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Rustemova, Z. A. (2013). Genre of fairy tales in the works of Y. Altynsarin. Science And World, 51. http://scienceph.ru/f/science_and_world_no_11_87_november.pdf#page=51

SAQ Kinostudiasy. (2019, April 15). Оқсыз оқиғасы_-_Oqsyz oqi'g'asy HD 2019 [Bulletproof story_-_Oqsyz oqi'g'asy HD 2019]. YouTube. https://www.youtube.com/watch?v=55aJEyJSgBU

Seitkazy, P. B., Toleubekova, R. K., Amanova, A. K., Tashetov, A. A., Iskakova, G., & Demissenova, S. S. (2016). A Web-Quest as a teaching and learning tool. International Electronic Journal of Mathematics Education, 11(10), 3537-3549. https://www.iejme.com/article/a-web-quest-as-a-teaching-and-learning-tool

Silva, H., Lopes, J., Cruz, G., Dominguez, C., Morais, E. (2023). Does university attendance affect students' critical and creative thinking skills? A longitudinal research with pre-service teaching and psychology undergraduates. Higher Education Research and Development, 42(2), 442-452. https://doi.org/10.1080/07294360.2022.2057448

Sormunen, K., Vehmaa, S., Seitamaa-Hakkarainen, P. et al. (2023). Learning science through a collaborative invention project in primary school. Discip Interdscip Sci Educ Res 5, 6 https://doi.org/10.1186/s43031-023-00074-5

Taibolatov Q.M., Burdina E.İ., Begimtaev A.İ. (2022). Programa variativnogo kursa Emosionälnyi intelekt i kriticheskoe myşlenie v srednih obşeobrazovatelnyh şkolah (. iz opyta raboty). Vestnik Toraigyrov universiteta, Seria Pedagogicheskaia, (2), 157-169.

Temple, C., Meredith, K., & Steele, J. L. (1998). Reading, writing, and discussion in every discipline. Guide Book III). Geneva, NJ: Reading & Writing for Critical Thinking Project. http://www.thinkingclassroom.org/uploads/4/3/9/0/43900311/green_book_3_eng.pdf

Tikhonova V. L. (2017). Problema ponimaniia tolerantnosti v sovremennom nauchnom diskurse [The problem of understanding tolerance in modern scientific discourse]. Istoricheskie, filosofskie, politicheskie i iuridicheskie nauki, kul'turologiia i iskusstvovedenie. Voprosy teorii ipraktiki, 6-1(80), 177-179.

Turehanova G.B., & Abdrahmanova N.K. (2016). Tıımdı sūraqtar arqyly oquşylardyñ oilau qabıletterın damytu: ädıstemelık ūsynym. Astana: Nazarbaev Ziatkerlık mektepterı, DBBŪ Pedagogikalyq şeberlık ortalyğy, 44.

Wijnen, F., Walma van der Molen, J. & Voogt, J. (2023). Primary teachers' attitudes towards using new technology and stimulating higher-order thinking in students: A profile analysis. Educ Inf Technol, (28), 6347–6372. https://doi.org/10.1007/s10639-022-11413-w

Zair-Bek, S. I., & Mushtavinskaya, I. V. (2011). Razvitie kriticheskogo myshleniya na uroke. Moskva: Prosveshchenie.

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PARAMETERS AND CRITERIA OF THE SCHOOL EDUCATIONAL ENVIRONMENT EXPERTISE

Abstract

This article substantiates the relevance of the research problem, which consists in the need to solve state tasks in the field of ensuring cybersecurity of social substructures of society, which is the education system. The current legal framework of the problem under study is in urgent need of improvement and development in projection on the educational environment of the school. This is due to the clearly insufficient awareness of its subjects in matters of cybersecurity, cyber defense and cyber ethics. This is confirmed not only by the empirical observations of the

authors of this article, but also by the practical lack of clear pedagogical measures of cybersecurity of the school environment.

The purpose of the study is to reveal the specifics of cybersecurity of the school environment.

To achieve this goal, the authors of the article interpret the concept of cybersecurity in the context of the environmental approach in education, perceived as a methodology of scientific and pedagogical research.

Based on these methodological positions, the authors of the article propose a detailed system of parameters and criteria for the examination of cybersecurity of the school environment.

The developed system of parameters and criteria for the examination of cybersecurity of the school environment acts not only as a measuring tool, but also as a pedagogical mechanism for the formation of such an environment.

Further prospects of the research are connected with the discussion in the scientific and professional audience of the modified methodology of the cybersecurity examination of the school environment proposed by us, its approbation in the real educational process and refinement taking into account the opinions of scientists and teachers.

