Trends, Opportunities and Perspectives of Digital Education Development in the Global Economy

A O Ivanova¹, T A Ignatieva² and V P Pilyavsky³

¹ITMO University, Kronverkskiy Prospekt, 49, Saint Petersburg, 197101, Russian Federation
²St. Petersburg State University of Economics, Griboedov canal embankment, 30-32/21, Saint Petersburg, 191023, Russian Federation
³Sankt-Petersburg Institute of Business and Innovations, Gavanskaya Street, Saint Petersburg, 199106, Russian Federation

E-mail: pil2@mail.ru

Abstract. This article is devoted to the development of digital education in the global economy; special attention is paid to the problems of digitalization of the educational process under the influence of socio-economic threats on a global scale in the context of special demographic and social conditions. The article specifies the main reasons for the emergence of digitalization problems and the ways to solve them. The article substantiates the exceptional role of digital technologies in the digitalization of education, analyzes existing information technologies and highlights the main trends and prospects for their development; describes the opportunities and key challenges of digital transformation of education. The research reveals the weaknesses of the traditional education system in the context of globalization, identifies fundamentally new consumer needs in the market of educational services, and considers prospective digital systems that meet the requirements of modern society.

1. Introduction

The globalization process is taking place in all spheres of life of the world society and, of course, has affected the sphere of education. As an example, the trends of globalization have initiated the creation of a single European educational space, known as the Bologna process.

At present, globalization, based on the paradigm of the unimpeded movement of people, capital, information, goods, services around the world, has suddenly, in the context of this paradigm, proved to be responsible for the rapid spread of viral infection COVID-19 worldwide.

The main way to contain the pandemic is to minimize physical contact. Thus, according to data from the United Nations Educational, Scientific and Cultural Organization (UNESCO), 188 States closed educational institutions, which affected 91.3% of students worldwide (1.58 billion people). In these conditions, there is a pronounced trend of increasing the share of digital education, which has proved to be in great demand.
2. Focus of the research
Digital education is linked to the changing nature of scientific and technological progress, which necessitates the formation of the ability for every member of society to live and work productively in a changing economy, to continue their education throughout their lives [1].

In this regard, the digital transformation of education should provide a coordinated solution that key objectives, such as infrastructure development; development, testing and implementation of digital educational and methodological complexes using adaptive algorithms based on artificial intelligence; development, testing and implementation of platform solutions and learning management systems; improving computer literacy of teachers for the successful development and implementation of educational programs in a digital environment [2].

It is necessary to formulate trends in the development of digital education [3]:

2.1. Increasing the role of academic autonomy in the educational process
Digital technologies make it possible to create an environment rich in various educational resources, almost unlimited in terms of nomenclature and content. In these conditions, the student will have to solve a number of educationally significant tasks independently and/or with the help of adaptive learning systems.

2.2. Formation of students' motivation [4]
To form the motivation of students, it is necessary to use the full range of possible means, such as:

- replacing the dominant factor of educational motivation among students – fear (getting a bad grade, losing a scholarship, etc.) - with a factor of success in learning;
- supporting of the learning process with an operation control system and assistance in mastering the material, if necessary, at each step of solving the educational task in real time using a virtual voice / text assistant based on modern digital technologies;
- using of various technological, social and emotional techniques, such as game technologies, quest technologies, augmented virtual reality, network training that connects the student with other members of the training team and teachers, project training, etc.

2.3. Increasing the role of active and interactive forms of education [5]
The process of digitalization provides qualitatively new opportunities for the" packaging" of educational material and educational activities, as well as creates fundamentally new educational needs. The role of passive forms of educational work, such as lectures, is significantly reduced and the role of educational technologies of interactive communication is increasing.

2.4. Formation of clip-thinking
The formation of the global information environment and, in particular, the digital transformation of education, has given rise to new ways of presenting educationally relevant information, more compact and convenient for quick perception and use. The narrative paradigm of thinking, which becomes a brake in the development of a digital society, is changing to an infographic (clip) paradigm, when the potential of both hemispheres of the brain is equally used.

2.5. Reducing the role of the academic component of the education content and increasing the role of practice-oriented education content [6]
Today, the obvious disadvantages of the modern education system are:

- lack of necessary practice;
- the educational program provides outdated knowledge;
- some of the studied subjects don’t relate to the future profession.

These disadvantages are eliminated through practice-oriented training, which is considered as the process of mastering the educational program by students in order to form their professional competence by performing real practical tasks.
2.6. Horizontal (interprofessional) and vertical (inter-level) convergence of educational programs
In the broad sense, a convergent activity can be defined as any activity aimed at interpenetration and mutual influence of different subject areas. Due to the implementation of horizontal convergence, it becomes possible to create an educational environment where students perceive the world as a whole, and not as a list of individual disciplines being studied.

Due to vertical (inter-level) convergence, the boundaries between General, professional, higher and additional education are blurred.

