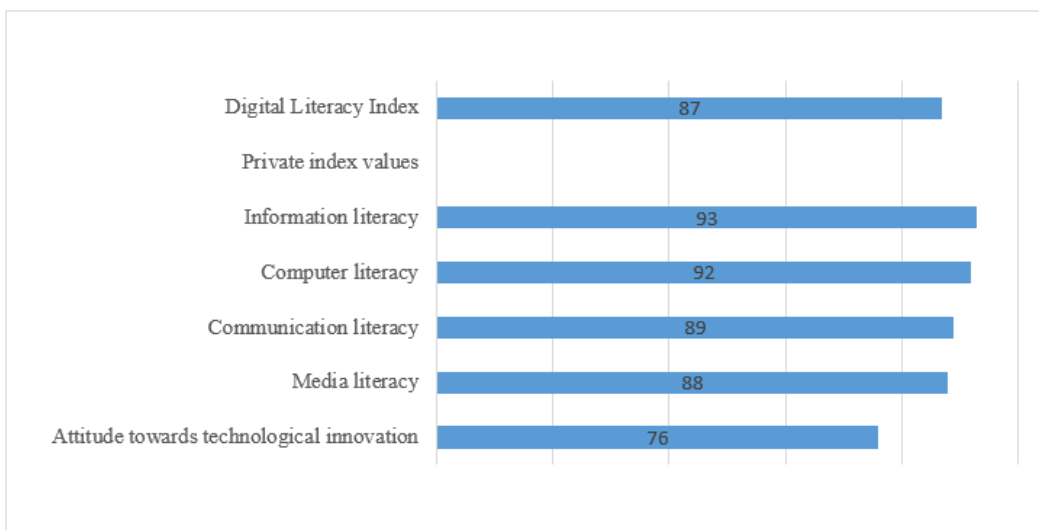


**Figure 1** Index of digital literacy of school teachers, in percentage points (out of 100 possible)

Higher education teachers also show strong indicators of digital knowledge, skills and attitudes. Obviously, work in the modern education system turns out to be impossible without knowledge, skills and attitudes in all five components of digital literacy. The digital literacy index of higher education teachers is 88 pp. out of 100 possible. In the context of the components of the digital literacy index

of university teachers, the worst indicator, as well as among school teachers, is the indicator of attitude to technological innovation: the value of the component among university teachers is 78 pp.
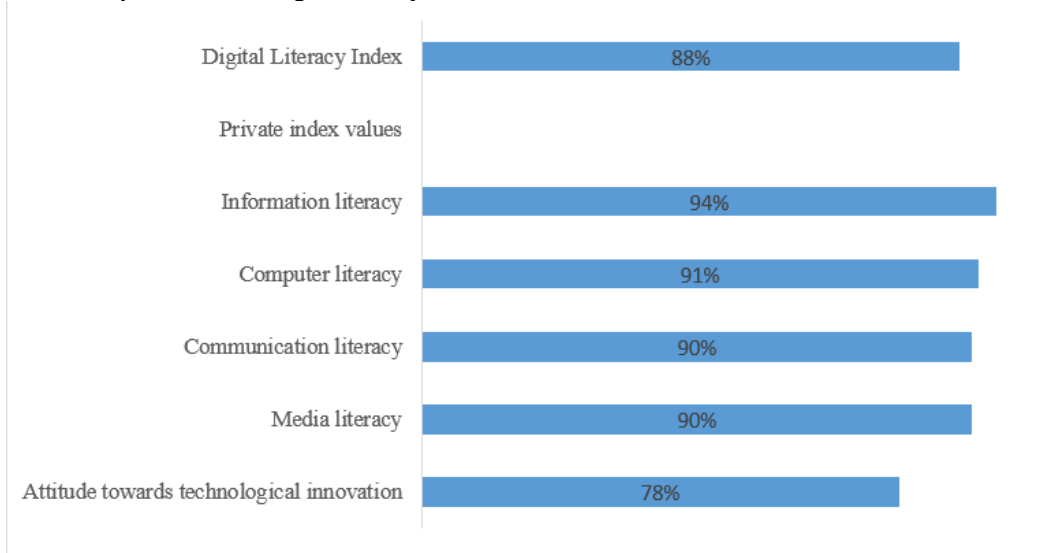


