

Problems Hindering Sustainable Development of Education

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Abstract: Digital transformation is one of the main directions of education development, and due to the COVID-19 pandemic, this agenda has become even more urgent. Teaching methods, traditional models of educational systems are changing significantly, and the following are being introduced: combining face-to-face and online learning; learning using distance learning technologies; scenario-based learning; e-learning; the "inverted lesson" model, blended learning; the BYOD model, which involves the use of personal mobile devices in the process of work; learning with the use of social networks for the development of interactive learning and educational communication. The article systematizes global trends in the spread of digital technologies in education. Based on statistical observation data, quantitative results of the use of digital technologies in the educational process are presented. The current state of the use of digital technologies in this direction is shown and recommendations with directions of support for the industry are presented.

1 INTRODUCTION

The deployment of the digital revolution on a global scale is increasingly immersing us in a new reality (Bereznoy, 2018). The variety of technical and technological innovations that change our lives has increased many times in the last decade, and in the most diverse areas of human life (Sadovaya, 2018).

When it comes to digitalization, first we mean the infrastructure, hardware and software, the list of Internet platforms and offers (Beksultanova, Vatyukova, Yalmaeva, 2020).

Digital educational transformation is aimed at increasing the efficiency and transfer of knowledge through digital learning tools and new formats (Golovina, Samarkina, Buinov, Evloeva, 2022). It provides for a new level of assimilation by the organization of administrative activities, educational work and the relationship of all participants in the educational process. Digitalization of education prepares students for life and work in a digital environment.


In order to increase the accessibility and quality of education, open educational resources are increasingly being used in training.


The basis of the digital educational transformation is modern processes and digital technologies that help improve the quality of education, expand access to education, increase the efficiency of the educational process and adapt it to the changing students' needs and the labor market.


Contemporary processes embrace active and interactive learning methods, an individual approach to students, an interdisciplinary approach and teamwork, as well as demands of the labor market in the development of educational programs.

Among the digital technologies that play a key role in the digital educational transformation, we can distinguish the following:

Application of Artificial intelligence technologies for diagnostic tracking and monitoring tools, adaptive learning, evaluation of automated systems and training applications;

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- gamification of education, which involves the transition to the mass use of digital simulators and digital learning games that contribute to achieving high student involvement in the educational process;

- using simulators as a digital simulation of activities or processes that are expensive or difficult to organize in real life;

- introduction of robotics, which involves the use of robots as teachers, assistants, mentors, partner students;

- development of augmented reality solutions and VR/AR visualization technologies (like simulators, they make it possible from a computer lab or from home to perform actions that are considered expensive, impossible or dangerous in other conditions);

- online platforms: allow students to get an education at anytime and anywhere in the world, communicate with teachers and other students, watch video lectures, do homework and take tests.

Cloud technologies: provide access to educational materials and applications via the Internet, storage and processing of big data volumes.

Mobile devices: allow students to access educational materials and applications anywhere in the world, communicate with teachers and other students, complete homework and take tests.

Artificial intelligence: meant to create individual educational programs, automate the assessment process and knowledge analysis.

Virtual and augmented reality: meant to create interactive and effective educational tools.

Blockchain: meant to create a reliable and transparent system for storing and transmitting data on student achievements and learning progress.

In Russian practice, most of the above solutions are used within the framework of digital educational transformation.

2 RESEARCH METHODOLOGY

The work contains the results identified in the framework of published reports and analytical materials of international organizations, specialized analytical publications, data from foreign and Russian news agencies, as well as interviews and articles by leading analysts and experts. Methods of the performed research:

- theoretical and empirical methods,
- methods of description,
- method of graphic illustration of data.

3 RESEARCH RESULTS

In Russia, the key factors in the digital transformation of education are the following:

1. State support: the Russian government actively supports the development of digital technologies in education. As part of the national project "Education", the "Digital Education" program was launched to create new educational technologies, developing digital competencies of students and teachers, as well as improving the quality of education in general.

2. Infrastructure development: Infrastructure for digital learning is actively developing in Russia, including high-speed Internet, cloud technologies and access to online platforms.

3. Active introduction of digital technologies in education: many universities and schools in Russia are already actively using digital technologies in their work, including online courses, electronic textbooks, virtual classrooms and much more.

4. Development of the e-learning industry: in Russia, there are many companies involved in the development and promotion of e-learning products and services, which contributes to the development of the e-learning industry and the creation of new jobs.

5. Increasing the number of distance learning programs: in Russia, more and more universities and schools offer distance learning programs that allow students from different regions to receive a quality education without having to move.

6. Development of digital competencies for students and teachers: various events and trainings are held in Russia to improve the digital competencies of students and teachers that enable more effective use of digital technologies in education.

In general, in Russia there is an active development of digital technologies in education, thereby improving the quality.

A wide range of digital technologies is used in higher education. Their intensive use is much higher than in the economy as a whole (Fig. 1).

