The value of digital technologies in inclusion

Tatyana Bashkireva[1,*], *Anastasia* Bashkireva[1], *Alexander* Morozov[2], *Yuliya* Fedorchuk[3], and *Antonina* Bakhtina[4]

[1]Ryazan State University named after S.A. Yesenin, 390000 Ryazan, Russia
[2]Research Center, The Federal State Institution «Research Institute of the of the Federal penitentiary service of Russia», 125130 Moscow, Russia
[3]The Federal State Budget Scientific Institution «Institute of Education Management of the Russian Academy of Education», 101000 Moscow, Russia
[4]Gorno-Altaisk State University, 649000 Gorno-Altaisk, Republic of Altai, Russia

Abstract. The article considers the importance of digital technologies in inclusion. The work used the analysis of literary sources and the method of heart rate variability. The results of the study showed that the introduction of digital technologies expands the problematic field of inclusive education. Students who have impaired health indicators in the context of the use of digital technologies, including in a remote format, should be attributed to inclusion. In this regard, the training of specialists in the field of cyberspace is a link between the development and implementation of new information technologies in an inclusive educational space and monitoring the health of students.

1 Introduction

Information technology takes become an integral part of our lives. The Internet space has become available in any language and for all ages of any country on the earth. As statistics show, 84% of humanity made connected to the Internet, which involves become necessary in all areas of society, including learning and the individual (2022). The Internet has likewise entered education. Modern children, adolescents, youth, because of the immaturity of functional systems, found themselves in the world of achievements of information and technological progress and information and communication space. The difficulties they face in mastering this space require integration into new conditions. In the humanization of education, inclusion is visible not only as inclusion in the social conditions of the life of people with disabilities. It also includes all aspects of the life of any person with his individual needs.

To create a safe information space when teaching children in digital conditions, it is necessary to pay attention to:
- the level of preparedness of teachers themselves for these conditions;
- understand what the security of the information space means;
- using digital and information technologies in teaching.

* Corresponding author: bashkireva32@gmail.com

Perhaps this will also affect the level of education in the modern digital space. This has become especially relevant because of the emerging COVID-19 pandemic. The pandemic crisis has forced both educators and students to embrace the digital space and enter online learning, as Lederman (2020) notes [22].

Scientists faced a relevant issue in studying the evolvement of children under the influence of introducing information technology into training [15]. Need to study the cyber-stages and cyber-cognitive stages of the growth of schoolchildren. These are very important questions. The general education traditional school cannot answer many of the questions that the use of the Internet by modern children poses to them today. Already from preschool age, they fall into a new information space. The child knows how to use a smartphone and gets into such an information field that it is almost impossible to track the information he receives. The studies note students use various programs, applications for individual learning. Teachers access the interactive whiteboard or learning platforms [21].

However, there are several technical difficulties associated with the quality and provision of digital products. This is because of the level of economic development of specific countries. And you should also pay attention to the development of digital competence among teachers. Digital competencies also depend on the availability of digital space. It does not limit only work in this space to the use of information and communication technologies. Therefore, there is a migration of young people to more economically developed countries to receive a quality education.

One priority in using ICT is the preservation of mental health and psychological comfort. Research is being actively conducted into the influence of the information and digital space on the psychological health of adults and children. However, the relationship between physical health and ICT remains understudied [23].

It related the purpose of this work to the exploration of the importance of digital technologies in inclusive training.

2 Methods

The task used the analysis of literary sources and the method of heart rate variability. 46 students (26 boys, 20 girls) made examined in natural conditions in the classroom using digital technologies. The analysis of balance indicators of the sympathetic and parasympathetic divisions of the autonomic nervous system (MxDMn), pulses (HR), activity of regulatory systems (IARS) was to give.

Many countries have used more actively the laptops in individual learning. Students complete learning tasks at their own pace. This applies to many things. So, in the lessons of geography, biology, chemistry, schoolchildren have the opportunity, after watching videos, to make a more complete picture of the processes, mechanisms, properties of the objects under study.

Introducing information and communication technologies in education has led to the emergence of such pedagogical technology as “gamification” [1]. Researchers believe that gaming motivates the cognitive activity of schoolchildren and positively affects their personal development [10]. The negative consequences of "gaming" puzzled parents and the pedagogical community. It noted in the literature that computer games perform educational and cognitive functions, reduce psycho-emotional stress in schoolchildren [2]. For the formation of positive motivation among schoolchildren when using gaming educational programs, the help of a facilitator-gamifier is required. However, the impact of digital technologies on the health and educational success of students was insufficiently studying [3].

The paper presents an analysis of the literature on the problem under study, as well as our own results of designing the use of digital technologies in inclusive education.

