

VI International Forum on Teacher Education

# Theoretical and Practical Issues of Education as Part of a Digitalization Process

Gasangusein I. Ibragimov\* (a), Aliya A. Kalimullina (b)

(a), (b) Kazan Federal University, 420008, Kazan (Russia), 18 Kremlyovskaya street,  
guseinibragimov@yandex.ru

---

## Abstract

The topic is relevant due to the existing contradiction between the widespread implementation of digital technologies into the educational process at all levels and stages, on the one hand, and the insufficient consideration of subsequent risks for educators and students, on the other hand. This statement raises the following question: what problems does digitalization cause for the learning process?

The aim is to define and systemize the major problems (risks) for the system of higher education that occur in the context of digitalization.

The research methods are empirical (polling, observation, interview) and theoretical (analysis, synthesis, generalization and systematization).

The study shows that digitalization in education, information accessibility and the growing role of students' independent cognitive activity raise a number of new questions. All of them are oriented at formation and development of students' abilities and their preparedness to cognitive, communicative, value-based activity and continuous self-development. In this regard, digitalization requires revision of didactic foundations of the learning process.

Means of online education provide a wide range of opportunities to strengthen the role of the learning process as part of the formal education system. However, these new forms cannot replace the "live" interaction between the participants of the learning process in the basic education system. Nevertheless online forms prevail in the system of extended learning, as well as the system of informal education.

The findings of the investigation are of practical interest for education experts, college professors, school teachers and allow improving the learning process in the context of its digitalization.

*Keywords:* digitalization of education, learning process, risks for the learning process in the context of digitalization, digitalization, e-learning, digital transformation of education.

© 2020 Gasangusein I. Ibragimov, Aliya A. Kalimullina

This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Published by Kazan federal university and peer-reviewed under responsibility of IFTE-2020 (VI International Forum on Teacher Education)

---

\* Corresponding author. E-mail: guseinibragimov@yandex.ru

## **Introduction**

Digitalization in education is a process caused by formation and development of digital economy, which can be defined as “a sector where digital data is a key production factor in all fields of social and economic activity that helps to increase the competitive advantage of the country, improve the quality of life, ensure the economic growth and national sovereignty” (Government executive order, 2017). The educational program “Digital economy” includes a course in “Human resources and education” aimed to training of employees who master digital technologies and able to meet the requirements of the modern era.

The formation and development of digital economy requires the closest attention to the system of education that is able to ensure the sustainable transition to the digital era through development and implementation of appropriate educational and research programs, integration of digital technologies into the learning process, development of individual learning trajectories and ways to trace the results, virtual and augmented reality.

The digital educational environment is actively developing at all levels of the modern education system: new educational sources and platforms, e-books are offered, the number of mass educational courses are growing, distance learning is becoming widespread, etc. As the part of this modernization process, the traditional models of learning are being transformed into e-learning models: universities and schools are becoming e-universities and e-schools. In the developed countries more than 90% of college students use e-learning options, and more than 80% of institutions of higher education provide services in a distance learning mode (Sergeev, Zhigalov, & Balandina).

The issue under investigation is substantiated by the contradiction between the widespread implementation of digital technologies at all levels and stages, on the one hand, and the insufficient information on the risks that occur in the learning process, on the other hand. Hence, the problem can be defined as it follows: it is required to identify the “blind spots” of the learning process in terms of digitalization.

## **Purpose and objectives of the study**

Purpose of the study is to identify and systematize the risks of the learning process at higher school as part of digitalization. To achieve the aim, we have to accomplish the following objectives: 1) to reveal the essence and the major characteristics of digitalization in education; 2) to identify and systemize the risks of the learning process at higher school as part of digitalization.