Keywords: cybersecurity, cybersafety, school educational environment, expertise, system of parameters and criteria of expertise.

Introduction. The relevance of this study is determined by the fact that the study of the school environment shows the ignorance of its subjects in matters of cybersecurity, cyber defense and cyber ethics. This is evidenced by the results of one of the studies: 78% of respondents have not encountered cyber incidents (Neuspokoyeva, 2021). It should also be noted that in the autumn of 2022, the number of cyber attacks in Kaznet increased several hundred times, massive external attacks were recorded (Musin, 2022). This shows the vulnerability of network resources and the need to protect the educational environment, since information systems function in schools Kundelik.kz, bilimland.kz, ekitap.kz, onlinemektep.kz.

In addition, the relevance of the study can also be justified by the practical experience of the authors of the article (as parents, experts), which indicates the presence of problems in the school environment related to cyberethics, cyberbullying, data confidentiality, cyber protection from viruses. Often there are facts of transferring accounts, re-correcting points, in addition, the procedure for checking the filling of electronic logs is not explained, and so on.

We fully agree with the researchers who claim that the main factor in ensuring cybersecurity is training: in order to minimize the negative consequences of cyber attacks, it is necessary to carry out work to improve the computer literacy of the population (Zeynelgabdin, 2019); knowledge of cybersecurity is an important part of the worldview of modern man and a necessary condition for his security; training in cyberethics should be the responsibility of all, to make up for the lack of knowledge and responsibility should begin with teachers.

Schools generate large amounts of data on tracking student progress, performing administrative functions, staffing and building a curriculum. However, not all this data falls under the school rules on cybersecurity for third-party Internet services. Therefore, the perceived risk of online resources is often not assessed, schoolchildren and teachers have little knowledge about the dangers of using third-party services, and teachers are not ready to teach cybersecurity to schoolchildren.

At the same time, the conducted research covers only one aspect of cybersecurity of the school environment, concerning cyberbullying, omitting the issues of cyberethics, cyber defense.

Since this article is an "entry" into the study of the above-mentioned topical issues, the purpose is to disclose the specifics of cybersecurity of the school environment. To achieve this goal, we intend to interpret the concept of cybersecurity in the context of the environmental approach in pedagogy.

Materials and methods. Methodological positions in our study are determined by the understanding of the importance of the environmental approach in education. At the same time, the main guidelines are the opinions of experts in this field, among whom we are impressed:

– Yu.S. Manuilov, who claims that "The variety of methods of using the possibilities of the environment in the theory and practice of the "big pedagogical process" allows you to combine innovations with retroviews that have

proven their effectiveness in the history of school development" (Manuilov, 2002);

− The methodology of the examination of the educational environment (Yasvina, 2001), when among the 11 parameters of the educational environment, the scientist identifies "... five "basic" parameters: breadth, intensity, and modality, degree of awareness and stability; as well as six parameters of the "second order": emotionality, generality, dominance, coherence, integrity, activity". We believe that when ensuring the cybersecurity of the school environment, all these parameters, with their appropriate modification, can serve as a starting position for the examination of the phenomenon we are studying;

− *Sulima I. I., who argues that the environmental approach in education is not only a methodology of scientific and pedagogical research, but also a methodology of practical activity of teachers, since "... The environmental approach is a theory of management of the process of formation and development of a student carried out through a specially-formed environment (Sulima, 2012);*

− A project carried out by specialists of the Moscow City Pedagogical University, who claim "... a qualitatively built and methodically thought-out educational environment allows not only accessibility and effectiveness, but also to reduce education costs and ensure the safety of students" (4).

Regarding cybersecurity, this article applies a theoretical analysis of a number of scientific papers and official documents. In particular:

− research by C. Brown, C. Chalmers, who argue for the need for a special cybersecurity policy at school (Brown et al., 2017); (Chalmers et al., 2016);

− the works of scientists of the United Arab Emirates, which indicate the lack of a universal method of preventing cybercrime in schools, offer many global solutions regarding cyberbullying. The Government of the United Arab Emirates has initiated the "Digital Safety of Children" program aimed at educating generations literate in the digital sphere (Siyam, 2021), and the smart security structure of the "Akdar School of Electronic Security" has also been launched (e-Safe School) (6);

− research by Portia Pusey and William A. Sadera (Towson University) (Pusey et al., 2011), according to which information security is a concept consisting of three "K" - cyberethics, cybersecurity and cyber defense. Cyberethics is a moral choice of people in the use of Internet technologies and digital media. It includes copyright, network etiquette, hacking, and Internet addiction. Cybersecurity consists of people's actions to minimize the danger when using Internet technologies. It covers the problems of online predators, viruses and spyware, the spread of malware and methods of deception when using Internet-compatible technologies (phishing, pharming and spoofing). Cyber protection includes technical interventions that protect data, identification information and equipment from unauthorized access or damage, as well as antivirus software, Internet content filters, firewalls and password protection;

