

EEIA 2019
**International Conference "Education Environment for the
Information Age"**

**PEDAGOGICAL AND ERGONOMIC CONDITIONS FOR THE
FORMATION OF INFORMATION EDUCATIONAL SPACE**

Irena V. Robert (a), Iskandar Sh. Mukhametzyanov (b), Vasilina A. Kastornova (c)*

*Corresponding author

(a) Academician, doctor of pedagogical sciences, associate professor, Federal State Budget Scientific Institution "Institute for Strategy of Education Development of the Russian Academy of Education", 105062 Moscow, Makarenko street, 5/16, Russia. rena_robert@mail.ru

(b) Doctor of medical sciences, associate professor, chief research officer, Federal State Budget Scientific Institution "Institute for Strategy of Education Development of the Russian Academy of Education" 105062 Moscow, Makarenko street, 5/16, Russia. ishm@inbox.ru

(c) PhD (Education), associate Professor, art. senior. Federal State Budget Scientific Institution "Institute for Strategy of Education Development of the Russian Academy of Education" 105062 Moscow, Makarenko street, 5/16, Russia. Kastornova_vasya@mail.ru*

Abstract

The article presents theoretical and methodological approaches to the formation of information and educational space. On the basis of the analysis of historical and philosophical interpretation of the term "space" the substantiation is presented and the concept "information and educational space" in the context of the philosophical category "space" is defined, its general characteristics are given and the parameters of IES of the educational organization are revealed. Health-saving conditions of functioning of IES in accordance with ensuring hygienic and ergonomic safety of students during of training are described. In addition, the components of IES (information, organizational, technological parts) are substantiated and described. Many factors are accounted for when considering the research of development of IES. It is shown that the functioning and its content are significantly influenced by informational needs of users. At the same time, depending on who is the consumer of educational (pedagogical) information, what is its real volume, type, form of presentation, storage and processing, various solutions are proposed. Special bodies (structures) are proposed to ensure existence of IES, as well as educational facilities to ensure its functioning through the generation of educational information. The pedagogical conditions of functioning of IES of educational organization are described. The article states the insufficiency of developments concerning the issues of health preservation of users of IES, it is noted that there are no conceptual approaches and measures to ensure information security of the student within the IES, including its medical components, both within and outside the educational organization.

© 2019 Published by Future Academy www.FutureAcademy.org.UK

Keywords: Information and educational space.



1. Introduction

In connection with the actively developing process of informatization of education, the conceptual apparatus of pedagogical science is improved, there are terms, the explanation of which is a condition for the development of both theories of learning and methods of subject areas. These terms can primarily include the concept of "space".

The conditions of organization of educational space proposed by some authors are based on the fact that active learning can make students into creative individuals, which can happen if they control their learning and develop their skills of social interaction in small groups (Vilensky, 2002; Park & Choi, 2014; Webb, 1982; Thomson, 2016).

The term "information and educational space" (IES) brings a number of obvious advantages into the education system, including the concentration of the potential of the best teaching staff, effective information systems and other technical means of education. The implementation of the capabilities of the IES provides targeted creation, interrelated development and consistent implementation of authored training programs, as well as creates conditions for the student to be able to freely get acquainted with all types of general knowledge and special knowledge of scientific disciplines, while acquiring the necessary practical skills (Ellis & Goodyear, 2016). The IES organizes a diverse interaction, exchange of knowledge and opinions in a group of students, provides a continuous learning process that takes into account the individual characteristics of each person, etc. The need to create the IES is due to the widespread introduction of information and communication technologies (ICT) in the educational process, through which there is a qualitative and operational satisfaction of the needs of participants of the educational process in educational information (Sergeev, 2017).

The presence of the IES makes it necessary to train the participants of the educational process in the conditions of information society, mass network communication and globalization, as well as the creates an obligation to establish operational communication between the subjects of educational activities in order to solve the problems of education management; increasing the social importance of education, etc. (Robert, 2014; Robert, Mukhametzyanov, & Kastornova, 2017).

2. Problem Statement

The concept of "information and educational space" is associated with the implementation of joint educational activities based on the use of modern ICT. Within the framework of the IES, it is possible to integrate existing information resources and develop a common policy on the most rational use of information tools. On its basis, the problems of personnel training in the education system in the field of application and introduction of digital information technologies in professional activities are solved. IES allows rational use of all types of resources, including material and information resources, and solves the problems of information support relevant to the education system (Abdul Munir, Abdul Tharim, Mohd, & Said, 2018).

However, the rationale and formulation of the term "information and educational space" requires explanation in the context of the terminology of pedagogical science. A number of theoretical considerations that are necessary to describe the structure and content of the IES can be included in the

definition of the concept and the IES. Research in the field of the content of the concept of "information and educational space" in the context of the content basis of the philosophical category "space" allowed us to conclude that all the general characteristics inherent in the philosophical category "space" are also inherent in the characteristics of the concept of information and educational space.