## **Literature review**

The rapid development of mobile and cloud technologies, as well as their popularity among the generation of digital natives mainstreamed a considerable number of investigations that convincingly prove that integration of mobile technologies into the learning process can transform it significantly. For example, it is noted that implementation of mobile technologies allows taking all individual characteristics of students into account and, accordingly, organization of autonomous learning (Kukulska-Hulme, 2010). In addition, they make students more flexible providing an opportunity to study out of the classroom at any time (Traxler, 2009); make it possible to diagnose the existing problems, create a mobile interactive learning environment and help to receive the feedback, break grounds for the new ways to present educational materials (as moblogs, coursecast and etc.) (Kumar, 2010); help to develop new formats of tasks with the use of augmented reality and geolocation applications (Driver, 2012).

However, digital technologies in the higher education system, along with enormous opportunities, pose corresponding risks. Hence, the study and systematization of those risks is one of the most relevant issues of the modern education science.

## **Methodology**

The research methods are empirical (polling, observation, interview) and theoretical (analysis, synthesis, generalization and systematization).

## **Results**

1. On the definitions of “digitalization in education”, “digital education” and “digital learning”.

The digital economy entering a new era is boosted by occurrence and implementation of the technologies resulted from the Fourth industrial revolution, such as artificial intelligence, Internet of things, blockchain neuro- and biotechnologies, additive manufacturing and multivariate data, virtual and augmented reality, etc. (Shvab & Devis, 2018). However, complete formation and development of digital economy requires both application of the most advanced technologies, and close attention to the issues related to the development of the value-oriented activity and all forms of social consciousness and, therefore the education system as one of the most important social technologies that ensures formation of the human capital assets – the most valuable assets for digital economy. The digital economy is in dire need of human resources able to actively apply and continuously improve information technologies (Danilyuk & Faktovich, 2019).

The global presence of digital technologies, as well as appearance and development of digital education lead to emergence of new terms that reveal the essence of digitalization as a process developing in education. At the same time some long-established definitions are being reconsidered. So far, we still have to clarify some of the definitions in education. In this regard, one of the objectives within the study is to identify and reveal the key features of “digitalization in education” and some other related concepts.

It should be noted that in the available sources we could not find a clear definition of “digitalization in education”, although there are a lot of publications in this field. We suggest that in order to disclose the concept of “digitalization in education” it is necessary to determine the content of the concept itself. So what does it mean?

Wiktionary interprets the concept of “digitalization” as “a transition from the analogue data transmission to the digital one; transformation of information into a digital form” (Academic Dictionaries and Encyclopedias). The data format is based on the digital presentation of data, which in contrast to the electronic one, represents data in a more accurate way, ensuring its free circulation, placement, processing, appliance for networks. The digital presentation is based on digital technologies. Thereby we come to the conclusion that digitalization in education is a transition to the widely applied digital technologies. It can appear in various forms: digital educational materials (e-books, lectures, individual tasks, etc.); interaction between the members of the educational environment (webinars, forums, chats, etc.); new types of educational means (online courses, quests, digital problem books. Digital technologies in a modern world are not only a tool, but also a type of environment that opens new horizons: a chance to study anywhere at any time, lifelong learning opportunities, individual learning trajectories, a possibility to change the role from the electronic sources’ user to the electronic sources developer. The “digitalization in education” concept is related to the use of Internet and mobile communication.

In the context of digitalization, the effectiveness of higher education to a large extent depends on how good managers and educators at digital technologies are, how quickly they analyze, process the required information and transfer it to students (Vayndorf-Sysoeva, 2019; Kondakov, 2018).

Along with the concept of digitalization in education some other concepts are widely used, such as: digital education, digital learning, the system of digital education, the digital system of education. Moreover, they are often considered as synonyms, which is incorrect. Let us consider more details.

When considering the concept of “digital education”, the element “education” must be emphasized. According to the law “On education in the Russian Federation” “education should be understood as a single process aimed at fostering and training; which is a socially significant good carried out for the benefits of

an individual, a family, society in a whole, values, experience and competences for intellectual, spiritual, moral, creative, physical and (or) professional development and satisfaction of educational needs and interests” (Government of the Russian Federation, 2012).