2.7. Growing number of educational platforms and requirements for it [7]
Among the most well-known global educational platforms may be mentioned such as massiveopenonlinecourses (MOOCs) [8], which are based on the system "one teacher — many students". There are successful examples of organizing mobile learning based on an online platforms: EdX, Coursera, Udemy. The EdX project [9] has created open source code for creating different online platforms, and even platforms that span entire countries. Nevertheless, sites dedicated to collaborative knowledge formation, such as Wikipedia, open collections of scientific papers such as arXiv, Plos, Academia, and professional forums such as StackOverflow and HabraHabr, are playing an increasingly important role for lifelong learning.

2.8. The emergence of platforms that implement the activity paradigm of education
Today, prospective technologies of the activity type are becoming widespread – a tool that allow to build an educational space in such a way that it effectively develops the abilities of students. The new activity-based paradigm of education implements such productive technologies as problem-based learning; research activities; project activities; group work; health-saving technologies; information technologies, etc.

The range of educational platforms that implement the activity paradigm, due to its specificity, is quite limited today. Mass online course u:Lab combines an online course on the EdX platform with self-organizing study groups that study offline. A similar approach suggests using Bridgedale360, an online educational space aimed at transferring sustainable lifestyle competencies [10]. It is available in seven European languages. In addition, the EU is considering several new global educational projects based on applications from the Erasmus + program [11].

Of course, in their current state, online platforms are still far from perfect, and in order to take a broader market sector, global online education platforms will have to solve several serious problems [12]:
- increasing the level of trust from the educational services market and the existing educational system;
- establishing criteria for determining the quality of courses;
- creating technologies for identifying students in an online environment [13];
- formation and management of personal educational trajectories;
- increasing the innovation of online education;
- increasing the motivation of students.

Speaking about the prospects for the development of digital education, it should be noted that the digital transformation of education is based primarily on prospective digital technologies that allow to implement a new paradigm of thinking and convergent approach in educational activities. Progress in online learning and the widespread use of high-performance telecommunications technologies in 4G and 5G formats are leading to the emergence of intelligent learning systems that will help students master knowledge, as well as interact in online communities.

The areas of digital education development include the following [3], [14]:
- using artificial intelligence;
- implementation of augmented and virtual reality technologies in the educational process, which allow to design digital and screen multidimensional models of objects;
• using digital double, digital footprint, and Big Data technologies that allow creating a system for personalized tracking of learning effectiveness and student development dynamics;
• using chatbot technology, which is used to provide interactive communication with students during distance learning;
• using electronic identification and authentication technology (face recognition, voice recognition), which can be used to verify students with remote knowledge control;
• using blockchain technologies that are suitable for organizing synchronous and asynchronous interaction between teachers and students in the digital educational environment of an educational institution.

The World Bank attracts attention to common problems faced by countries, including the Russian Federation, in the transition to a distant education system, and also identifies challenges for all affected groups – students, teachers, parents and decision-makers [15].

1. At the moment, there are very few educational systems that have good technical support for a quick transition to distance learning. Success is more likely in countries where distance education was widely used before the pandemic.

2. The transition to distance learning requires a large initial material cost, which, however, quickly pays off. Of course, it is important to ensure infrastructure capacity. But a much bigger challenge is to support teachers; provide high-quality and relevant digital learning materials; develop students’ digital skills to effectively use technology for learning purposes; and implement assistive data and information management systems [16].

3. The transition to distance learning raises concerns about social stratification. In practice, online learning disproportionately benefits students who are initially more advantaged (for example, when stratified along the rich-poor line; those who live in cities – those who live in rural areas; those with good academic performance – those with bad academic performance) [17].

4. When switching to distance learning, keep in mind that students will initially show weaker results. This is due to a lack of experience in interacting with learning tools and processes, and a lack of favorable conditions for online learning at home. After a while, both students and teachers will face the challenge of lack of motivation.

5. Educational institutions will have to choose which subjects to teach online, and which ones to leave for students to master independently. Some subjects, school and student events will be difficult to transfer to an online environment.

6. Only some teachers will be able to make a quick and effective transition to an online learning model, since the processes of teaching remotely and in the classroom differ significantly from each other. In this regard, teachers will need support and additional training.

7. Most parents are ill-prepared to provide effective support for their children. Especially in cases where they themselves don’t have sufficient technical skills or there are several children and one computer in the family. Thus, it becomes obvious that despite the program "Digital economy of the Russian Federation" adopted by the Government of the Russian Federation [16], our country was not ready to switch to distance learning [18], [19]. This is due to the fact that the country currently does not have the opportunity to fully organize the educational process outside the format of the classroom system in its usual sense with the full-time presence of students in the classroom.

3. Conclusions
Thus, the essence of the digital transformation of education is to achieve the necessary educational results at a lower cost and move towards the personalization of the educational process throughout life based on the use of digital technologies [14]. Support for existing positive trends in the development of education based on digital technologies is necessary to increase the level of education of the population and ensure continuity of knowledge throughout life [20].