In addition to the conceptual problems, there are no less problems in the field of preserving the health of the user working in the conditions of IES. Previously discussed issues of security of the educational space did not include elements of ICT (Rom, 1998). The current sanitary regulation in Russia in terms of the use of informatization of education as a component of the information and educational space is frankly outdated, as it does not even consider the moving technical means in the learning process, such as laptops, tablets, and smartphones, and more. In addition, modern communication technologies (wi-fi and mobile Internet) have been completely removed from regulation. There is a need to modernize the normative regulation of the use of modern means of information and communication used in the information and educational space of an educational organization, as the presence of certain difficulties should be noted, which are caused by the actual output of training outside the educational organization (Levy, 2008) and the need to regulate not only and not so much in terms of medical aspects, but also all other aspects of information security of the individual as a priority aspect of activity in the modern IES (Polyakov, 2016; Hadlington, 2017; Rader & Wash, 2015).

3. Research Questions

When creating an IES, in addition to theoretical and health-saving conditions, it is necessary to highlight its information, organizational and technological components. So the information component of the IES can include information components that have an educational orientation, designed for all parts of the education system and provide scientific, pedagogical, psychological, methodological types of support for the educational process in the educational organization, and self-educational activities of users of the information support system. The organizational component includes a single system of information support for the functioning of the IES, providing for a single databank of educational information, which provides storage and support of information funds, for example, an educational organization. In turn, the units included in the educational organization serve as the structure-forming elements that directly provide the formation of the IES and support the modes of information service of the participants of the educational process. The technological component of the IES is determined by a system of tools that ensure work with all types of educational information, including the mechanisms of its processing, storage, quick search and replication. It provides for the presence in the IES of an expanded media system, and the system's operability is provided after its commissioning with the necessary service, repair and modification of the technical means used to work with educational information.

In this consideration, the principal for the existence of the IES is, on the one hand, the need for interconnected elements - organizational structures (e.g., electronic libraries), with the necessary resources to maintain the information space, on the other - the availability of properly organized regional system of education, that is adequate to information needs of education (Osmolovskaya, Ivanova, Klarin, Serikov, & Aliev, 2018).

In research, one of the main objectives of the development of the IES is to eliminate the most common contradiction in educational practice, one between the availability of educational information and the possibility of its operational use in educational activities. Consequently, the IES should initially: be a means of raising the education system to a new qualitative level in meeting the educational needs of society; be composed of all parts of the education system, taking into account their structural features; ensure the links of the education system with all related (adjacent) areas of education, that is, to be an open system.

In addition, the existing information support system for education in the framework of the IES should support the work of participants in the educational process with all types of media and sources of educational information. In this regard, the main functions of the IES can be formulated: informative, designed to provide open access to information and create conditions for information exchange; integrative, providing for the implementation of intra-system relations; communicational, allowing to maintain links both "within" itself and with the "external" information space; coordinating, reflecting the ability of the IES to fix and implement the relationship within the content, which is addressed to different subjects; developing, aimed at the development of intelligence, personal creative qualities of the subjects of the educational process; culture-forming in the context of understanding of culture, in particular information culture; professional-oriented, taking into account the professional orientation of the future specialist.

4. Purpose of the Study

The aim of the study is to substantiate and formulate the term "information and educational space" in the context of the philosophical category "space", as well as the development of pedagogical and ergonomic conditions for its creation and functioning in the educational organization.

5. Research Methods

Methods of research are: theoretical analysis and generalization of provisions of psychological and pedagogical science, and also research of scientific and pedagogical literature and normative legal and methodical documents in the field of creation and functioning of educational space; supervision, conversations, questioning; carrying out training sessions in the conditions of functioning of information and educational space of the educational organization; expert assessment; generalization of results of research.

6. Findings

We define the information and educational space of the educational organization as:

(A) form of existence and functioning:

of an educational organization as a material object, having its own structure, profile, staffing, teaching, hardware and software, methodological and other supporting materials to the educational process that are in constant change, interaction, development;

components of the educational organization (structural divisions of the educational organization) as the material objects which are in interaction, mutual influence and development;

objects (physical objects), which is an integral part of different types of support of the educational process including ICT-based ones, such as educational-methodical, software and hardware, methodological and others;

(B) Conditions for the implementation of educational activities by the subjects of the educational process (using objects), characterized by the presence of:

material and technical base of the educational organization, including software, hardware and information systems for educational purposes;

information and methodological support of the educational process (textbooks, including those presented in electronic form; scientific and pedagogical, educational, instructional and organizational materials, including those presented in electronic form; electronic publications of educational purpose; interactive educational network resource; teaching tools, including those operating on the basis of IES; sets of "virtual" laboratory works; tools and devices for automation of educational process, etc.);

organizational and methodological support for the implementation of information activities and information interaction between the subjects of the educational process using objects of IES;

(C) the form of the organization of educational process providing:

functioning and development of the educational organization in accordance with a certain concept and depending on the level of material-technical, information-methodical and instructive-legislative base;

educational and information interaction between the subjects of the educational process involved in the implementation of information activities and information exchange in terms of their use of objects;

organizational and methodological support of the subjects of the educational process of information activities and information exchange.