Firstly, since education is a single process that unites fostering and training, digital education should be considered as a single process of digital fostering and digital training. But are we able to use the concept of “digital fostering”? We define the term of “fostering” as “a process aimed at development of an individual within the system of personal values, motives and aspirations”, which means that fostering requires live communication and interaction with other individuals, as only an individual can foster another individual. And in the context of digitalization a student, on the contrary, uses digital and mobile devices to get information in its different forms (texts, images, photos, etc.). The insufficient amount of personal interaction with teachers, other students, managers, etc. eliminates the fostering function of education. As Verbitskiy (2019) once mentioned “computers cannot foster students”, therefore the concept of “digital education” is inappropriate.

Secondly, education is not only a single process aimed at fostering and training, but the result of the process as well; for example, student’s level of knowledge and his qualification as an indicator of student’s preparedness to work in a certain field. In this context we define those fields as economic, medical, engineering, educational, mathematical field and etc. Keeping the idea in mind, we can conclude that digital education is a definition of a certain professional field that deals with design and development of digital technologies.

As we can see, digitalization in education and digital education are not the same thing. These two definitions are interconnected, but definitely have different meanings.

Thirdly, we should define the concept of “digitalization in the system of education” as well. Here we proceed from the definition of the education system as a complex of educational programs, educational institutions and control bodies. So digitalization in the education system is application of digital technologies at all stages of the system (Government of the Russian Federation, 2012). The more we apply digital technologies, the higher digitalization ratio within the system is. In this case the key function is still provided by a human being (a manager or a teacher); it is related to creation of new content under changing conditions. Digitalization in the system of education includes all information sources, such as educational portals, websites, telecommunications (networking and mobile environments, mass media, television, telebridges, hosting, mail services, etc.), and the management system.

and finally, let us consider the definition of “digital learning”. One of the articles of the law “On education in the Russian Federation” covers organization of educational programs using e-learning and distant learning opportunities. E-learning is defined as “organization of educational activity using databases, information technologies, technical devices, information and telecommunication networks” (Government of the Russian Federation, 2012). As we can see, we can identify three elements of e-learning: 1. databases as a source of information; 2. information processing and application of information technologies; 3. technical devices and networks that help to transmit information and ensure interaction between students and teachers.

In our opinion, if we substitute “information technologies” with “digital technologies” in the definition given above, we get an appropriate definition for “digital learning”. The major components of digital learning are electronic information and educational environment, digital learning process, digital content, digital interaction and digital sources of information (Vayndorf-Sysoeva, 2019).

2. Blind spots (risks) of the learning process in the context of digitalization. In modern schools digital technologies are widely spread at all levels and stages. At higher education institutions, namely federal universities and research institutes, where major resources, such as human, financial, material and technical ones are concentrated, digitalization is particularly intensive. The process of digitalization covers all levels and stages: management and control, education and training, fostering, methodology, etc. In this regard the following hypothesis is becoming popular: learning at all levels will become an online process, so there will not be any need to spend money to maintain buildings; the number of professors will dramatically decrease as most all them will change their roles to tutors; students will be able to combine work and distance learning, etc.

The idea is mainly supported by education economists, futurologists, businessmen who promote online courses. As for teachers and students, their opinions differ, but the dominating idea is based on combination of offline and online learning. The first-year master students of the department of teacher education at the Institute of psychology and education of Kazan federal university, took part in our survey (in 2017-2019, 348 respondents). Only 10% of respondents expressed their readiness to switch to the online form of studies. Other 90% of respondents stood for a combination of online and offline forms of studies in an approximate ratio of 60% of offline studies versus 40% of online classes. The respondents mentioned that they would like to increase the share of their independent and research work both at classrooms and as a part of their online activity.

As for college professors, 90-95 % of them (75-80% among young professors with less than 10 years of experience) support the idea that offline studies should remain the major form of studies (both at intermediate and higher levels). At the same time they consider that digital technologies can be applied at all stages of learning – starting from designing of new educational programs to their control and assessment functions.