3 Results and discussion

It should note that there are technological solutions to problem fields in the digital space. For example, it insufficiently understood the impact of cyberspace on the mental health of students. Cyber psychology explores the possibilities of psychological protection from the negative impact of computerization on the psychological life of a person [14]. Being an interdisciplinary science, it includes the results of research in clinical psychology, medicine, physiology, sociology, topical issues of IT technologies in order to improve online security in the Internet space.

Cyberspace is space; allowing to expand individual and collective opportunities. "How we respond to the various environments in this space – whether it be social media, games, chat, text messaging, video, exotic virtual worlds, or email – depends on how that environment was build using an eight-dimensional architecture cyber psychology" [18, p.22]. Cyber psychology also studies the impact of computer technologies on human cognitive development in different periods of age development [3; fifteen]. It devoted some studies to the problems of the impact of computer technology, social networking sites on the positive or negative control of human behavior [4; eight].

According to researchers, the architecture of cyber psychology is an interdisciplinary science for analyzing the psychological impact of various digital footprints on a person's digital lifestyle [4]. With computer technology, more and more research appears in various scientific fields (Fig. 2).

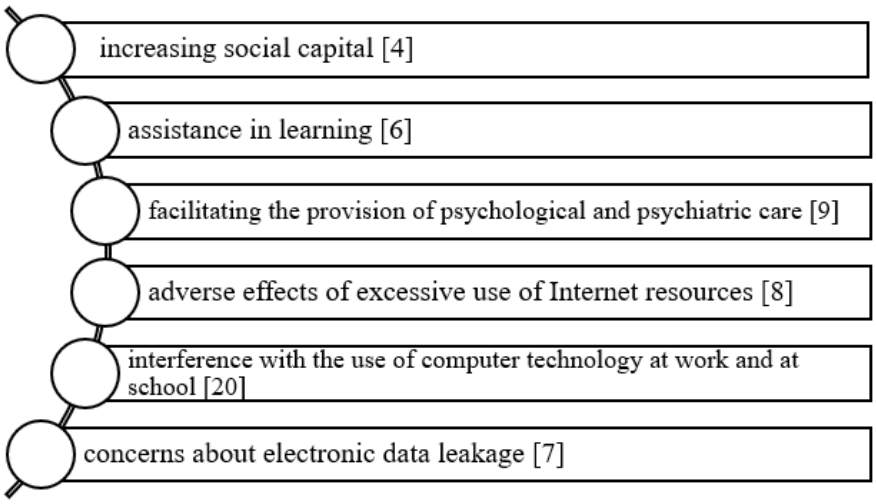

Fig. 1. Scientific areas of cyber psychology.

It paid particular attention to the development of computer technologies for counseling patients with mental health disorders, the creation of social robots to improve the social skills of children with health disorders. Chatbots and tele consulting methods are also being developed [11, 14, 17]. It also associated distance learning with the use of computer technology, as it carried out considering computerized tools and space.

Using the social media has become an integral part of the daily lives of many people. In the last decade, the influence of social networks on the psychological well-being of a person, both a child and an adult, was actively studying [5; 12; 13; 16 19]. However, to date, the relationship between physical health and the use of social networks was not sufficiently studying.

Because of the massive COVID-19 disease, many educational organizations have used a distance learning format. Many parents have experienced difficulties in mastering the

learning platforms and need counseling. The main difficulty that parents face is relating to the time that the student can spend in front of the monitor screen while completing the task. At present, the influence of the screen flicker frequency on the student's visual analyzer was not sufficiently studying. It is advisable for parents to prepare a step-by-step plan for organizing distance learning. For example, prepare a checklist to check: 1) the operation of the mobile Internet; 2) serviceability of the camera, microphone, headphones; 3) a comfortable chair for work; 4) activity of programs established for training.

The study of heart rate variability indicators revealed that the balance of the sympathetic and parasympathetic divisions of the autonomic nervous system (MxDMn) was observing in 19.2% of boys and 25% of girls. A moderate predominance of the parasympathetic nervous system note in 69.2% of boys and 60% of girls. We found a pronounced predominance of the parasympathetic nervous system in 11.6% of boys and 10% of girls. Signs of tachycardia (HR) was detecting in 53.8% of boys and 30% of girls. Disruption of adaptive systems (IARS) observed in 19.2% of boys and 5% of girls. 7.7 boys showed the norm and 15.2% of girls. The rest noted the tension of functional systems.

Prolonged exposure to the load as activities in the digital space on the sympathetic branch of the baroreflex can lead to the occurrence of a sympathoadrenal crisis associated with vegetative-vascular dystonia. Panic attacks associated with a sharp release of adrenaline may occur. Suddenly, a headache begins, the heartbeat quickens, blanching or redness of the face occurs. Arterial hypertension, chills, tremor, numbness of the extremities, anxiety usually noted. The attack ends abruptly, accompanied by asthenia and polyuria (increased urine production). Students in the conditions of long-term studies in the digital space showed increased excitability, anxiety, because of the search for the correct information. After class, they complained of headache and polyuria.