Additive technologies (17%), digital platforms (35.6%), cloud services (used by 45.9% of organizations), geoinformation technologies (19.5%), RFID technologies (26.2%), Internet of Things technologies (17.1%) are considered the most popular. Big data will be used by 12.4% of organizations, Artificial intelligence — 8.4%, industrial robots — 4.6%, digital twins — 4.9% (Gokhberg, Ozerova, Sautina, 2021).

In higher education, the intensity of software application generally corresponds to the average level in economics in relation to ERP systems (13.3% of

educational organizations use it) and is significantly higher than the average values in economics in terms of the use of CAD/CAE/CAM/CAO systems (25.8%, which are mainly accounted for, probably, engineering universities) and MES (11.9%). The intensity of use of PLM/PDM systems is below average and is 2.5%.

Digital solutions are being introduced into all areas of activity of educational institutions. Thus, within the framework of the project "Monitoring the economics of Education", according to the results of a survey of heads of ICT blocks of state universities,

digital services and systems for legal, personnel and accounting issues are widespread — they are used in more than 90% of universities. Among the information services and systems that are used for educational activities, the most widespread are such as a single personal account of an employee, student (79.1%), lesson schedule planning systems (58.8%), electronic information educational environment (LMS, MOODLE, etc.) (95.7% of universities), accounting and analytical systems educational process management (70.5%), (Volkova, Permyakova, Shmatko, 2021).

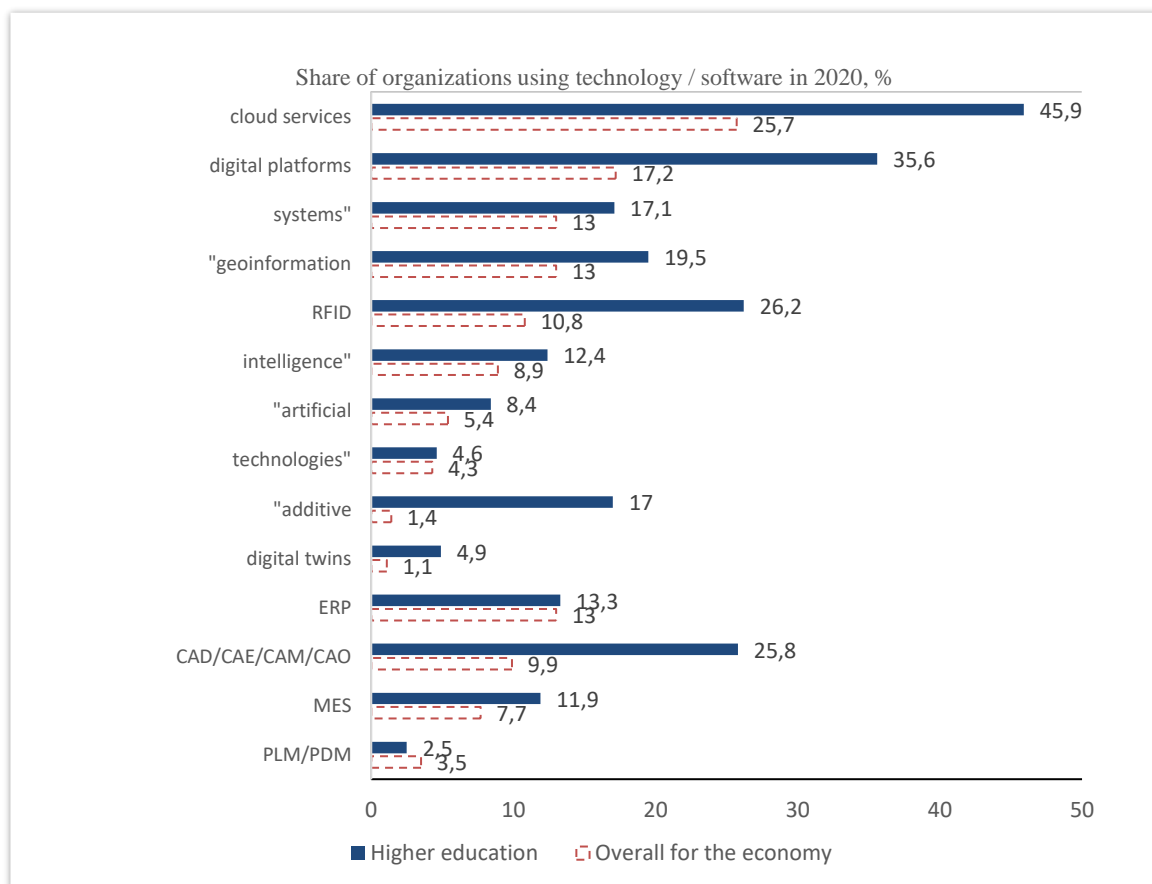


Figure 1: Use of digital technologies and software by organizations in the field of higher education.