The active introduction of digital technologies in education along with the enormous opportunities (which have not been studied sufficiently yet) for teaching and learning, entails considerable risks. Identification and systematization of those risks can contribute to more efficient use of digitalization and the higher quality of education. So what are the risks?

The risks caused by digitalization can be identified and analyzed through various approaches. We systemize them according to the basic components of the learning process (objectives, aims, content, forms, methods, means, control and assessment), since all the components have an impact on the learning process and influence its quality.

Loss of the knowledge value, lack of motivation. The key source in terms of digital economy is information, and, accordingly, sustainable motivation for effective information activity is one of the required professional competencies that directly affect the qualitative indicators of work. Therefore, formation and development of such sustainable motivation to learn something new and continue self-learning are one of the essential objectives of the teacher education system. Thus, in reality master students often misunderstand the idea of knowledge value and, subsequently, lose interest to gain knowledge. As the survey among master students of the department of teacher education demonstrates, only 40% of students admit that motivation is dominant. The rest 60% of students are motivated by external factors, such as: to get the master's degree, to find a job, to pass an exam, to receive regular student's payment, to avoid conflicts with parents, etc.

The reasons are social and economic: the present system of education was established in order to serve the requirements of the industrial economy, where motivation for knowledge is not that important. We can give a number of examples of those who were low-grade students, but became successful entrepreneurs, company managers, politicians, and high-grade students who got diplomas with honors but didn't get any prosperity in social and professional life.

Within the process of digitalization external motivation (to get a good mark, to pass a test, to fulfill certain requirements) should be substituted by internal motivation, when students are eager to get new knowledge and experience to satisfy their inner need for self-development in order to get new social and professional

competencies. At the same time, it should be noted that motivation for lifelong learning should become an integral part of an individual and that motivates for effective and productive activity.

The contradiction between the obvious need to have sustainable motivation for productive information activity and the insufficient level of its formation among the majority of graduate students substantiate the need for search of new teaching methods and techniques that can help student to get such motivation for self-development.

Goal-setting. There is a contradiction between the obvious demand of the digital economy for a creative individual who is able to creative new information units and capitalize his inner wealth, on the one hand, and the insufficient attention that higher education system pays to formation of such creativity as one of the major personal characteristics of an individual, on the other hand. Higher institutions still consider students as an element of the knowledge-oriented system, where a person serves as a performer, not a creator.

Another conclusion related to goal-setting: we can define our modern reality as liquid, variability, uncertainty (Bauman, 2013), so the key aim of education and training is to prepare students for this uncertain world. Accordingly, the new functions of education and training are: first of all, to teach students how to adapt to uncertainty and the lack of objective criteria to assess the validity of information; also to develop a number of personal qualities an individual should have to be able to adapt fast and easily to this “after post-modernity” era. The main educational goals set in internationally approved documents are: to prepare students for an ever-changing labor market and help them establish a direct connection between the skills developed at college and skills required by employers; to help them adapt to living in complex democratic societies; to get competencies related to innovations and creativity; to develop abilities for collaborative in life and at work; to make them more flexible – professionally, geographically, emotionally, intellectually; to increase their motivation for personal self-development; to help them develop their ability of lifelong learning, gaining knowledge and to become prosperous in life (Kolesnikova, 2019).

Content unification and simplification. One of the key trends in education is unification of educational programs due to the fact that students use online sources so they tend to choose the ones developed by leading experts in a certain field. It can lead to another increasing risk – the loss of pluralism in approaches to the content designing. Meanwhile, students have to be able to develop different approaches to the same phenomenon, it is important given the increasing differentiation of knowledge demanded in various fields. Rakitov (2018) suggests that “formalization of professional knowledge and reduction of its variety may have a negative impact on college graduates in the future”.