Obviously, introducing digital space into the educational process has a negative impact on the autonomic nervous system. It is necessary to develop methodological recommendations and sanitary and hygienic standards for a productive educational process in traditional conditions that are safe for health.

It can state that the influence of the parasympathetic nervous system dominates in boys and girls in conditions of distance learning. This may show an increase in hypoxia because of a low level of physical activity. For 19.2% of students, this format of education has a negative impact on their health.

4 Conclusion

Thus, the results of the study showed that the introduction of digital technologies expands the problematic field of inclusive education. Students who have impaired health indicators, experience difficulties in individual learning in a distance format, should be attributed to inclusion. The effectiveness of the use of digital technologies depends on the purpose of learning in the specific conditions of the educational environment. There are other questions as well. For example, will the use of digital technologies in teaching affect teacher-student and student-to-student interactions, and how? How to assess the student's achievements in the new learning environment? And how will the use of digital technologies affect the quality of student education?

In this regard, the training of specialists in the field of cyberspace is a link between the development and implementation of new information technologies in an inclusive educational space and monitoring the health of students. This will make it possible to realize the educational and socially significant needs of heterogeneous groups. And also to create a safe psychological space in the globalization's context of the digital environment.

References

1. G.M. Nikitin, Pedagogy: history, perspectives **3**, 5 (2020)
2. A. Fuster-Guilló, M. L. Pertegal-Felices, A. Jimeno-Morenilla, J. Azorín-López, M. L. Rico-Soliveres, *Felipe Restrepo-Calle Evaluating Impact on Motivation and Academic Performance of a Game-Based Learning Experience Using Kahoot*. https://www.frontiersin.org/articles/10.3389/fpsyg.2019.02843/full
3. A. Attrill-Smith, C. Fullwood, M. Keep, D.J. Kuss, *The Oxford Handbook of Cyberpsychology* (Oxford University Press, Oxford, England, 2019)
4. C. Cheng, H.Y. Wang, L. Sigerson, C.L. Chau, Psychol Bull. **145** (2019)
5. S.M. Coyne, A.A. Rogers, J.D. Zurcher et al, Computers in Human Behavior **104** (2020)
6. H. Crompton, D. Burke, The use of mobile learning in higher education: a systematic review.Comput Educ. **123** (2018)
7. J.D. Elhai, R.D. Dvorak, J.C. Levine, B.J. Hall, J Affect Disord **207 (**2017)
8. J.D. Elhai, J.C. Levine, B.J. Hal, Internet Res. **27** (2017)
9. T.L. Fletcher, J.B. Hogan, F. Keegan, M.L. Davis, M. Wassef, S. Day, J.A. Lindsay, Curr Psychiatry Rep. **20** (2018)
10. R. de Lemos, A. B. Romanovsky, Int. J. of Advanced Trends in Computer Science and Engineering **8**, 1.3 (2019)
11. L.I. Ismail, T. Verhoeven, J. Dambre, F. Wyffels, Int. J. Soc. Robot. **11** (2018)
12. E. Kross, P. Verduyn, E. Demiralp,et al., PLoS One **8** (2013)
13. D. Liu, R.F. Baumeister, C.C. Yang, et al., J. of Computer-Mediated Communication **24** (2019)
14. M. J. Guitton, Computers in Human Behavior **125** (2021)
15. K.L. Norman, *Cyberpsychology: An Introduction to Human-Computer Interaction* Cambridge University Press (Cambridge, England, 2017)
16. A. Orben, T. Dienlin, A.K. Przybylski, Social media's enduring effect on adolescent life satisfaction.Proceedings of the National Academy of Sciences of the United States of America. **116** (2019)
17. B. Shneiderman, C. Plaisant, M. Cohen, S. Jacobs, N. Elmqvist, N. Diakopoulos Designing the User Interface: Strategies for Effective Human-computer Interaction (Pearson, Essex, England, 2016)
18. J. Suler, *Chapter 1-The Dimensions of Cyberpsychology Architecture.Boundaries of Self and Reality Online*, Implications of Digitally Constructed Realities (2017)
19. M. Tromholt, Cyberpsychology, Behavior, and Social Networking **19** (2016)
20. M. Van Laethem, A.E.M. Van Vianen, D. Derks, Front Psychol. **9** (2018)
21. Evidence Informed Educators. https://evidenceforlearning.org.au/evidence-informed-educators/
22. D. Lederman, *Will shift to remote teaching be boon or bane for inline learning? Inside Higher Ed.*
23. L. Mishra, T. Gupta, A. Shree, Int. J. of Educational Research Open (2020)