Let us focus on the description of pedagogical conditions for the creation of information educational space:

A. Positioning of subjects and objects on the basis of a set of parameters describing their position in the information and educational space, as well as features of the educational process. The description of characteristics of subjects and objects on the basis of the established set of the parameters describing each concrete subject and object of information and educational space, and also features of the educational process is thus carried out.

B. The presence of parameters describing the position of each subject and each object of information and educational space, which are in certain relationships with each other.

C. Identification and justification of the purposes of use by subjects of objects of information and educational space, and features of their functioning.

D. Formation of the structure and content of hardware and software, information and methodological support of professional activities of the subjects of information and educational space.

E. Presence of axiomatics describing the relationship of subjects and features of objects of information and educational space:

description of relations between subjects of information and educational space in the conditions of use of objects of information and educational space;

description of methodical and normative-instructive materials, the use of which provides the relationship of subjects and objects of information and educational space, and the use of scientific and pedagogical, instructive and methodical and software and hardware materials necessary for its application in the educational process;

F. The possibility of changing the position of the subject and (or) the object of information and educational space, followed by a description of modifications in the same system of parameters due to the following features:

providing the subjects of information and educational space with the unity of ways of access to distributed information resources;

providing the subject of information and educational space with the unity of ways to exchange, transfer and broadcast information using objects;

providing on the basis of objects of information and educational space of unity of forms and methods of implementation of educational-informational interaction between subjects of information and educational space and an interactive information resource;

providing on the basis of objects of information and educational space of the information resource corresponding to pedagogical and ergonomic requirements according to the status of the subject of educational process; realization by subjects of information and educational space of didactic opportunities of information and communication technologies.

The above-described pedagogical conditions for the creation and functioning of information and educational space determine the form of organization of educational and information interaction between subjects engaged in information activities with the help of objects that ensure the collection, processing, transmission, production of information in the educational process.

However, the very concept of information and educational space brings the learning process beyond the educational organization. Information security issues of the student outside the educational organization are shifted to the students themselves and their parents. At the same time, there is practically no section in the training program for medical safety of trainees, and work with parents, even educational in terms of ensuring the safety of informational and educational space in the student's place of residence, is not conducted. The importance of such work with an emphasis on education of all participants in the educational process has been repeatedly confirmed in studies focused on the formation of a modern concept of cyber security, and the learning process itself should be in the form of individualized learning with pronounced feedback.

Active implementation of smartphones and mobile Internet in the training system allows access to educational resources for students from anywhere in the world. But to date, there is no mandatory certification of the key component of the modern educational space - digital educational resources, not meaningful, namely in the form of presentation of the material. Each educator prepares them to the best of their ideas about the subject and ease of use, without paying attention to the pedagogical and ergonomic and sanitary standards for the presentation of educational material. Thus, when preparing and using digital educational resources for educational purposes, there is a problem of lack of control, including medical, over the implementation and consequences of their use in the framework of educational and extracurricular activities. Quite sceptical is the assessment of the knowledge of students and their parents

in terms of information security. A number of authors show that the sources of this knowledge can be peers (who conducts attacks), training (how attacks are carried out) and parents and training (the consequences of attacks). This approach to the issues of information security of the individual does not allow to create and train a clear model of behavior and proven methods of response to ensure their own information security.

Going beyond the traditional educational space of an educational organization and considering ways to solve the problem of medical and social component of information security of information and educational space, we believe it is necessary to focus on the fact that, first of all, it is necessary to teach the student the rules of obtaining and analyzing information in the most secure ways for him, using methods of saving personal data. It is impossible to realize it without participation of parents of the trainees as the main part of activity of the trainees on the Internet is realized outside of the educational organization and cannot be controlled by teachers. It is necessary to form information security skills in both students and their parents. We state the fact that the lack of control over the activities of students outside the educational organization within social networks and network communities can provoke a demonstration of antisocial behavior in the virtual space, and ultimately a violation in the field of current legislation. From the point of view of medical and social aspects of information security of the person two main mechanisms of influence on it of use of digital educational resources are offered. The first technical, implemented through the influence of the means of informatization of education and the conditions of their use: sanitary violations; non-compliance with the rules of labor protection, work and rest; the use of non-certified technical means, media; violation of regulation in terms of information presentation technical regulations, etc. Second, the very impact of negative information on the student through its controversial, aggressive and negative character. This has an impact on social and moral guidelines of social life, distorts moral norms and criteria.