Restrictive measures introduced in the context of the pandemic in 2020 had an impact on the development of e-learning and distance learning technologies in order to increase the availability and quality of education. At the beginning of the 2021-2022 academic year, 53.2% of students studied under higher education programs using distance learning

technologies (at the beginning of the 2019/2020 academic year, their share was 13%), and using e—learning - 45.3% (respectively, 20.5%).

In higher education, the main information platform is the state information system "Modern Digital Educational Environment", which serves as a marketplace for online courses from different

universities and platforms, makes it possible to solve the tasks of implementing unified authentication using GIS "Unified Identification and Authentication System", evaluating the quality of content and its rating, searching for online courses, and also, the creation of digital portfolios of students and the recognition of the results of online training by employers and educational organizations.

When taking online courses, students create a personal "digital footprint" — statistics on the completion of tasks, viewing of video materials and the results obtained. Such data arrays are analyzed automatically and stored on the platform.

The platform creates and sends digital portfolios of students to educational organizations and employers and forms an opportunity for employers to familiarize themselves with the results of online courses, Olympiads, completed projects, creating resumes with full data on students' personal achievements and education.

Currently, in the field of general education, a set of measures is planned to support existing digital technologies and platforms, as well as create conditions for the emergence of new ones. This is implemented as part of the creation of a digital educational environment (DSP) to ensure equal conditions for high-quality education of students, regardless of their place of residence:

- it is planned to introduce information systems and information and telecommunication infrastructure that are part of the DSP platform;
- school equipment with information and telecommunication and material and technical infrastructure (computer, Internet, presentation equipment, multimedia and software in accordance with the approved standard, videoconferencing in school premises);
- development of technologies and solutions for processing and managing data of participants in educational relations on the basis of the public services portal;
- ensuring the possibility of implementing educational programs using e-learning and distance learning technologies and using the portal of public services, the information system of the Ministry of Education of the Russian Federation and the information and communication educational platform, etc. (Enterfin, 2020).

3 DISCUSSION OF THE RESULTS

In Russia, attention to the digitalization of the education process is conditioned by the strategic

goals of increasing the quality and accessibility of education. General and higher education are among the industries for which digital maturity is monitored as part of the indicator of the national goal "Digital Transformation". In December 2021, the Russian government approved strategic directions (strategies) in the field of digital educational transformation aimed at achieving digital maturity of general and higher education.

The educational process is being transformed, systems of electronic document management and planning of financial and economic activities, electronic diary, journal, schedule, electronic accounting of the development of additional programs and achievements of students based on the results of their participation in Olympiads and other intellectual events are being actively introduced into it.

By the end of 2020, 82.7% of educational organizations used an electronic journal and an electronic diary, 59.4% used computer training programs on individual subjects or topics, 53.5% used electronic versions of textbooks, 52.6% used electronic versions of reference books, encyclopedias, dictionaries, etc., 45.9% used electronic versions of textbooks, 23.2% used electronic libraries (Abdrakhmanova, Vishnevsky, Gokhberg, 2021).

The availability of personal computers used for educational purposes, per 100 students, was 15.9 units at the end of 2020. (at the end of 2019 — 14.7 units). Internet usage with a speed of 100 Mbit/s and higher was 20.7% in educational institutions (at the end of 2019 — 14.6%) (Gokhberg, Ozerova, Sautina, 2021).

The complex epidemiological situation associated with the COVID-19 coronavirus infection contributed to an increase in the proportion of students using e-learning in primary, basic and secondary general education programs (from 16.3% at the beginning of the 2019/2020 academic year to 20.5% at the beginning of the 2021/2022 academic year) and distance learning technologies (from 4.8% to 17%, respectively).

4 CONCLUSION

From all of the above, it can be concluded that the use of new technological solutions and the use of digital platforms makes it possible to fill in the gaps that arise in traditional teaching methods. This gives students a number of advantages, including the possibility of flexible learning, regardless of geographical location

and at any convenient time. The combination of technology with education makes education accessible to everyone, coping with the limitations of traditional learning.

As mentioned above, in the spring of 2022, the education sector faced sanctions that restrain the digital transformation of the industry. In the shortest possible time, it is necessary to switch to domestic equipment and software that is associated with digital technologies, while potential obstacles to solving this problem are due to the fact that the Russian market is not ready for a possible rise in the cost of ICT goods and services, including domestic ones. In particular, the sanctions of foreign Internet service operators have a negative impact on the implementation of educational programs using distance learning technologies and e-learning. In such circumstances, possible areas of support for the industry may be:

- implementation of centralized procurement of the Ministry of Education of Russia and the Ministry of Education and Science of Russia of equipment and domestic software, which educational institutions need first of all;
- subsidizing educational organizations of the difference between the cost of purchased domestic software and equipment in actual prices with their cost in pre-sanction prices;
- assistance in retraining students and teachers to work with domestic software (instead of the "usual" foreign);
- training of specialists to overcome the increasing shortage of IT personnel in the current situation.

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