Kolesnikova (2019) focuses her attention on the idea that digitalization in formal general and higher education is accompanied by atomization, so called “granulation” of educational courses, on the one hand, and the amateurish approach to creation and teaching of new courses, on the other hand, when quality of materials, their value and meaning content recede into the background; social networks, games, anime, websites and applications substitute traditional materials that leads to the superficial contact of an individual with information, its simplification and primitivization. There is a shift in the way we cognize the world – from theoretical understanding to a spontaneous act, normally not well-thought ... and in this stream of chaotic interaction the value of scientific facts and objective knowledge gradually lose its significance (Kolesnikova, 2019).

The study (Gabdulkhakov & Galimova, 2014) showed that electronic educational sources are less effective than traditional teaching methods. Therefore, it is emphasized that “efforts made by universities to transfer as many educational courses as possible into electronic format is unjustified”.

The risk of students’ alienation. Digitalization promotes simplified forms and methods that correspond to the market mechanisms of supply and demand, that increases that risk that students will lose their role in a learning process as a teaching process is replaced by provision of services, development is replaced by consumption, the mental effort is replaced by satisfaction (Ibragimov, 2015; Ibragimov, & Ibragimova, 2014).

In addition, many education experts suggest that in the new educational environment the didactic side of the learning process, as well as its methodic and methodological grounds remain undeveloped. Due to this fact there is a direct transfer of traditional didactic foundations to the digital environment, where there are new types of interaction between participants in the educational process both among themselves and in the "man-machine" system.

It is also important to note that online learning requires not only a high level of motivation, but also self-development and self-learning. Meanwhile, studies show that not every individual is able to study independently. According to some reports, only 5-10% of students who study online, complete their studies successfully (Kolesnikova, 2019).

Digital imitation of traditional courses leads to the following problem - the transfer of implicit knowledge, which, in contrast to explicit knowledge, is inseparable from an individual, but can be transferred to another individual in the process of joint activity through a personal example. The student adopts approaches to solving problems from his teacher, as well as the culture of working with information, the art of generating ideas, world vision, etc. To make it possible face-to-face interaction with students is required. An effective

solution to the problems of socialization and transfer of implicit knowledge is impossible when the learning process in an online process.

Lowering fostering and developing function of the learning process. Online learning is not able to foster students as it involves personal communication and interaction, emotional and value-oriented attitude towards a moral choice, a possibility to live through it and experience it based on knowledge and moral standards in each society. Cultivation of morality cannot be reduced to assimilation of information about what is considered good or bad in the society. An individual can know the moral norms but still be immoral, bad-mannered, become a bribe taker and a criminal (Verbitskiy, 2019). In addition, online learning does not have the same sources to have an impact on its audience: students cannot see how we look like, our gestures, poses, how we move, cannot catch the intonation patters; a teacher does not have an opportunity to ask a direct question or express his opinion. The knowledge student gain from their monitors is senseless, it is dead, no matter how good the teacher is. We are not able to understand the real world if we spread the dead knowledge. Therefore, the lack of live interaction reduces educational capabilities of the learning process (Robotova, 2019).

As for the developmental function of education, a large number of studies prove that digital technologies in education can lead to weakening mental abilities (“digital dementia”). It happens because modern technologies let people find information very fast without the need to deeply understand the text, mental efforts are no longer required, people are getting used to get answers fast and lose their ability to perceive large pieces of text. Modern students have to reread texts for several times in order to understand its meaning. Experts point out to the increasing risk of speech degradation, and subsequently, mental degradation, as speech and mental activity are interdependent; modern students do not have to speak but press a key on their computer. If a student does not have opportunities to develop his communication skills as part of live interaction, his mental abilities will not be developed either (Verbitskiy, 2019).

## **Discussions**

The process of learning requires combination of those forms and methods that includes personal interaction of students with professors as well as virtual forms like social networks. Such a combination can become a general didactic principle aimed at finding a reasonable ratio of digital technologies and live communication.

