

# **Cognitive Risks of Education Digitalization: Crisis Transformation of Student Consciousness and the Problem of Forming Safe Communicative-Educational Environment**

Khrapov S.A.\* Baeva L.V.

*Astrakhan State University, Astrakhan, Russia*

*\*Corresponding author. Email: khrapov.s.a.aspu@gmail.com*

## **ABSTRACT**

This article will reflect the results of the complex problem of education digitalization study, its impact on the cognitive sphere of students and the definition of cognitive destructive consequences - crisis trends in the transformation of consciousness. As the main threat that determines cognitive risks and destructive consequences, we consider the absolutization of the digital approach to transforming the institution of education, without taking into account the specifics of the personality-cognitive and didactic-methodological aspects of the educational space. The study is aimed at identifying cognitive risks and crisis trends in students' consciousness in order to further take them into account when developing comprehensive measures to reduce this risk potential and creating a safe communication and educational environment. The structure of the article is sequentially revealed in the introduction, devoted to the general review of the social context of the digitalization of education, research methodology, results and conclusion.

**Keywords:** *cognitive risks, threats, digitalization of education, crisis trends, consciousness, students, digital forms of learning*

## **1. INTRODUCTION**

The modern era of the formation of technogenic civilization covers all the key modes of human being and society.

December 2016, President V.V. Putin, speaking with a message to the Federal Assembly of the Russian Federation, proposed launching a systematic program for economic development of a new technological generation [10]. In July 2017, the large-scale infrastructure project "Digital Economy of the Russian Federation" was included in the list of the country's strategic development for the period until 2025. The Institute of Education, traditionally the flagship of all social innovations, was one of the first to undergo large-scale technologicalization and its main form - digitalization, which is not accidental. The modern education system is considered as the leading technological tool for the formation of a digital economy, a new civilizational structure, since it not only performs the function of "training personnel", but is, in fact, the main institution of human socialization, which is also reflected in the digitalization of education. So Academician of RAS and RAE A.L. Semenov proposes to formulate approaches to the formation of school education, taking into account the need for radical changes in the role of the school, the content of education and the directions of human development with a consciousness expanded by

the digital world [13]. Indeed, today, when such traditional institutions of socialization as family, religion, culture are in crisis, the education system acts as the basic guide of a person on the way from childhood to adulthood, which, of course, imposes a huge responsibility on it, and at the same time, gives it special value for anthropological and social development. That is why there is a huge amount of research in foreign and domestic science in the field of digitalization of the educational space, which, in our opinion, should be considered as an integral phenomenon, ontologically centered on institutional and psychological-pedagogical contexts, determining the specifics of didactic and subject-substantive conditions and technologies of the educational process .

A philosophical analysis of the numerous scientific literature on this topic shows the presence of two parallel research trends: vivid supporters of the absolutization of the digital approach to education, who are convinced that development is impossible without it, and their opponents who vehemently criticize such "technological innovations", who uphold the values and methods of classical education . We believe that clarification and a certain rapprochement of these extreme positions will be possible if, nevertheless, the focus of the research will be on the main subject of the educational space - the student, with the whole complex of age, psychophysiological, personal and cognitive characteristics. In the study of such complex multivariate processes of the educational

space digitalization and their impact on the consciousness of students, we will try to avoid extreme, unambiguous assessments and, if possible, provide the most complete range of possible risks and their consequences, with a view to taking them into account in the further development of a safe communication and educational system media. The role of the cognitive characteristics of students is also noted by some supporters of the educational space digitalization. For example, the president of the Skolkovo Institute of Science and Technology A. Kuleshov in his report at the Moscow International Forum of Innovative Development "Digital Economy. Challenges of global transformation" (2019) stated that: Skoltech is implementing personalized team work today, when, on the one hand, a person works in the eye-to-eye mode, and on the other, as part of a team, he works on a common project. ... Online learning often looks like a surrogate. ... A new direction needs to be actively developed, but classical education will not go anywhere, it should be supported" [6]. In this statement, the idea of recognizing the importance of the combined forms of learning "digital" and "real" is encouraging, which seems to us the most promising approach to the digitalization strategy of the educational space. Of course, in the comprehension and resolution of these issues, a major role is played by the motivation of actors in the digitalization of education. We are sure that the goals of digitalization of education were nevertheless more related to optimizing resources and adapting the institution of education to the new economic structure, which is why we offer the most objective assessment of the risks of the educational space digitalization and the crisis transformation of students' consciousness, in particular.