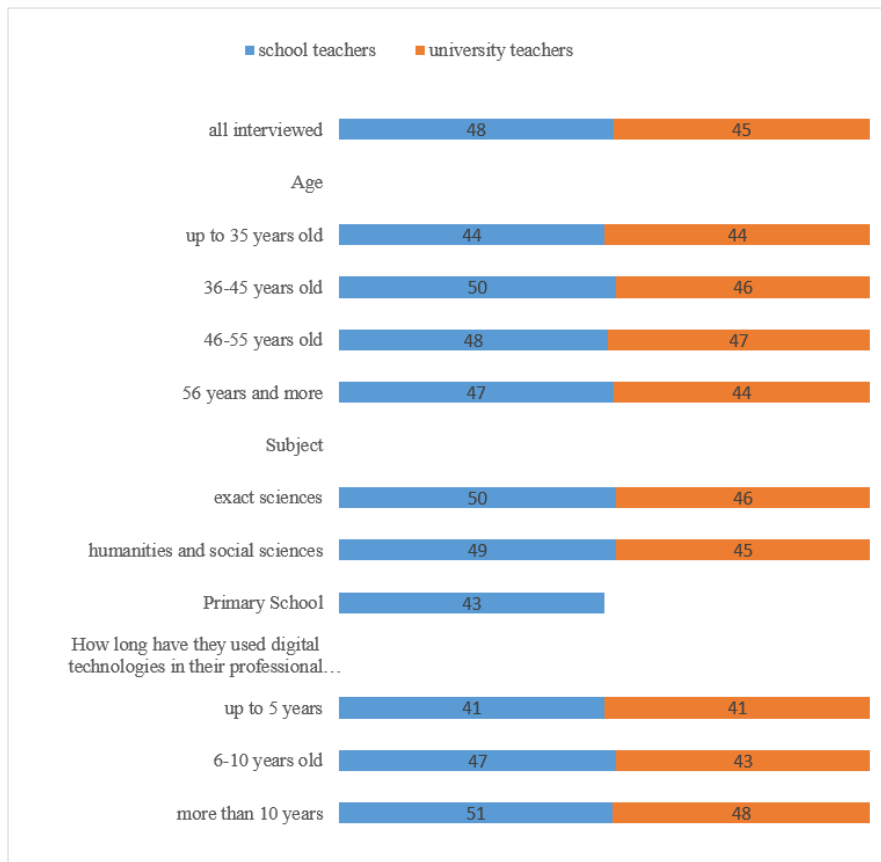**Figure 2** Index of digital literacy of university teachers



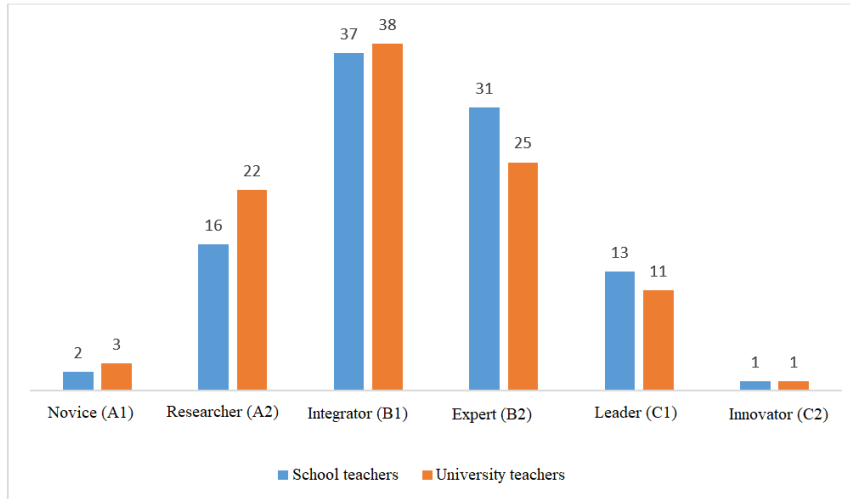**Figure 3** Average number of points scored (out of 88 possible)

**Figure 4** Distribution of school teachers and university teachers by levels of experience in using digital technologies in the educational process, in % of respondents

## 4. DISCUSSION OF RESULTS

According to the results of measuring the digital literacy index, it can be seen that Russian teachers - both university and school teachers - have a high level of digital literacy - the digital literacy index significantly exceeds the average Russian level (by 35 percent) and is 87 percent among school teachers and 88 percent among university teachers (out of 100 possible). In terms of the degree of digital literacy, teachers bypass their students - young people and adolescents, despite the fact that these subgroups also have a high level of digital literacy, which significantly exceeds the national average - 73% and 77% of 100 permissible, respectively. Both university teachers and school teachers showed the highest level in the areas of computer and information literacy - more than 90% out of 100 permissible. The lowest results were obtained in the field of technological innovation - below 80%, indicating an insufficient level of knowledge in modern technological trends, understanding of the benefits of technological innovation, as well as the availability of skills to work with modern applications and gadgets. Students (adolescents from 12-17 years old and the younger generation from 18-24 years old) demonstrate indicators in this area of competence that exceed the results of teachers.

