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Philosophy of a Transdisciplinary Approach in Designing an Open Information and Educational Environment of Institutions of Higher Education

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Abstract: In the modern globalized space, which is riddled with transformational changes, the need to respond quickly and rethink existing approaches to learning throughout the educational industry and higher education institutions, in particular, becomes evident. The proposed article presents a philosophical understanding of the technology of designing an open information and education environment of higher education institutions using a transdisciplinary approach. It is determined that the transdisciplinary approach is a universal and effective means of understanding the content of the information system by overcoming the limits of disciplinary fragmentation of knowledge.
The authors show that in order to apply a transdisciplinary approach, it is necessary to comprehend motives and values, assess the risks from joint actions of various cognitive practices, as well as to determine their relevance to contemporary culture and civilization. They argue that designing the information and educational environment (IEE) of a particular institution of higher education (HEI) through the implementation of relevant methodological approaches based on the philosophy of transdisciplinarity blurs the communicative and cognitive boundaries between a particular disciplinary knowledge. Thus, they consider the information and educational environment of a higher education institution, the design of which was based on a transdisciplinary approach, as providing a synergistic effect from the interaction of its elements and contributing to the improvement of the quality of the pedagogical process. The article also reveals the prospect of using cloud technologies to ensure the effectiveness of the transdisciplinary approach.

Keywords: *transdisciplinary approach, open educational environment, higher education, informatization of education, the effectiveness of educational systems.*

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1. Introduction

In recent years, modern society has faced a number of global challenges, the finding of answers to which lies, among others, in the field of information and communication on a worldwide scale.

Indeed, the fact that globalized digitalization provokes the extensive use of information and communication technologies (ICT) in almost all spheres of human activity. However, the formation of the information society is still far from complete. In addition, the cardinal challenge to humanity by the viral pandemic COVID-19 shows the precariousness and vulnerability of socio-economic relations that have developed within the framework of the modern society of the organizing structure.

Unfortunately, one of the social markers that actualize the necessity to intensify processes to implement the latest information technology and to develop methods for their use has been a certain decline in the quality of education. In our mind, this is due to the need to rapidly massively use distance learning technologies.

This training was not typical for most educational systems in many countries. The introduction of a self-isolation quarantine regime served as an impetus for its further development. Thus, the leading Ukrainian institutions of higher education were forced to switch to a remote system of work to provide educational services. This became possible due to the fact that the signing of the Bologna Declaration and Ukraine took place. Moreover, this process was supported by state support for the modernization of the higher education system, for the development and integration of European "educational standards into the educational process", for introduction effective new approaches and technologies (UNESCO, 2005).

We also focus on the fact that the presence of high-tech tools alone cannot improve the quality of education. Of course, for the effective use of information and communication technologies, there is a need to ensure its functioning with the necessary educational content, the modeling of which needs scientific and methodological support. It was the search for solutions to this problem that led to the emergence of the concept of open education.

Development of the educational system (in this case, the institution of higher education) requires the organization and formation of its specific educational environment based on the principles of openness and mutual communication with the global educational space. The design of any system and in our case an educational one, can be carried out by choosing the correct methodology of certain scientific approaches.

Note that, according to the degree of completeness of knowledge of the surrounding world, modern scientific approaches to the educational process are reduced to four main types, namely, disciplinary, interdisciplinary, multidisciplinary (polydisciplinary) and transdisciplinary approaches (Mokiy & Mokiy, 2014). For example, D. Jeder argues that the transdisciplinary – "holistic approach, which overtakes the limits of disciplinary fragmentation with its disadvantages, provides a more complete vision of the world and life and has as starting point the human nature with all its complexity and diversity of its forms of manifestation"(2014). Thus, we believe that the transdisciplinary approach is aimed at obtaining a synergistic effect in the system of cognition of the reality around us.

2. Theoretical Background

In his scientific work "Philosophy of Information Civilization", back in the late 70s – early. 80s, R. Abdeev (1994, p. 336) argues that "historical experience teaches: where the old concepts, the old content are formulated in a new way, systematically, in the sense of a broader theory, one always gets something more than a repetition of the old. The very old gets a new content within a new system of concepts". The author also quotes G. Klaus that "the interpretation of the old, already known, in the new system is often the beginning of new discoveries" (Abdeev, 1994). In this sense, we will try to find out the essence of the scientific anomaly, which has already passed a certain way from change in understanding the essence of the phenomenon of "disciplinarity" to understanding "interdisciplinarity" and finally entered the system of scientific knowledge as the phenomenon of "transdisciplinarity" caused by modern transformations (transdisciplinary approach) (Rostoka & Cherevychnyi, 2020).