## 2. METHODOLOGY OF THE STUDY

The issues of the formation of anthropogenic civilization and its influence on the development of culture, society and human consciousness began to worry scientists back in the 60s of the 20th century [2, 9]. Representatives of the concepts of a post-industrial or information society: A. Toffler, P. Drucker, M. Zeleny, M. McLuhan, M. Castells, J. Naisbit, J. Stiglitz, U. Habermas, N. Luman, W. Beck, R. Bart, J. Baudrillard, P. Bourdieu became classics in this area. The study of the information transformation of society and human, the creation of artificial intelligence from the position of a cognitive approach has been studied since the 50s. (A. Turing, J. McCarthy, D. Dennett, N. Block, C. Colby, J. Searle, R. French, U. Genova, S. Watt, A. Sloman, S. Bringsjord, J. Lucas, R. Penrose, S. Harnad, P. Schweizer, J. Pollock, D. Chalmers, V.K. Finn et al., 1950-2017)

Studies of the Institute of Philosophy of the Russian Academy of Sciences should be noted here (V.S. Stepin, V.I. Arshinov, V.G. Budanov, B.G. Yudin, V.G., Fedotova, I.Yu. Alekseeva and others); Scientific Council of the Russian Academy of Sciences on the methodology of artificial intelligence (academician S.N. Vasiliev, academician V.A. Lectorskiy, D.I. Dubrovsky); Institute of

Sociology of the Russian Academy of Sciences, where research and monitoring of the impact of informatization on social processes are carried out; and also Tomsk State University, which explores the phenomenon of "high technology" and the development trends of high-tech society (I.V. Melik-Gaykazyan, E.A. Zhukov and others). The problems of informatization of education are actively studied by the staff of the Institute of Psychology of the Russian Academy of Sciences, the Institute of Psychology of the Russian Academy of Education. The activities of the scientific school "Informatization of Education" (Uvarov A.Yu., Vodopyan G.M., etc.) of Moscow City Pedagogical University are of high importance, as well as of the Institute of Educational Informatics of the Federal Research Center "Informatics and Management" of the Russian Academy of Sciences, which conducts fundamental, search and applied research and development in the field of education computer science, as defined by Academician A.P. Ershov. Under the direction of Academician A. L. Semenov since the 1980s works in educational informatics were carried out. Institute staff: Vardanyan V.A., Galkin V.O. Lange M.M., Yakovleva T.V. Uvarov A.Yu., conduct work in the field of theoretical informatics, cognitive science, teaching computer science, as well as computerization of education; learning in a digital educational environment.

As concerns directly the problem of assessing the impact of digital education on the abilities and skills of the student, at the moment, it is, to a greater extent, studied by foreign scientists. One of the first large-scale works in this area: the monograph by Jerome Johnston and Linda Toms Barker "Assessing the Impact of Technology in Teaching and Learning" Institute for Social Research, University of Michigan, 2002 [8]. It presented innovative results of the use of online technologies in training for that time and an assessment of their impact in various fields. The positive impact of digital education on the development of students' abilities is reflected in an article by Ragad M. Tawafak, Awanis BT Romli «Assessing the Impact of Technology Learning and Assessment Method on Academic Performance: Review Paper» [15]; Gable, G., Sedera, D., & Chan, T. «Re-conceptualizing information system success: the IS-Impact Measurement Model» (2008) [7]. Authors note that the use of digital technologies in the variant of blended learning, including the use of video blogs, contribute to the improvement of learning outcomes. At the same time, a number of studies reveal a number of significant problems and risks in the application of digital learning. For example, the study of the negative effects of mobile learning by analyzing the cognitive load and student performance is presented in Hui-Chun Chu article "Potential Negative Effects of Mobile Learning on Students' Learning Achievement and Cognitive Load-A Format Assessment Perspective" [4].