- research by a group of such scientists as Sağlam R.B., Miller V. and Franqueira V.N.L.A, dedicated to cybersecurity education for children (under 18 years of age) on a global scale. Scientists have identified what cybersecurity skills are taught to children around the world, what are the key strategies/methods of cybersecurity training, and considered the question of which stakeholders are considered responsible for teaching cybersecurity to children. Scientists speak about the importance of using innovative teaching methods in teaching cybersecurity and the role of school teachers in raising awareness in this area (Sağlam, 2023).

- a scientific study by J. Knott, H. Yuan, M. Boakes and S. Li, which presents some new results and ideas about how British schools in general conduct their cybersecurity events and online security training on Twitter. They have launched a project that can help inform people and organizations interested in cybersecurity and teaching online security in schools (Knott, 2023).

- a research project by C. Mourning, D. Jueves, A. Hellman-Thrasher, H. Chunji, S. Katya, A. Karanth, in which high school teachers were trained in cybersecurity through a series of online seminars. Scientists talk in their project about raising awareness about cybersecurity in three areas: general cybersecurity issues, software

security and hardware security (Mourning, 2022).

Main part. Among the official documents on the problem of our research, we have attributed:

− The concept of "Cyber Shield of Kazakhstan", the purpose of which is to achieve and maintain the level of protection of electronic information resources, information systems and information and communication infrastructure from external and internal threats that ensure the sustainable development of the Republic of Kazakhstan in the conditions of global competition (7). This document speaks about the need for constant monitoring of compliance with the modern needs of society and trends in ensuring the safe development of information technologies in educational institutions. However, specific procedures for ensuring compliance with information security standards are not described;

− unified requirements in the field of ICT and information security, approved by the Government of the Republic of Kazakhstan, a list of necessary procedures and documents, including: methodology for assessing information security risks; rules for identification, classification and labeling of assets, inventory and certification of computer equipment, etc. (8);

− as well as a number of documents regulating cybersecurity for the banking and insurance sectors (9); (2).

It should also be noted that a number of organizations and companies directly dealing with cybersecurity issues have been identified by the method of desk research. For instance:

− the leader of the Kazakh market in this area is the Tsarka Company, which provides financial organizations with expert services in the field of information and cybersecurity (Polyakov, 2020);

− the organization "Cooperation in the Field of Science and Technology" (COST) brought together fifty-four leaders from twenty-seven European countries in order to exchange experiences in the field of cyber bullying in schools (O'Moore, 2013);

− an organization for the protection of personal data that operates in Kazakhstan on the basis of general regulations (data protection agency).

The Agency of the Republic of Kazakhstan for Regulation and Development of the Financial Market has created training lessons on the topic "Safe Internet and children's cybersecurity", thematic hours on countering financial pyramids and cyber fraud (5).

Next, we applied the method of interpretation of the above scientific materials, on the basis of which the modification of the methodology of examination of the school educational environment was carried out by Yasvin V.A. while maintaining the methods proposed by him for calculating the modality coefficient of the educational environment, taking into account the peculiarities of cybersecurity.

And, finally, the method of visualization of interpretation results is applied, which is presented in the form of a table reflecting a detailed system of parameters and criteria for the examination of cybersecurity of the school environment.

Results and discussion. As a result of the modification of V.A. Yasvin`s methodology, we propose a detailed system of parameters and criteria for the examination of cybersecurity of the school environment, presented in Table 1.

Table 1. *Parameters and criteria for the examination of cybersecurity of the school environment*

Expertise Parameters	Scores			
	0	1	2	3
1 Quality parameters				
1.1 Modality				
dogmatic				
career				
serene				
creative				
2 Quantitative parameters				
2.1 Width				
Virtual tours				