The analysis of literary sources allowed us to consider the evolution of the concept of transdisciplinarity, to reveal a number of approaches to the definition of this concept, to highlight its essential characteristics.

B. Nicolescu, one of the founders of the Study Group on Transdisciplinarity in UNESCO, reveals the basics of the transdisciplinary approach and notes that the word "transdisciplinarity" was first used by in France in 1970 during the international seminar "Interdisciplinarity – problems of teaching and research in universities". The researcher says that Indeed, J. Piaget (1972) considered transdisciplinarity to be the highest level of interdisciplinary relationships that blurred any boundaries between disciplines in the process of scientific research. However, B. Nicolescu (2006) argues that in the time of J. Piaget (1972) "transdisciplinarity" was

considered to be a new phase of interdisciplinarity, a stage of it (in the mid-twentieth century, scientific society was not yet ready for the perception of transdisciplinarity as scientific knowledge about the sciences beyond the study of narrowly focused disciplines) (Nicolescu, 2006).

B. Nicolescu's (2006) positions are also adhered to by researchers M. Mokiy and V. Mokiy (2014), emphasizing that "the development of science in the XX century was characterized by the emergence of interdisciplinary, multidisciplinary and interdisciplinary approaches". The researchers believe that as a consequence, interdisciplinary research was much more effective if they were accompanied by a search for general patterns of behavior of systems of fundamentally different nature. They note that at the same time "the presence of general patterns had to be ascertained, but not explained their nature and mechanisms of formation" (Mokiy & Mokiy, 2014). Of course, a scientist confined within the framework of "academic reductiveness" (Jantsch, 1972) must be held back and unable to fully invest his potential in the process of scientific research. In our opinion, this is why the search for answers to many questions that require prompt solutions, which are sometimes postponed for many decades, or even centuries, is slowed down. We are convinced that transdisciplinarity helps to empower researchers and produces sustainable positions of freedom of thought and activates the emergence of new scientific knowledge.

The Austrian astrophysicist E. Jantsch (1999) expressed the opinion that it is desirable to consider transdisciplinarity as a hyperdiscipline in the vector of the axiomatic approach to correct the interdisciplinary connections of the pedagogical system and innovations. He was convinced that transdisciplinarity reflects "a new space without stable boundaries between disciplines" (Jantsch, 1999). We emphasize that it is the "new space", the development of which is a necessity and a relevant aspect of the present, from our point of view, should ensure the functioning and development of the transdisciplinary approach in education. It is also obvious that modern science confirms the fact that the transdisciplinary paradigm of education is dynamically developing in the era of building an information society.

That is why, speaking about the development of the transdisciplinary paradigm in the modern global space of the world, we focus on the UNESCO Recommendations, which states that transdisciplinarity is one of the main methods of finding solutions to the problems of the 21st century. Here it is proposed "to encourage transdisciplinarity of educational process programs and to teach future specialists, to use transdisciplinary approach to solve complex problems of nature and society" (UNESCO, 1998). Of course, the transdisciplinary approach contributes to the advanced

development of educational systems in many developed countries. Therefore, the future is already outlining the need for professionals of a new generation, who must be adapted to the conditions of a unified information professional environment, who already today need to be trained in the professions of the future.

The documents formed under the auspices of UNESCO argue that multidisciplinary and interdisciplinary approaches are not an effective defense against the current ongoing "fragmentation of knowledge" because. Their conceptual and methodological tools need to be rethought (UNESCO, 1998). Of course, a transdisciplinary approach contributes to the advanced development of educational systems in many developed countries. Therefore, the future is already outlining the need for professionals of a new generation, who must be adapted to the conditions of a unified information professional environment, who already today need to be trained in the professions of the future.