Based on this historical and scientific context, the methodology of our study of the educational space digitalization cognitive risks will be based on the principles and theories of cognitive, psychological, pedagogical, structural, functional and socio-philosophical approaches. The concept of information security will play

a special role, in particular, the idea of I.M. Azhmukhamedova about the logical chain of risk implementation:

Source of threat => Risk (Threat + Vulnerability) => Implementation of a threat (attack, negative impact) =>Consequences (damage) [1].

In accordance with this scheme, we will successively consider the processes of cognitive risk formation in the context of the digitalization of the educational space and their destructive consequences - crisis trends in the transformation of students' consciousness.

### 3. RESEARCH RESULTS

Any change in the educational environment, starting with a change in the psychological and pedagogical climate, in connection with the change of teacher, and ending, for example, with such an important process as the introduction of specialized training, cardinaly affects the student's self-awareness, strategy and tactics of his education. The digitalization of education is such a large-scale project that it will inevitably lead to revolutionary changes not only in the pedagogical process, but also in the personality of the student, and will determine the formation of cognitive complexity or simplification. Particular concern is connected to the idea of digital education actors to eliminate the teacher's personality (or its minimal participation) from the real educational process, which undoubtedly poses a threat to the psychological (cognitive) safety of students, because it is known that the teacher's personality performs significant educational functions. So a well-known specialist in the field of psychological safety in education I. A. Baeva very accurately notes that "A teacher in a personality-oriented learning does not communicate with a student at the level of social roles, but at the level of personal interaction, uses his personality as a tool. Accordingly, the student does not just get knowledge, skills, but his personality is subjected to a deeper formative influence" [3,45]. The totality of digital education, alas, will deprive students of this opportunity. Based on this fact, it can be argued that the digitalization of education creates not only prospects, but also carries significant risks, including cognitive risks. In our opinion, cognitive risks should be understood as follows: - probabilities of cognitive security threats (i.e., stable homeostatic functioning of cognitive processes, anthropological identity and human existence), mediated by personal and psychophysiological vulnerabilities (traits, psychophysiological characteristics, cognitive, behavioral styles, potentially contributing to the successful implementation of these threats) and forming cognitive destructive consequences.

Consciousness, as you know, acts as an integral cognitive phenomenon, combining not only cognitive processes (thinking, memory, speech, attention), but also acting as a conductor in the affective sphere (feelings, emotions, imagination, intuition). It is also consciousness that builds the student's relationship with the environment. What happens to this structurally functional system if digital

(informational, virtual) conductors and communicators are "embedded" in the learning process? This is a very complex and large-scale question, which cannot be answered in one article. We will try to identify only some crisis changes in the student's consciousness, which may be in the process of its inclusion in the digital educational space.

The main risk group for the crisis transformation of consciousness under the influence of digitalization of education is a student of middle and high schools, first-year universities and colleges, since it is to this age group that digital education technologies are primarily targeted, which, in addition to obvious prospects, carry certain threats. Of course, the degree of realization of these threats to the students' consciousness depends not only on the institutional, organizational and methodological forms of digital education, but also on the level of vulnerability (predisposition) of the students themselves to them. In this sense, those students who do not have information about the risks of digital education (due to the fact that their teachers and parents do not have it) who do not have a sufficient level of will and critical thinking to independently search for others should be assigned to a special risk group forms and technologies of training (for example, they don't want to, or already psychophysiological cannot read the plain text for 45 minutes). Unfortunately, it is worth recognizing that this group can include a significant (if not large) part of students of this age due to the fact that socialization and learning strategies simply did not give them the opportunity to fully get acquainted with the forms and methods of classical education.

Potential sources of threats to students' consciousness include such a form of digital learning as the total use of vivid, emotionally rich visual material (videos, electronic presentations), which, for some reason today, is one of the most common "innovative" methods. Of course, initially the popularity of the use of visual material was determined by the FSES, where their use is indicated as mandatory, but then, most likely, the notorious "human" factor came into force. The general availability of such material on the Internet and the "significance" of this method in the modern educational space have led many classes to turn into watching videos, videos and electronic presentations. This form is interesting for students, it is much easier for a teacher to withdraw from the educational process, because it will be replaced by a "digital format". But here a lot of questions arise, not only about the subject-didactic justification (or not justification) of this form of training, but also about its cognitive consequences for the consciousness of students. It is well known that modern teenagers and young people spend a huge amount of time in front of the screens of laptops, smartphones, iPhones. Classes in schools, colleges, universities were actually the only forms in which real communication prevailed and verbal-logical thinking was actively involved. The transition of training sessions into video, the online format deprives students of this opportunity, contributes to the formation of such crisis forms as clip consciousness,

simplified perception (when the visual image dominates the perception and its understanding is devalued).

