

## DIGITALIZATION AS A NEW EDUCATIONAL PARADIGM

### *A DIGITALIZAÇÃO COMO UM NOVO PARADIGMA EDUCACIONAL*

### *LA DIGITALIZACIÓN COMO NUEVO PARADIGMA EDUCATIVO*

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**ABSTRACT:** The rapid development of digital and communication technologies in the second decade of the XXI century has had a significant impact on all spheres of human life and accelerated the transition to a post-industrial society. Information has become as accessible as never before, moreover everyone who has a gadget with Internet access becomes an active content producer. In this article the authors analyze five major trends that have emerged in education at global and individual levels in this period. These trends significantly influence traditional methods and approaches. According to the authors, they can be an indicator of the shift to a new paradigm in education.

**KEYWORDS:** Post-industrial society. Education.

**RESUMO:** *O rápido desenvolvimento das tecnologias digitais e de comunicação na segunda década do século XXI teve um impacto significativo em todas as esferas da vida humana e acelerou a transição para uma sociedade pós-industrial. A informação tornou-se mais acessível do que nunca, além disso, quem tem um gadget com acesso à Internet torna-se um produtor de conteúdo ativo. Neste artigo, os autores analisam cinco grandes tendências que surgiram na educação em nível global e individual neste período. Essas tendências influenciam significativamente os métodos e abordagens tradicionais. Segundo os autores, eles podem ser um indicador da mudança para um novo paradigma na educação.*

**PALAVRAS-CHAVE:** *Sociedade pós-industrial. Educação.*

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**RESUMEN:** *El rápido desarrollo de las tecnologías digitales y de comunicación en la segunda década del siglo XXI ha tenido un impacto significativo en todas las esferas de la vida humana y ha acelerado la transición hacia una sociedad posindustrial. La información se ha vuelto más accesible que nunca, además todo el que tiene un dispositivo con acceso a Internet se convierte en un productor activo de contenido. En este artículo los autores analizan cinco grandes tendencias que han surgido en la educación a nivel global e individual en este período. Estas tendencias influyen significativamente en los métodos y enfoques tradicionales. Según los autores, pueden ser un indicador del cambio a un nuevo paradigma en la educación.*

**PALABRAS CLAVE:** *Sociedad postindustrial. Educación.*

## Introduction

The role of education in today's world cannot be overestimated. It is the key to societal development at both national and international levels. Approaches to and requirements for education are changing in response to the demands of the times. The transition to a post-industrial society has created a demand for qualified personnel, as well as a demand for lifelong learning. Uniqueness and creativity are key characteristics.

Whereas the task of classical education in the 19th and 20th centuries was to create conditions for educating and training identical people capable for performing identical tasks on an industrial scale, the robotization increasing is creating a demand for training all people to be different. In the 21st century, diversity and uniqueness are becoming the most important global social values.

Increasing individualization leads to an increase in the diversification of options for realizing each individual's feature. This trend has manifested itself in fields ranging from design and literature to science and industry. New fields of knowledge are emerging at interdisciplinary junctions, such as neuroeconomics (the science of how "the brain makes decisions"), nutrigenetics (studies the genes responsible for metabolism and food digestibility), settleretics (studies the possibility of "relocating consciousness" of humans from their mortal biological brain to an immortal artificial "neurocomputer brain").

Some new educational principles have emerged in cultural studies under postmodernism. Among them, researchers emphasize the principle of maximizing human freedom, which does not lead to a break with many established cultural traditions and has no corresponding philosophical justification, as is common in modernism, but is a secondary reflection of the achievements of human culture (KUZNETSOVA *et al.*, 2020).

There has been a major transformation in social and socio-cultural development associated with the active use of scientific and technological advances and information

technology. Values are being reevaluated, new priorities and goals of human life and society are being formed.

One of the features of the information civilization is the development of human intellectual potential and its active use in all spheres of life. Man, developed and oriented in many directions, becomes one of the significant achievements of modernity (MELESHKINA; SLUTSKAYA, 2020).

## **Materials and methods**

In many ways, this freedom has been made possible by the intensive development of computer technology. The digital revolution has touched virtually every aspect of our lives. According to [statista.com](https://www.statista.com), in January 2021, there will be 4.66 billion internet users in the world, while 4.32 billion people will be mobile users and 4.2 billion people will be active users of social networks (STATISTA, 2021). Such rapid development of digital and communication technologies has certainly had an impact on the conservative sphere of education as well. Even the format of textbooks and workbooks has changed. This has made it possible to gamify the learning process and increase students' interest in the material.

Any information has become available virtually anywhere in the world 24/7. But it's not even that important – the development of technology and technology has allowed everyone with a gadget to become an active producer of information, and the rapid development of social media has made it easier to find an audience.