## Conclusion

Digitalization in education, as well as information accessibility and the growing role of students' independent cognitive activity raise a number of new questions (why to study? what to study? how to study? how to control the process and results of learning? how to choose the content of education aimed at development of certain competencies? and etc.). All of them are oriented at formation and development of students' abilities and their preparedness to cognitive, communicative, value-based activity and continuous self-development.

Online courses and other means of online education provide a wide range of opportunities to strengthen the role of the learning process as part of the formal education system. However, these new forms cannot replace the "live" interaction between the participants of the learning process, which is a major part of the basic education system (both general and vocational). Nevertheless online forms prevail in the system of extended learning (both general and vocational), as well as the system of informal education.

## References

- Academic Dictionaries and Encyclopedias. (n.d.) Digitalization. In Dictionary of Academic Dictionaries and Encyclopedias. Retrieved from <https://official.academic.ru/29422/>
- Bauman, Z. (2013). *Liquid modernity*. New York: John Wiley & Sons.
- Danilyuk, A. Y., & Faktovich, A. A. (2019). *Digital general education*. Moscow: "Avtorskaya masterskaya" publishing house.
- Driver, P. (2012). Pervasive games and mobile technologies for embodied language learning. *International Journal of Computer-Assisted Language Learning and Teaching (IJCALLT)*, 2(4), 50-63.
- Executive order on establishment of the program "Digital economy of the Russian Federation № 1632 (2017). Retrieved from [http://www.consultant.ru/document/cons\\_doc\\_LAW\\_221756/](http://www.consultant.ru/document/cons_doc_LAW_221756/)
- Gabdulkhakov, V. F., & Galimova, E. G. (2014). Digital education and gamification at universities. *Education and self-development*, 4, 42.
- Government of the Russian Federation. (2012). *A law 'On Education in the Russian Federation'* (in Russian). Retrieved from <http://zakon-ob-obrazovanii.ru/>

- Ibragimov, G. I. (2015). On definitions of “electronic education”, “electronic didactics” and “e-learning”. *Alma mater*, 5, 38-41.
- Ibragimov, G. I., & Ibragimova, E. M. (2014). Peculiarities of the learning process at universities. *Innovations in education*, 12, 46-61.
- Kolesnikova, I. A. (2019). Post-pedagogical syndrome in the post-modern era. *Higher education in Russia*, (8-9), 67-83.
- Kondakov, A. M. (2018). *Digital education: the matrix of opportunities*. [PowerPoint slides]. Retrieved from <http://ito2018.bytic.ru/uploads/materials/2.pdf>
- Kukulska-Hulme, A. (2010). *Mobile learning for quality education and social inclusion*. Moscow: UNESCO IITI.
- Kumar, S. (2010). Blackboards to Blackberries: Mobile Learning Buzzes Across Schools and Universities. *E-learning Lms, online education*, 220.
- Rakitov, A. I. (2018). Higher education and artificial intelligence: euphoria and alarmism. *Higher education in Russia*, 6, 41-49.
- Robotova, A. S. (2019). Aesthetics of an online course in humanities. *Higher education in Russia*, 10, 152-156.
- Sergeev, A. G., Zhigalov, I. E., & Balandina, V. V. (2012). *Introduction to e-Learning*. Vladimir: Publishing House of VLU.
- Shvab, K., & Devis, N. (2018). *Technologies of the Fourth Industrial Revolution*. Moscow: Eksmo.
- Traxler, J. (2009). Learning in a Mobile Age. *International Journal of Mobile and Blended Learning*, 1(1), 1-12.
- Vayndorf-Sysoeva, M. E. (2019). *Multi-level training of teachers in a digital world* (Doctoral Dissertation). Moscow: Moscow State Pedagogical State University.
- Verbitskiy, A. A. (2019). Digital learning: problems, risks and opportunities. *Electronic scientific journal "Homo Cyberus"*, 1(6). Retrieved from [http://journal.homocyberus.ru/Verbitskiy\\_AA\\_1\\_2019](http://journal.homocyberus.ru/Verbitskiy_AA_1_2019)