A possible threat to the consciousness of students is also the individualization of learning paths, when, instead of classical forms, distance (online) forms of education are offered. The student individually watches educational online videos, reads lecture material, performs tests, and relies on his own decision, which, according to the digitalization of education, should contribute to the development of independent thinking, leadership qualities, but the question arises of whose leader he will be if he is "One on one" with the educational information environment. Analyzing the psychological risks of digitalization of education, O.L. Panchenko, F.G. Mukhametzyanova, R.R. Khayrutdinov noted the following crisis trend in student consciousness: "The subject-subject space of interaction forms a certain level of psychological comfort for the student. The digitalization of education violates the unity of this continuum through the inclusion of a new link in the process - information and communication tools. ... In this sense, the orientation of subjectivity is also transformed - it is mediated by means of communication. Consequently, when a new intermediary appears, the risk is the possibility of upsetting, dispersing the subjectivity of the student (teacher) in the process of conveying the meaning of the message ... there is a high risk of wasting the existing potential of the subjectivity of student youth" [12, 641-642]. Accordingly, when developing a strategy and specific technologies for digitalizing the educational space, it is necessary to propose methods and opportunities for the development of youth subjectivity, without which its active participation in the socio-economic life of the country is impossible. It should be borne in mind that the absolutization of digital learning contributes to the hyperindividuality of consciousness, autism, reduces the student's personality to teamwork, and devalues the values of social solidarity in consciousness.

We believe that early profiling of education (in some lyceums and gymnasiums, even starting from the fifth grade), can be a serious threat to the constructive dynamics of students' consciousness. The idea of early profiling of students fully fits into the ideology of digital education, in particular, the idea of a digital assessment of their abilities and competencies, dividing adolescents and young people into specific groups with the help of information evaluation programs (core classes). The good idea of the need for the early development of professional self-awareness often does not correspond to the lability of the personal and cognitive development of students at such an early age. Interests and cognitive style may change, but the student is already "hostage" to a certain learning path, he already has a rating of "who he is", and this assessment is made mechanically, by means of information analysis of his "digital footprint" (online profile, electronic diary, test results, etc.). Such a simplified digital approach to education does not take into account the complexity and multivariate development of the cognitive sphere of students. Well-known experts in the methodology of NBIC-technologies D.V. Chernikova, I.V. Chernikov,

correctly noted that "the functioning of the human brain cannot be reduced to computation, but is distinguished by its ability to understand" [5, 116], that is, one cannot perceive the cognitive sphere as a "biological computer" functioning by means of digital algorithms.

We also consider it necessary to highlight structural and functional deformations, which can be considered as cognitive destructive consequences of the digitalization of education. It is known that all basic cognitive processes are involved in the learning process (and a specific lesson, lesson, fulfillment of a specific task): consciousness, thinking, memory, attention, speech, imagination. Their functioning occurs, almost synchronously, taking into account the educational context, the specific task of training. In the case of distance, "remote" learning, this synchronism is lost, which inevitably affects the quality of the educational process. For example, a student in a classroom or audience can ask the teacher a question that arises at a time when it is significant to him, but if the tutor takes distance education, he will have to wait a few days or even more. The lack of explanation, clarification of information for a particular student, taking into account its psychological and pedagogical features, is one of the significant shortcomings of digital learning. This fact is also noted by N. B. Strekalova. In her opinion, the active introduction of digital technologies into the education system can lead to "a loss of basic cognitive competencies (writing, calculation, reading, logic) and a decrease in the quality of education" [14, 87].