In the conditions of active inclusion of most of the participants of educational relations in the educational process using distance educational technologies are important technical characteristics of the equipment used by the participants, and its throughput and reliability of communication channels.
The volume of transmitted information is of great importance. As shown by practical experience at the beginning of April 2020 [18], [19], the characteristics of the equipment that hosts information resources and the amount of information transmitted are critically vulnerable links in the process of digital transformation of education at the moment. To ensure continuous and universal education, each country (a group of countries) needs to deploy a national (cluster) e-learning platform and ensure free access to it for all students.

4. References
[1] Vasilieva E V, Dmitriev V Ya, Zholdasov V V and Pilyavsky V P 2015 Transformation of educational services in the knowledge economy Vestnik of the National Academy of tourism 2 (32) pp 66-68
[2] Pilyavsky V P, Dmitriev V Ya and Klimin A I 2016 The role of educational services in the formation of intellectual capital The St. Petersburg economic journal 2 pp 15-22
[3] Blinov V I, Dulinov M V, Yesenina E Yu and Sergeev I S 2019 Project of the didactic concept of digital professional education and training Publishing House “Pero” pp 72
[4] Pilyavsky V P Management of motivation to study for students with a low level of academic independence. Certificate of Deposit of an object of intellectual property in “National Register of intellectual property” 758-776-48 Available at: https://ipchain.ru/network/sight/object/?id=59913084e830e5526bb54d40d6d48b02e582ae66da523e53488a0e4663c6b299&channel=prom (accessed: 19.04.2020)
[5] Alexandrova A A and Ignatieva T A 2015 Features of development of the information services market in Russia Issues of modern economy: theoretical and practical aspects (collection of scientific papers of the Int. scientific and practical Conf.) pp 57-61
[6] Dmitriev V Ya, Pilyavsky V P and Rozhkov N N 2011 Professional recognition as a tool for evaluating the quality of educational services Vestnik of the National Academy of tourism 4 (20) pp 96-100
[7] Krasovsky I N, Pilyavsky P V and Ignatieva T A 2019 Prospects for the development of online education in the market of educational services Strategies and tools for managing the economy: sectoral and regional aspects (materials of the VIII Int. Conf. scientific-practical Conf. May 23, 2019) ed V L Vasilenok (SPb: ITMO University)
[8] MOOC: Higher education is free for everyone. Available at: https://www.hotcourses.ru/study-abroad-info/subject-guides/mooc-free-education-for-everyone/ (accessed: 12.04.2020)
[9] Project Management Life Cycle. Available at https://www.edx.org/course/project-management-life-cycle-rtix-pm9001x-0 (accessed: 13.04.2020)
[10] TOT RIO Facilitate transformative learning environments 19-23 April 2019. Leading provider of Education for Sustainable Development. Available at: https://www.gaiaeducation.org/ (accessed: 13.04.2020)
[11] Youth Led Societal Innovation for Resilience (ySI4R). AKA Bridgedale360. Available at: https://ecovillage.org/youth-led-societal-innovation-resilience-ysi4r/ (accessed: 23.04.2020)
[12] Alexandrova A A and Ignatieva T A 2017 Problematic issues in the sphere of education and its role in the development of the economy Success of modern science and education vol 2 1
[13] New Research Shows Free Online Courses Didn't Grow As Expected. nprEd. April 11, 2015. Available at: https://www.npr.org/sections/ed/2015/04/11/397295495/the-future-of-free-online-courses-new-research-from-mit-and-harvard (accessed: 17.04.2020)
[14] Uvarov A Yu, Gable E, Dvoretskaya I V and others 2019 The challenges and opportunities of the digital transformation of education ed A Yu Uvarov and I D Frumin (Moscow: Publishing house of the Higher school of Economics) p 342
[15] Remote Learning and COVID-19. Available at: http://documents.worldbank.org/curated/en/266811584657843186/pdf/Rapid-Response-BriefingNote-Remote-Learning-and-COVID-19-Outbreak.pdf (accessed: 12.04.2020)
[16] Government Order of the Russian Federation of 28.07.2017 N 1632-p <on approval of the
[17] Krupenya A P and Pilyavsky V P 2009 The Genesis of scientific thought in the context of the noospheric paradigm. *Journal “Region: Politics. Economy. Sociology”* 1-2 pp 125-126

[18] The Ministry of Education explained why distance learning systems do not survive. Available at: https://www.1obl.ru/news/o-lyudyakh/v-minobre-obyasnilo-pochemu-ne-vyderzhivayutsistem-distantsionnogo-obucheniya/?utm_source=yxnews&utm_medium=desktop&utm_referrer=https%3A%2F%2Fyandex.ru%2Fnews (accessed: 21.04.2020)

[19] The collapse of online services occurred on the first day of distance learning in Voronezh. Available at: https://vestivrn.ru/news/2020/04/06/voronezhcy-pozhalovalis-na-massovyi-sboi-v-rabote-servisov-onlain-obucheniya/ (accessed: 23.04.2020)

[20] Pilyavsky V P, Krasovsky I N, Shendrikova S P and Nazrieva M V 2020 Mechanism of the Innovation Development in the University *Advances in Economics, Business and Management Research* vol 128 *Int. Scientific Conf. "Far East Con"* (ISCFEC 2020) pp 2132 - 40