Speaking about the readiness to use digital technologies in the educational process, Russian teachers showed an average level of mastery of communication and information technologies of teaching activity - out of the allowable 88 points based on the results of measuring the ICT competence index, school teachers scored an average of 48 points, and university teachers - 45 points. Most of the teachers were included in subgroups B1 and B2 (Integrators and Experts) - 68% of school teachers and 63% of university teachers in total. The C1 subgroup (Leader) and the C2 subgroup (Novator) included only 14% of school teachers and 12% of teachers of higher education institutions. Teachers of educational institutions are more competent in

information exchange with colleagues from other institutions thanks to digital technologies, in the safe and conscious use of digital technologies in the process of educational activities, in increasing their own qualifications through online learning, and also competent in being more attentive to their students, manifested in the identification of individual needs and characteristics of children in the learning process. University teachers are better able to cope with the need to make any changes to existing digital learning resources and materials, they are most actively using digital technologies to communicate with colleagues, and more often they unite students using digital services - such as cloud servers and joint documents - in working groups for conducting project activities. University educators are also actively using various digital technologies to provide feedback on student performance.

Based on the results of the study, the following recommendations were proposed:

Basic recommendations for teachers.

To ensure the achievement of a wider use of digital technologies in the learning process and to reach the level of an Innovator and a Leader, each teacher should strive for personal growth, exchange of experience, and more and more implementation of modern technological achievements in educational activities. Gaining experience in the use of new digital tools and technologies, an increase in the level of awareness of innovations, the involvement of students and schoolchildren in the practice of using digital technologies in the learning process, the exchange of experience with colleagues will provide an opportunity to increase each teacher's personal level of digital competence. The use of ICT competencies, as well as modern methods for assessing the personal level of digital literacy, will enable teachers to track their progress and build an individual development strategy.

Heads of educational institutions.

Conducting meetings and training seminars with experts, as well as exchange of experience with the most advanced colleagues in the field of ICT competencies, who can ensure

the exchange of positive knowledge, experience and strategies in the practice of applying digital technologies in education, will help teachers acquire new skills and transfer this knowledge to their students. The formation of a system of measures that motivate teachers to use digital technologies in education will ensure the development of ICT competencies of the teaching staff, an increase in the level of digital literacy of students, as well as an increase in the overall level of prestige of education.

Recommendations to government agencies.

Industry research organizations, specialized government bodies need to monitor the demand and availability of digital resources for teachers of all educational levels to quickly eliminate problem situations. periodic measurement of the level of ICT competence of teachers, as well as monitoring the digital literacy of teachers will make it possible to determine the state of the current situation, develop and effectively implement measures to improve them, measures to increase the readiness of teachers to use digital technologies in the process of educational activities [6].

The level of development of modern technologies determines the creation of digital educational resources that ensure the solution of key educational problems that are poorly solved or not solved by modern Russian educational institutions based on traditional technologies. The following actions are required:

 &ndash; Transition to the mass use of digital modern educational and methodological complexes. For schoolchildren, these complexes will draw up individual programs, select the formats and methods of studying the material that are suitable for each. Teachers will be helped to fill out magazines and reports, check notebooks, that is, the teacher will have time for a creative approach. For example, in Austin, Texas, there is an institution called Querium, which uses artificial intelligence in its classes to teach systematization skills and effective management technologies to high school students and students. The software works by analyzing the responses and the length of time it took to complete the training sessions, thereby allowing educators to identify areas where student weaknesses are identified. For example, Kidaptive, an adaptive learning platform in Redwood City, California, employs artificial intelligence algorithms to help educational institutions collect data and increase student engagement. Students are offered new challenges that are based on their strengths and weaknesses, and predictions are made according to future results based on current learning models:

 &ndash; Introduce simulations and games into the learning process. This will ensure the involvement of children, make the learning process visible and contribute to the development of 21st century skills: think creatively and critically, work in a team.

 &ndash; To develop a system of blended and distance learning - when you study materials as and where it is convenient, and for exams and seminars you come to class. This is how children learn subjects that are not available at school. Distance learning makes it possible to quickly

master the material. The combination of on-campus and off-campus learning will become more popular in the next decade as people try to balance digital connectivity with human connectivity. Digital technologies for online learning will become more advanced, leading to better quality online learning. Teachers in a mixed learning environment become more like facilitators. This means that students can expand their opportunities to learn and continue learning even after completing formal education.