An important issue directly related to the structural and functional crisis tendencies of students' consciousness is the problem of the formation of its self-awareness and, in particular, self-esteem. The self-esteem of the student himself as knowing or not knowing, understanding or not understanding, knowing how or not knowing how to do anything, is one of the determining cognitive factors for the success of training. Self-esteem always includes not only a pure digital information level, but also a subjective psychological one. Obviously, in real-life learning, when a student is in a classroom, an audience with a teacher, and other students, his self-esteem is highly susceptible to their opinion. Of course, this opinion is not always objective, nevertheless, a teacher who has a sufficient level of psychological competence has sufficiently large possibilities for regulating the student's self-esteem. For example, he may include a student who has not learned the material in teamwork with those who have mastered the material, or may offer to carry out another task, use mentoring technologies, etc. In the conditions of distance education, in fact, the student does not have such opportunities. He receives a digital assessment of the information system for a test or a specific task, the help of a tutor and other students is possible very indirectly (except when everyone is online, but the entire educational process in this form is not possible). Lack of external control and external evaluation can stimulate students to become aware of learning outcomes as not important ... or vice versa, may encourage the use of other sources to complete the task (perform a test and simultaneously look for answers in a smartphone, etc.), artificially overestimate

scores and more. etc. (recall the annual cases of hacking electronic exam papers with tasks and answers). Digitalization of education can contribute to the loss of the role of self-awareness (self-esteem) in the formation of motivation for learning. Accordingly, the processes of digitalization and technological development of education should be aimed, first of all, not at modifying the cognitive sphere of students and turning them into "online users", but at creating a new information and educational environment that takes into account the personality-cognitive and didactic-methodical aspects of learning. A. Nordmann, one of the developers of the European program document *Converting Technologies for Improving the Human Abilities* calls for this approach. "It's much more promising to direct the capabilities of high technology not to the modification of our brain and body, but to create a smart environment that is able to adapt as much as possible to human capabilities and needs" [11].

#### **4. DISCUSSION OF RESULTS AND CONCLUSIONS**

Summing up the results of our study, we consider it necessary to dwell on the following results and conclusions.

First, it is required to note the importance and need for further study of the cognitive risks of the educational space digitalization, which we propose to understand as the probability of cognitive security threats (i.e., the stable homeostatic functioning of cognitive processes, anthropological identity and human existence), mediated by personal and psychophysiological vulnerabilities (traits, psychophysiological characteristics, cognitive, behavioral styles that potentially contribute to the successful implementation of these threats) and forming cognitive destructive consequences. The importance of this area of research is determined both by the importance of the cognitive sphere of the student for his personal and professional development, and by its insufficient study in the context of digitalization of the educational space.

Secondly, our special attention to consciousness and its crisis transformation is due to its integral role, which in fact determines other cognitive risks of digitalization of the educational space (the problem of establishing professional self-awareness; the formation of "technogenic" identity; devaluation of individual and social memory capabilities; language virtualization and deanthropologization communication; a decrease in critical thinking, the ability to independently create an intellectual product; dominance in external locus of control in decision-making).

Thirdly, the cognitive destructive consequences that we have identified of the realization of the cognitive risks of the educational space digitalization — the crisis trends in the transformation of consciousness — are certainly not exhaustive and do not have an unambiguous assessment. Nevertheless, such possible cognitive deformations as: clip

consciousness, simplified perception, hyperindividualization of consciousness, autism, a decrease in cognitive and personal opportunities for teamwork, a devaluation in the consciousness of the values of social solidarity, a decrease in the level of subjectivity, a crisis of professional self-awareness, impaired synchronization of the functioning of cognitive processes, crisis and instability of self-esteem of students, of course, require the consideration of these cognitive risks in the formation of forms and technologies of educational space digitalization.

Thus, the digitalization of the educational space contains a significant potential for cognitive risks and crisis trends in the transformation of students' consciousness. Of course, this does not mean the need for a complete rejection of these innovative forms of training, which in the conditions of the digital economy, in principle, is impossible. Paying attention to cognitive risks, studying and searching for principles, technologies for reducing their potential is another significant and extremely necessary reason for building a dialogue between all actors and subjects of the educational space in order to create a safe communicative and educational environment.

#### **ACKNOWLEDGMENT**

Our gratitude to the RFBR fund for supporting the project No. 19-29-14007 MK "Assessing the impact of digitalization of educational and social space on a person and developing a system of a safe communicative and educational environment", within the framework of which an article and reviewers for valuable comments were prepared.