7. Conclusion

Thus, based on the content definition of information and educational space of the educational organization, pedagogical, medical and social aspects of its creation and functioning, described above, pedagogical and ergonomic conditions of its formation and use were identified, the implementation of which is focused on ensuring:

- activities of subjects who, using objects (components of software and hardware, information and methodological materials of the educational process) participate in the educational process and manage it on the basis of automation of electronic document management, planning, design, etc.;
- organization of educational and information interaction between entities involved in the implementation of information activities for the collection, processing, transmission, production of information in the conditions of use of objects operating on the basis of ICT;
- educational process, involving the independent extraction, transformation, processing, production, translation of educational information, developing according to certain laws, scenarios and stages according to the theory and methodology of informatization of education.

References

- Abdul Munir, F.F., Abdul Tharim, A.Y., Mohd, T., & Said, S. (2018). The relationship between learning space attributes with student's satisfaction and perceived performance. *Planning malaysia journal*, 16, 256-265. <http://dx.doi.org/10.21837/pmjournal.v16.i6.480/>
- Ellis, R. A., & Goodyear, P. (2016). Models of learning space: integrating research on space, place and learning in higher education. *Rev Educ*, 4, 149-191. <https://doi.org/10.1002/rev3.3056>.
- Hadlington, L. (2017). Human factors in cybersecurity; examining the link between Internet addiction, impulsivity, attitudes towards cybersecurity, and risky cybersecurity behaviours. *Heliyon*, 3(7). <https://doi.org/10.1016/j.heliyon.2017.e00346>.
- Levy, R. (2008). "Third spaces" are interesting places: Applying "third space theory" to nursery-aged children's constructions of themselves as readers. *Journal of Early Childhood Literacy*, 8(1), 43–66. <https://doi.org/10.1177/1468798407087161>
- Osmolovskaya, I. M., Ivanova, E. A., Klarin, M. V., Serikov, V. V., & Aliev, Y. B. (2018) Innovacionnye obrazovatel'nye praktiki v obshchem i professional'nom obrazovanii [Innovative educational practices in both General and vocational education]. In *Collection of scientific works of the international scientific-practical conference "Educational space in the information age» (International conference Education Environment for the Information Age) (EEIA–2018)* (pp. 363-373). Moscow: FSBSI "ISED RAE". Retrieved from: <http://www.instrao.ru/images/Izdaniya/EEIA-2018-sbornik.pdf>. [in Rus.].
- Park, E.L., & Choi, B.K. (2014). Planning classroom design and layout to increase pedagogical options for secondary teachers. *High Educ*, 68, 749. <https://doi.org/10.1007/s10734-014-9742-0>
- Polyakov, V. P. (2016). Pedagogicheskoe soprovozhdenie aspektov informacionnoj bezopasnosti v informacionnoj podgotovke studentov vuzov [Pedagogical support of information security aspects in information training of University students]. *Pedagogical Informatics*, 4, 37-47 [in Rus.].
- Rader, E., & Wash R. (2015). Identifying patterns in informal sources of security information, *Journal of Cybersecurity*, 1(1), 121–144. <https://doi.org/10.1093/cybsec/tyv008>
- Robert, I. V. (2014). Psihologo-pedagogicheskie usloviya sozdaniya i funkcionirovaniya informacionno-obrazovatel'nogo prostranstva [Psychological and pedagogical conditions of creation and functioning of information and educational space]. *Pedagogical Informatics*, 1, 60-78. [in Rus.].
- Robert, I. V., Mukhametzhanov I. S., & Kastornova V. A. (2017). *Information and educational space*. Moscow: FSBSI "IEM RAE". [in Rus.].
- Rom, R.B. (1998). 'Safe spaces': Reflections on an educational metaphor, *Journal of Curriculum Studies*, 30(4), 397-408. <http://dx.doi.org/10.1080/002202798183549>
- Sergeev N. (2017). High-priority directions of modernization of university education in innovational society. *International Journal of Educational Management*, 31(1), 56-61, <https://doi.org/10.1108/IJEM-03-2016-0045>
- Thomson, K. S. (2016). *Educational Choice and Educational Space* (Doctoral Dissertation). Columbia University. Retrieved from: http://gateway.proquest.com/openurl?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:dissertation&res_dat=xri:pqm&rft_dat=xri:pqdiss:10011436
- Vilensky, M. Ya. (2002). Obrazovatel'noe prostranstvo kak pedagogicheskaya kategoriya [Educational space as a pedagogical category]. *Pedagogical education and science*, 2, 8-12. [in Rus.].
- Webb, N. M. (1982). Student Interaction and Learning in Small Groups. *Review of Educational Research*, 52(3), 421–445. <https://doi.org/10.3102/00346543052003421>