Virtual travel				
Online visits to cultural, sports events/facilities				
The possibilities of choosing educational online microenvironments				
2.2 Intensity				
The predominance of interactive forms and methods of teaching over traditional				
Monitoring of online learning load of students				
Organization of online leisure of students				
2.3 Awareness				
Knowledge of the rules of behavior in the Internet environment				
Compliance with the rules of behavior in the Internet environment				
Knowledge of means of protection against cyberbullying, cyber attacks				
The ability to use a means of protection against cyberbullying, cyber attacks				
Teachers' activity in online communication				
Parents' activity in online communication				
2.4 Generality				
Cybersecurity Risk Management				
The existence of a concept for the development of cybersecurity of the educational environment				
Availability of standards for ensuring the cybersecurity of the educational environment				
The success of the implementation of the Concept of cybersecurity development of the educational environment				
Monitoring of the cybersecurity of the educational environment				
2.5 Emotionality				
The predominance of coping behavior of students in the digital environment				
The predominance of teachers' coping behavior in the digital environment				
The predominance of coping behavior of parents in the digital environment				
2.6 Dominance				
The dominance of the live communication environment over online communication for teachers				
The dominance of the live communication environment over online communication for students				
The dominance of the live communication environment over online communication for parents				
2.7 Coherence				
Continuity with the organizations of TVET and HPE in the field of digital pedagogy (consistency of curricula)				
2.8 Social activity				
Broadcasting achievements in the Internet environment				
Working with the media, social networks				
2.9 Mobility				
Implementation of additional (elective) academic subjects/modules focused on functional (digital) literacy of students				
The use of digital technologies in the holistic pedagogical process				
Development of digital competencies of teachers				

Of the 11 parameters proposed by Yasvin V.A., we selected 10, one of which is a qualitative measurement of the educational environment (1.1 modality of the educational environment) and 9 is a quantitative assessment (2.1-2.9). At the same time, we considered it appropriate to change the scaling of estimates, which consists in the following criteria: does not manifest itself – 0 points, does not manifest itself rather than manifests itself – 1 point, rather manifests itself than does not manifest itself – 2 points, manifests itself completely – 3 points. It should be noted

that several indicators of parameters 2.3 and 2.4 are not evaluated on a three-point scale (they are highlighted in color in the table).

Regarding the modality of the educational environment: the first parameter means that the environment promotes the development of "passivity and dependence of the child", the second - the development of "activity, but also dependence of the child", the third promotes "free development, but also causes the formation of passivity of the child", the fourth – "free development of an active child" (Yasvin, 2001:79-80]. The remaining parameters are interpreted by us in the context of ensuring the cybersecurity of the school environment.

The system of examination of cybersecurity of the school environment proposed by us is an initial version, which in the course of further discussion and testing can be supplemented or modified to a certain extent (this article was prepared by us at the very beginning of the study, i.e. the results obtained are an introduction to the research problem).

Conclusion. Based on the conducted research, we came to the following conclusions:

Ensuring the cybersecurity of the school's educational environment is an urgent task in Kazakhstan. Currently, there are a number of organizations operating in the country whose activities are aimed at ensuring the cybersecurity of socio-economic processes. At the same time, the legal field of their activities is determined by official documents. However, these documents and procedures require improvement in the aspect of cyber defense and cyber ethics, need to be adapted for their use in the education system, as they are not updated in accordance with the specifics of the school environment.

The study showed that the environmental approach in education, being a methodology of scientific and pedagogical research, fully acts as a guideline for ensuring the cybersecurity of the educational environment of the school.

The system of parameters and criteria for the examination of cybersecurity of the school environment developed by us acts not only as a measuring tool, but also as a pedagogical mechanism for the formation of such an environment.

Further prospects of the research are connected with the discussion in the scientific and professional audience of the modified methodology of the cybersecurity examination of the school environment proposed by us, its approbation in the real educational process and refinement taking into account the opinions of scientists and teachers.

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References

Brown, C. F., Demaray, M. K., Tennant, J. E., & Jenkins, L. N. (2017). Cyber victimization in high school: Measurement, overlap with face-to-face victimization, and associations with social–emotional outcomes. School psychology review, 46(3), 288-303. doi:10.17105/SPR-2016-0004.V46-3. (Scopus).

Central Accountant's House. Cybersecurity Strategy of the financial sector of the Republic of Kazakhstan for 2018-2022 (2018). Approved by Resolution No. 281 of the Board of the National Bank of the Republic of Kazakhstan. Retrieved from https://cdb.kz/sistema/pravovaya-baza/ob-utverzhdenii-strategii-kiberbezopasnosti-finansovogo-sektora-respubliki-kazakhstan-na-2018-2022-gody.

Chalmers, C., Campbell, M. A., Spears, B. A., Butler, D., Cross, D., Slee, P., & Kift, S. (2016). School policies on bullying and cyberbullying: perspectives across three Australian states. Educational Research, 58(1), 91-109. doi:10.1080/00131881.2015.1129114.

Club of directors (2023). Formation of a modern educational environment: The Club of Directors. https://director.rosuchebnik.ru/article/formirovanie-sovremennoy-obrazovatelnoy-sredy/.