 &ndash; Create a search engine filter system to recommend and promote the safest and highest quality open online resources for use in educational activities;

 &ndash; Implement collaborative technologies. Such tools support online learning through chatbots: applications and platforms that enable peer-to-peer interaction; as well as blogs, groups. Students can use chat tools they already know, such as WhatsApp, Skype, or Facebook, and use chatbots such as Google Allo to save teacher time, personalize online learning, and for online assessments. For collaboration lessons, learners can use Google's learning apps as well as TalkBoard, Recap, Padlet, and GoSoapBox. Groups can be created in Learning Management Systems to help educators manage online discussions, stimulate interaction between learners, and receive and provide feedback.

 &ndash; Implement training platforms. Online learning platforms such as Open Colleges' Open Space are designed to make learning more convenient for students. With a tool like Open Space, you can access all your course materials in one place, submit assignments, receive feedback, and check your grades. It is convenient and easy to use, and it also provides a support network of educators and fellow students to help you when you need to increase motivation [7]. Thus, the services of one of the most famous on-line educational platforms Coursera are used by 24 million people. More than 2000 courses are taught here in 160 specializations. More than one and a half hundred educational institutions take part in their preparation [5].

 &ndash; To develop, test and transition to the mass use of digital simulators and digital learning games, which ensure a high degree of student involvement in the learning process, organization of competitions on a team and personal basis. These tools can be introduced into the traditional educational school process based on existing textbooks and standards and serve as a transitional form for teachers to master the latest teaching methods.

 &ndash; Ensure the introduction of modern technology solutions to radically simplify reporting and reduce routine work for teachers and leaders of all educational institutions.

## 5. CONCLUSION

Unfortunately, the possibilities and importance of digital space is often underestimated, which allows, along with images and texts, to supplement the lessons taught with other formats, such as simulations, video, audio, etc., taking into account the social aspect of the changes taking place. If educational materials were created as open educational

resources, then their use does not contradict copyright and they can be easily included in the classroom.

However, it would be a mistake to think that digital technologies automatically provide a solution to all problems in the educational system and, by themselves, contribute to improving the learning environment. Because the teaching style - be it collaborative learning, a project method, a front-end lesson, or a teacher-centered lesson - doesn't depend on technology. However, their use more often leads to a change in the corresponding teaching style. Only a positive, purposeful development of interaction between students and teachers will make it possible to make the learning process better and more flexible.

Thus, "Digital technologies" should be considered as one of the means of improving the quality of education and as one of the amplifiers of the power of human "natural intelligence". But in no case can the development of the practice of their application be the goal of education. Here there is a substitution of "means" (when they are considered as the goal of politics) the true goal of the system of upbringing and education - the spiritual elevation of a person, his harmonious and comprehensive development

## REFERENCES

[1] Bereznoy, Multinational Business in the Era of the Global Digital Revolution, World Economy and International Relations, 62 (9) (2018) 5-17. https://doi.org/10.20542/0131-2227-2018-62-9-5-17

[2] W. Dittler, Brief Historical Overview of the Previous Three Waves of E-Learning, E-Learning 4.0. Mobile learning, learning on smart devices and social networks. Berlin: De Gruyter, pp. 5–42, 2017.

[3] Education in the Age of Digital Change, Russland. https://www.goethe.de/ins/ru/ru/spr/mag/21272715.html

[4] ICT Competence Framework for Teachers, UNESCO Recommendations, 2011.

[5] E. Sadovaya, Digital Economy and the New Paradigm of the Labor Market. World Economy and International Relations, 62 (12) (2018) 35-45. DOI: 10.20542 / 0131-2227-2018-62-12-35-45

[6] T.A. Aimaletdinov, L.R. Baimuratova, O.A. Zaitseva, G.R. Imaeva, L.V. Spiridonova, Digital literacy of Russian teachers. Readiness to use digital technologies in the educational process, NAFI Analytical Center - Moscow: NAFI Publishing House, 2019, 84 p.

[7] A. Boretsky, Trends in educational technologies in 2020, 2020. https://www.abstudy.ru/tendencii-obrazovatelnyh-tehnologij-v-2020-godu

[8] Scientists ask Putin to revise the system of "digital" education in Russia, 2019. https://eadaily.com/ru/news/2020/05/11/uchenye-prosyat-putina-peresmotret-sistemu-cifrovogo-obrazovaniya-v-rossii

[9] The digital future of education: how do Russian teachers integrate technology into the educational process? Analytical Center NAFI, 2019.

[10] 12 Solutions for New Education, School of the Digital Age. https://www.hse.ru/twelve/part2