In 1998, an international conference on higher education was held in Paris at UNESCO Headquarters (the results were enshrined in the text of the "World Declaration on Higher Education for the 21st Century: Approaches and Practical Measures"). Specifying the goals and objectives of higher education for the 21st century, Art. 5 (a) and Art. 6 (b) of this declaration point to the need for a broad application of a transdisciplinary approach both in solving complex socio-economic problems of society and in organizing and conducting scientific "research studies" (UNESCO, 1998). In our opinion, an institution of higher education today is not just a place where you can get an education of a certain level, but also represents a complex socio-pedagogical system. The need to support the functioning and interaction of its various components with each other and with the rest of the world has led to the emergence of many methodological and technological solutions. One of such solutions, providing for a comprehensive influence of higher education, is the design and construction of an IEE based on a transdisciplinary approach.

As the Ukrainian scientists note in their research "... a new stage in the development of society is characterized, first of all, by the development of computer and telecommunication technologies, therefore information becomes the basis of modern society" (Dzvinchuk et al., 2020). It is obvious that the formation of information as the main product of the post-industrial space has significantly influenced the style of economic, political, socio-psychological and other relationships of many states and peoples, and has also led to colossal transformational changes in the functioning of their educational systems.

Let's note that their attention to the problem of designing and forming information and educational environments in the higher education system has been paid by many scientists (Andreev, 2004; Antonova, 2011; Bykov, 2018, Bykov & Shyshkina, 2018, Bykov, et al., 2019; Guajardo-Leal et al., 2017; Gurevich & Kademiya, 2009; Khoshimova, 2017; Moiseenko & Sadullaeva, 2016; Osmolovskaya et al, 2016; Poprotskyi & Sapiga, 2019; Terentieva, 2019; Topuzov, 2017; Tytyanchuk, 2019; Vaindorf-Sysoeva, 2012 and others). Researchers consider the principles of design, formation and the conditions that ensure the effective functioning of the educational environment in higher education institutions. In the further presentation, we will take a closer look at the works of the authors describing both the technological and methodological aspects of the design and operation of the IEE.

Undoubtedly, many different scientific works of researchers from different parts of the world are devoted to the problems of designing the IEE of higher education. It is important that this process in modern conditions is taking place in the conditions of a transdisciplinary paradigm.

3. Argument of the paper

In philosophical terms, the goal of the proposed research is to actualize the problem of transdisciplinary education, namely in the context of the application of the methodology of the transdisciplinary approach in designing the IEE. Therefore, it is proposed to focus on the fact that such an environment contributes to a more efficient organization of both the pedagogical process in higher education institutions itself and the accompanying knowledge management processes. The immediate goal of the article provides is to attract the attention of the scientific and educational community to the discussion of the proposed problems, and also, in our opinion, emphasizes the significance for the authors the opinion of scientists at the international level regarding the use of a transdisciplinary approach in the design and formation of the IEE (Kartashova et al., 2017).

We note that in accordance with the analytical data obtained, today one can say that the transdisciplinary approach contributes to the advanced development of educational systems in many developed countries. In accordance with this, the knowledge management factor is gaining relevance, which plays a multi-tasking role in the transformational rethinking (Rostoka & Cherevychnyi, 2018). It is important in this context to create conditions and opportunities for the formation and development of transdisciplinary competence of a person of a new generation, real professional through the rational organization of the information and educational environment of educational institutions.

Let's pay attention to the fact that the human goal of

transdisciplinarity is the search for the unity of knowledge. Scientists argue that implementation of "transdisciplinarity implies the creation of a common conceptual, theoretical and empirical structure among disciplines, therefore the processes of its implementation often offer interesting opportunities in educational research" (Guajardo-Leal et al., 2017). For example, an interesting fact is the creation of a transdisciplinary environment for scientific and practical activities that are aimed at adaptive reform of the education system. So, in 2018, on the basis of the Ukrainian Engineering and Pedagogical Academy (UIPA), through the efforts of independent scientists and the unity of co-organizers (educational institutions of Ukraine) and including the authors of the article, the first transdisciplinary All-Ukrainian Scientific and Practical Web-Forum "The Development of a Single Open Information and Educational Space is a Requirement of the Time" (2018), which provokes further development of this direction and the formation of the "International Scientific and Practical Web-Forum "The Development of the Unified Open Information Space in Lifelong Education "Forum SOIS" (2019, 2020). These events bring unites scientists, practitioners, educational representatives in various disciplinary areas to build a unified transdisciplinary strategy for adaptive education reform, among other things to design and build an effective information and educational environment for Ukrainian education.