In other words, everyone can become a kind of mass media. For example, the television channel Russia 1, the leader among Russian broadcasters in 2020, gathered an average daily audience of 1.3 million people in major Russian cities, according to Mediascope (RIA NEWS, 2020), while the YouTube channel of Yuri Dud (a Russian journalist and YouTube show host, vDud, where he interviews famous journalists, businessmen, cultural, political and sports figures) has over 9 million subscribers, and his most popular videos have had over 30 million views. But Yuri Dud is far from being the most popular blogger and content producer on the Internet.

At the beginning of 2019, it was difficult to predict that the education sector would undergo a paradigm shift. Importantly, the new coronavirus pandemic that broke out in early 2020 was not a trigger for new trends, but it was a catalyst for existing ones, accelerating their development many times over. Traditionally, distance and online education was considered less effective than face-to-face education. The pandemic has forced a major revision of this attitude

and distance learning is now approaching full-time education in terms of credibility and methodology.

In the context of the problem under consideration, it is relevant to identify the main trends that digitalization has brought to the educational sphere. The trends towards distance education and its personalization have come to the forefront. This is becoming a key difference from the face-to-face form of education that prevailed for many decades, which often minimized the opportunities for individual approach to the special needs of students.

## Results and discussion

*Distance education.* This is a form of education in which classes and assessments are conducted online. With the development of distance education, students have virtually unlimited possibilities in choosing courses and educational programmes, as well as access to libraries and other information resources. There are many factors that guide applicants in their choice of school, college and university. Traditionally, the most important have been the quality and cost of education, and, until recently, the territorial accessibility of the institution. The geographical remoteness of leading HEIs has been a barrier for applicants and trainees: from submitting documents in person or by post, to physical restrictions on attending lectures and seminars by the most sought-after academics due to capacity limitations in classrooms.

This problem has now been minimized. Both distance learning and hybrid forms are available to applicants. In the first case, teaching and attestation take place online, while in the second case, teaching also takes place online, but attestation takes place in person. In addition, an important advantage of online education, as compared to the traditional distance learning form, is its flexibility and informativeness. Training takes place in a multimedia environment and learning materials are provided in different formats most convenient for perception (audio, video, text, presentations, forums, etc.). There is no need to attend lectures and seminars in person on campus, you can participate in webinars and communicate with the teacher in real time. Digitalization has also greatly simplified and accelerated feedback between HEIs and students.

The development of multimedia has allowed corporations and even libraries to enter the educational market. Many of them open their own educational programs, video lectures, and organize distance learning courses on third-party platforms, such as [www.coursera.org](http://www.coursera.org). This online resource already cooperates with more than 200 leading universities and companies. If the trainee completes the study program and successfully passes the final assessment, he or she

is awarded a certificate. The flipside of technological development is increased competition between educational institutions. In addition, the lockdown has revealed three groups of problems in digital education.

Firstly, the infrastructure (equipment and networks) and the educational environment were not ready for the abrupt transition to distance learning. The first classes were held in Skype and similar internet telephony programmes. Moreover, the load on the infrastructure of the Internet telephony providers has increased manifold, which has caused malfunctions. It took time to develop specialized solutions for education;

Secondly, unpreparedness of teachers for online learning. Many educators, unfortunately, have had difficulties in adapting to online learning. Problems have arisen on many different levels: from a lack of familiarity with communication programs and a lack of teaching materials in multimedia formats, to a lack of necessary equipment and Internet channels of sufficient capacity.

And third, the digital divide. High-speed internet access is far from available everywhere, and many families in Russia have found themselves unable to provide their children with the level of laptops and tablets needed during the compulsory distance learning in 2020.

*Personalization.* With the development of digital technology, the amount of information produced and processed has increased every year in leaps and bounds. At the same time, information and knowledge have become more accessible, no matter how well one can read. This applies to voice-to-text and text-to-speech technologies, which are particularly useful for students with dyslexia and other learning difficulties. The amount of information available in video and audio format is also increasing, so that learning is no longer limited to being able to read.

Digital technologies have enabled educators to consider cognitive features of students (visual, auditory, kinaesthetic, etc.) and to do so in a less resource-intensive way, which cannot be achieved in conventional mass school settings. In a multimedia environment, it is easier for a teacher to select didactic materials and control the learning process. This is especially important for children with special needs. Distance learning enables them to get the specialized support they need, even in the most remote areas. The computer also helps some students to overcome their fear of speaking in public and answering questions incorrectly in front of the whole class, while they feel freer and easier to cope with tasks, even if they are unsure of what they are doing (ANUFRIEV *et al.*, 2018).

According to Vadim Grinshkun (2020), Corresponding Member of the Russian Academy of Education, Doctor of Pedagogical Sciences, Professor, Head of the Department of Informatization of Education at Moscow City Pedagogical University, many scientists and teachers among the proposed innovations highlight cooperation education,

maintenance and accounting of personal electronic portfolios, implementation of the methodology of multilevel learning, implemented on the basis of digital tools. Many researchers note that digital technologies are increasingly being used to personalize learning and give students greater choice over such factors as the content and methods of learning, the pace at which the program is mastered, the preparation for organizing and managing their own learning, not only in school or university, but throughout life.