#### **REFERENCES**

- [1] I.M. Azhmukhamedov (2012.) "Information Security. System Analysis and Fuzzy Cognitive Modeling." M.: Publishing house LAP. 385 p.
- [2] L.V. Baeva (2012.) "Anthropogenesis and Dynamics of Values under Conditions of Information Technology". *International Journal of Technoethics*. № 3(3) July-September pp.33-50. DOI: 10.4018/jte.2012070103.
- [3] I. A. Baeva (2002) "Psychological safety in education: Monograph". - St. Petersburg: Soyuz Publishing House. 271 p.
- [4] Chu, H.-C. (2014), "Potential Negative Effects of Mobile Learning on Students". *Learning Achievement and Cognitive Load—A Format Assessment Perspective*. *Educational Technology & Society*, 17 (1), pp. 332–344.

- [5] D.V. Chernikova, I.V. Chernikova, (2012) "EXPANDING HUMAN POSSIBILITIES: COGNITIVE TECHNOLOGIES AND THEIR RISKS". Bulletin of the Tomsk Polytechnic University. T. 321. No. 6. pp. 114-119.
- [6] "Digitalization of education in Russia and the world" (2019.), Accreditation in education. No. 98. [Electronic resource] -: [https://akvobr.ru/cifrovizaciya\\_obrazovaniya\\_v\\_rossii\\_i\\_mire.html](https://akvobr.ru/cifrovizaciya_obrazovaniya_v_rossii_i_mire.html).
- [7] G. Gable, D.Sedera, T. Chan (2008) "Re-conceptualizing information system success: the IS-Impact Measurement Model". Journal of the Association for Information Systems, 9(7), pp. 377-408. DOI: 10.17705 / 1jais.00164.
- [8] J. Johnston, L. T. Barker (2002) "Assessing the Impact of Technology in Teaching and Learning" Institute for Social Research, University of Michigan. [Electronic resource] -: [https://www.researchgate.net/publication/242507859\\_Assessing\\_the\\_Impact\\_of\\_Technology\\_in\\_Teaching\\_and\\_Learning](https://www.researchgate.net/publication/242507859_Assessing_the_Impact_of_Technology_in_Teaching_and_Learning)
- [9] S.A. Khrapov (2019) "Crisis of consciousness: "cognitive response" of anthropogenic civilization". Voprosy filosofii. No 1. pp. 88-95. DOI: 10.31857 / S004287440003623-0.
- [10] "Message from President V.V. Putin to the Federal Assembly of the Russian Federation" (December 1, 2016, Moscow, Kremlin). [Electronic resource] -: <http://kremlin.ru/events/president/news/53379>.
- [11] A. Nordmann, (2011) "Ignorance at the Heart of Science? Incredible Narratives on Brain–Machine Interfaces // TU Darmstadt". [Electronic resource] -: <http://www.philosophie.tudarmstadt.de/nordmann>.
- [12] O.L. Panchenko, F.G. Mukhametzyanova, R.R. Khayrutdinov (2019) "Challenges and risks of personal security in the context of digitalization of education PSYCHOLOGY OF THE XXI CENTURY: CHALLENGES, SEARCH, VECTORS OF DEVELOPMENT". Collection of materials of the All-Russian Symposium of Psychologists. Edited by D.V. Fortunately. Publisher: Academy of Law and Administration of the Federal Penitentiary Service. pp. 640-645.
- [13] A.L. Semenov "GOALS OF GENERAL EDUCATION IN THE DIGITAL WORLD" (2019), Education informatization and e-learning methodology Materials of the III International Scientific Conference. Siberian Federal University, Institute of Space and Information Technologies. pp. 383-388.
- [14] N.B. Strekalova (2019.) "Risks of introducing digital technologies into education". Bulletin of Samara University. History. Pedagogy. Philology. No. 2. pp. 84-88. DOI: 10.18287 / 2542-0445-2019-25-2-84-88.
- [15] Tawafak, Ragad & Romli, Awanis & Abdullah Arshah, Ruzaini & Saeed, Rana. (2018), "Assessing the Impact of Technology Learning and Assessment Method on Academic Performance: Review Paper". Eurasia Journal of Mathematics, Science and Technology Education. 14. pp. 2241-2254. DOI: 10.29333/ejmste/87117.