Countering financial pyramids and cybersecurity will be taught to schoolchildren of Kazakhstan (2022). Portal of information support for heads of secondary and preschool organizations. https://edu.mcfr.kz/news/2943-protivodeystviyu-finansovym-piramidam-i-kiberbezopasnosti-budut-obuchat-shkolnikov-v.

Department of Education and knowledge (2023). ADEK: About us. https://www.adek.gov.ae/en/About/About-Us

Institute of Legislation and Legal Information of the Ministry of Justice of the Republic of Kazakhstan. The Concept of Cybersecurity "Cyber Shield of Kazakhstan" (Approved by the Decree of the Government of the Republic of Kazakhstan (2017). https://adilet.zan.kz/rus/docs/P1700000407.

Institute of Legislation and Legal Information. On approval of uniform requirements in the field of information and communication technologies and information security Resolution of the Government of the Republic of Kazakhstan (2016). No. 832. Retrieved from https://adilet.zan.kz/rus/docs/P1600000832.

Institute of Legislation and Legal Information. Requirements for the organization of safe work that ensures the safety and protection of information from unauthorized access to data stored in an insurance (reinsurance) organization, as well as cybersecurity of an insurance (reinsurance) organization (2018). Approved by Resolution No. 164 of the Board of the National Bank of the Republic of Kazakhstan. Retrieved from https://adilet.zan.kz/rus/docs/V1800017289.

Knott, J., Yuan, H., Boakes, M., & Li, S. (2023, March). Cyber Security and Online Safety Education for Schools in the UK: Looking through the Lens of Twitter Data. In Proceedings of the 38th ACM/SIGAPP Symposium on Applied Computing. p.1603-1606. doi:10.1145/3555776.3577805.(Scopus).

Manuilov, Yu.S. (2002). Environmental approach in education (2nd revised ed.). Moscow, Novgorod: Publishing House of the Volga-Vyatka Academy of Public Service, 157.

Mourning, C., Juedes, D., Hallman-Thrasher, A., Chenji, H., Kaya, S., & Karanth, A. (2022, March). Reflections of Cybersecurity Workshop for K-12 Teachers and High School Students. In Proceedings of the 53rd ACM Technical Symposium on Computer Science Education V. 2 (pp. 1127-1127). doi:10.1145/3478432.3499094.(Scopus).

Musin, B.B. This is exactly from the outer contour - Musin about the attacks on Kaznet: TengriNews (2022). https://tengrinews.kz/kazakhstan_news/eto-tochno-s-vneshnego-kontura-musin-ob-atakah-na-kaznet-479459/.

Neuspokoyeva, E. Cybersecurity in schools at the level of: News of digital transformation, telecommunications, broadcasting and IT. (2021). https://www.comnews.ru/content/216202/2021-08-31/2021-w35/kiberbezopasnost-shkolakh-urovne.

O'Moore, M., Cross, D., Valimaki, M., Almeida, A., Berne, S., Deboutte, G., ... & Stald, G. (2013). Guidelines to prevent cyberbullying: A cross-national review. In Cyberbullying through the New Media (pp. 136-161). Psychology Press.

Polyakov, V.P., Romanenko, Yu.A. (2020). Pedagogical provision of personal information security in the digital information and educational environment. Human Science: Humanitarian Studies. T. 14(1), 43-47.

Pusey, P., & Sadera, W. A. (2011). Cyberethics, cybersafety, and cybersecurity: Preservice teacher knowledge, preparedness, and the need for teacher education to make a difference. Journal of Digital Learning in Teacher Education, 28(2), 82-85. https://files.eric.ed.gov/fulltext/EJ960154.pdf.

Sağlam, R. B., Miller, V., & Franqueira, V. N. (2023). A Systematic Literature Review on Cyber Security Education for Children. IEEE Transactions on Education: IEEE Transactions on Education. doi:10.1109/TE.2022.3231019. (Scopus).

Siyam, N., & Hussain, M. (2021). Cyber-safety policy elements in the era of online learning: a content analysis of policies in the UAE. TechTrends, 65(4), 535-547. doi:10.1007/s11528-021-00595-8.

Sulima, I.I. (2012). Environmental approach as a methodology of scientific and pedagogical research: Center for Scientific Investments. Retrieved from https http://www.ni-centr.ru/chitalnyj-zal-centra/metodologiya/sredovoj-podxod-kak-metodologiya-nauchno-pedagogicheskogo-issledovaniya/.

Yasvin, V.A. (2001). Educational environment: From modeling to design. Moscow.

Zeynelgabdin, A. B. & Isabayeva, S. B. (2019). Cybersecurity of Kazakhstan in the period of digital transformation. https://repository.apa.kz/xmlui/handle/123456789/263.