According to a study conducted by the Center for Digital Education, personalized learning is a top priority in the field of educational technology in the United States.

*Mobility.* This is a way of accessing learning materials using mobile devices (smartphones or tablets). Now you can study whenever and wherever you want, as long as the student has a gadget connected to the Internet. This technology will be most in demand in corporate education, as it helps companies improve the skills of employees who travel, work remotely, or want to study outside of working hours for a significant portion of their time. The millennial generation has grown up with digital devices and is well versed in how their interfaces work. Mobile learning is therefore proving to be one of the most adaptable formats for them.

Among the main advantages of this technology is the accessibility of learning content. Textbooks and workbooks are practically "in the pocket" of the student. This can serve as additional motivation. Feedback from the teacher is also accelerated. Many solutions and types of digital content are available specifically for learning in an appropriate format. The small size of tablets and smartphones allows educators to teach wherever the context of a particular lesson requires.

At the same time, it is worth recognizing that learning on mobile devices requires greater concentration and self-discipline on the part of the learner, as other applications on the device can be very distracting. In addition, mobile learning will not be possible without an Internet connection and electricity for long periods of time. However, given the intense annual increase in the number of mobile devices, it is safe to assume that the problems of poor-quality connectivity and lack of electricity will soon become irrelevant.

Mobile learning can help tackle illiteracy at the global level too. A study of 16 sub-Saharan African countries found that most primary schools have few or no books. This slows

down learning to read and, by extension, mastering the whole school curriculum. With the ubiquity of mobile devices, UNESCO is exploring how they can be used to improve literacy in line with Sustainable Development Goal 4.6. The data transfer fee required to read an open access book on a mobile phone can be as little as 2-3 cents, whereas the cost of a comparable paper book rarely exceeds \$10. This means that mobile reading can be 300-500 times cheaper than reading books in physical format. Mobile books are also easier to distribute, easier to update and, in some cases, more convenient than paper books (UNESCO, 2021).

*Engagement and interactivity (VR and AR).* As the production of virtual (VR) and augmented (AR) reality screens and glasses become cheaper, the application of these technologies in mass education becomes more affordable. ABI Research analysts predict that by 2022, the volume of the global VR/AR learning market (based on virtual and/or augmented reality, respectively) will grow to a total of \$6.3 billion. Experts believe that the digitalization of learning will adapt the presentation of complex material, facilitate the process of memorization and motivate students to study harder. By comparison, in the United States, VR technology was working in 18% of educational institutions nationwide by the end of 2018 (RBC, 2020). Introducing technologies such as virtual and augmented reality into the classroom can increase student engagement in the educational process. That is why many educators predict a bright future for VR and AR in education.

Virtual or augmented reality technologies can enhance the effectiveness of teaching complex subjects and, as a result, improve the quality of learning. For example, AR can be used to teach students how to dissect a frog or take a virtual journey through remote areas or objects. Educational institutions that embrace digital transformation provide deep learning experiences and opportunities for Alpha children (children who are used to acquiring knowledge through technological means, gadgets and devices), which helps them better prepare for the future and become leaders.

The effectiveness of applying VR and AR in education has been confirmed by research conducted by Modum Lab and the FEFU STI Centre. "As part of the experiment, a core group of schoolchildren underwent an intensive course in a blended learning format," writes RBC,

alternating virtual classes with classroom discussions in groups of ten. The total training time was 4-4.5 hours, spread over three days. During the same time, the control group studied the same topics on the regular school curriculum - with textbooks and notebooks. As the researchers explained, the results of the experiment were evaluated based on the school tests for the two groups and, subsequently, the results of exams: after the VR-training, the average final test score of the main group increased by 28.8%, while the control group (where no technology was used) did not change. There was no

direct link between VR-training and success in the GCSE on specific items, but the average overall GCSE score in the main group was on average 2.5 points higher than in the control group (RBC, 2020).

It is safe to say that the use of VR and AR in the classroom helps students gain a deeper understanding of concepts, memorize information, increase motivation and foster collaboration. Although the rate of adoption of these technologies in the education sector is slow right now, it will become a familiar tool in the coming years.

*Big data.* Educational institutions have long been collecting a large amount of information about their students and pupils, including their personal data, courses taken, grades, career track, etc. This information can help institutions identify the most problematic and, conversely, the easiest places in curricula, patterns in the individual characteristics of students who excel in certain areas and use this knowledge to improve the quality of services provided. It will help to create personalized programs (NEWMAN, 2019). Together with this comes the issue of protection of students' personal data, which requires a separate elaboration.

## Conclusions

Thus, it can be argued that the transition to digital transformation in education is not a short-term phenomenon, but rather an evolving trend. For the education technology industry, now is the time to use modern advanced technologies and take the learning process to a qualitatively new level with maximum consideration of individual student needs. It is time to let go of the past, rethink the present and move to new formats and new standards of education.

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