It should be noted that there is a certain number of scientific schools in the world that study transdisciplinarity (also that there are several approaches to understanding and using transdisciplinarity). For example, the approach of the Swiss Academy of Sciences (the approach of Christian Paul and Gertrude Hadorn) allows us to consider the construction of the information and educational system of the HEI as a complex social problem. Within the framework of this approach, the following principles are proposed: reducing complexity - involves identifying the necessary knowledge and identifying the people involved in terms of solving practical-oriented problems; achieving efficiency through contextualization – the need to take into account social consequences, as well as their adaptation for understanding by non-specialists; achieving integration through open discussions. The development of reflexivity through recursiveness – each effort in a certain phase of the study becomes a "real world experiment", the analysis of which can be used in further consideration and structuring of the problem, which allows you to correct the initial cognitive attitudes regarding its specific complexity (Guajardo-Leal et al., 2017). To our point of view, in this very connection the application of transdisciplinary methodology acquires the greatest importance.

The generalization of the results of the analytical study of theory and practice on the problem of information and educational systems using information and computer technology has showed that many aspects of the design and formation of IEE have not been sufficiently studied. So incompletely studied remain: the system of scientifically grounded application of technologies for digitalization of education; selection of adequate forms and methods of remote learning; the effectiveness of the use of multimedia educational resources; technologies for advanced training of scientific and pedagogical personnel in conditions of quarantine; research support systems; activities of virtual laboratories and much more. On this basis, for a deep understanding and comprehension of the problems of designing an information and educational environment, we studied the term field of the key concepts of IEE.

Noting that define scientists IEE as the "information content and communication opportunities of local, corporate and global computer networks, formed and used for educational purposes by all participants in the educational process" (Vaindorf-Sysoeva, 2012), and includes media information in printed and electronic forms, information and technical means, applied programs, printed sources, as well as "software products, on the basis of which the administrative, financial and economic activities of the educational institution are carried out" (Andreev, 2004), we have opinion. From our point of view, this approach is somewhat lopsided. Not any combination of technical means and the opportunities provided by them will ensure an increase in the quality of the pedagogical process.

The main resource of any system is the human component. Thus, we believe that it is advisable to include human resources in the IEE component and provide for systemic capabilities to ensure the interaction of personnel in the IEE conditions (motivation to use modern means, determination the level of information competence, if necessary, organization of advanced training, etc.).

Let us also pay attention to such a widespread approach to understanding the IEE strategic model, which is implemented through a system of communication means of collective and individual subjects and a system of means of fixing, storing and broadcasting educational material and interaction with it (Osmolovskaya et al, 2016). From our point of view, such a definition takes into account the role of "collective and individual subjects", but it does not take into account that the institution of higher education is an open system interacting with the educational space, etc.

Considering that the methodology of transdisciplinarity will bring certain qualitative grounds to the philosophy of our research, we note that

the semantics of the term "environment" includes a set of certain conditions of a different nature (both natural and artificial) that determine the interaction of subjects and phenomena of socio-cultural reality. The educational environment is everything that gives a person the high-quality necessary education, contributes to the effective learning and development as a person, as a professional specialist, and also, if you look into the academic context, then a scientist.

The problem of the expediency and prospects of using a transdisciplinary strategy in education has top priorities, especially when it comes to its advanced development. At the same time, the possible contribution of education itself to the effective development of the transdisciplinary approach is undoubtedly advisable.

According to provisions CIRET (International Center for Transdisciplinary Research), transdisciplinarity refers to what may lie between disciplines, across disciplinary divisions or beyond the boundaries of each individual discipline (Lysak, 2014). In our opinion, transdisciplinarity is practically the only one of the possibilities, which allows to expand the scope of research for a deeper understanding and awareness of what is happening and what is to come.

Also, the situation of transdisciplinarity presupposes a violation of the rigidity of the disciplinary divisions of scientific knowledge, the boundaries become "passable", which contributes to the emergence of all sorts of systems "on top" of disciplinary division, intersystem formations, extrasystems, etc (Kiyashchenko et al., 2009). It is true that in order to apply a transdisciplinary approach, to comprehend motives and values, assess the risks from the joint actions of various cognitive practices, as well as their fit into modern culture and civilization a look at the whole situation is necessary.

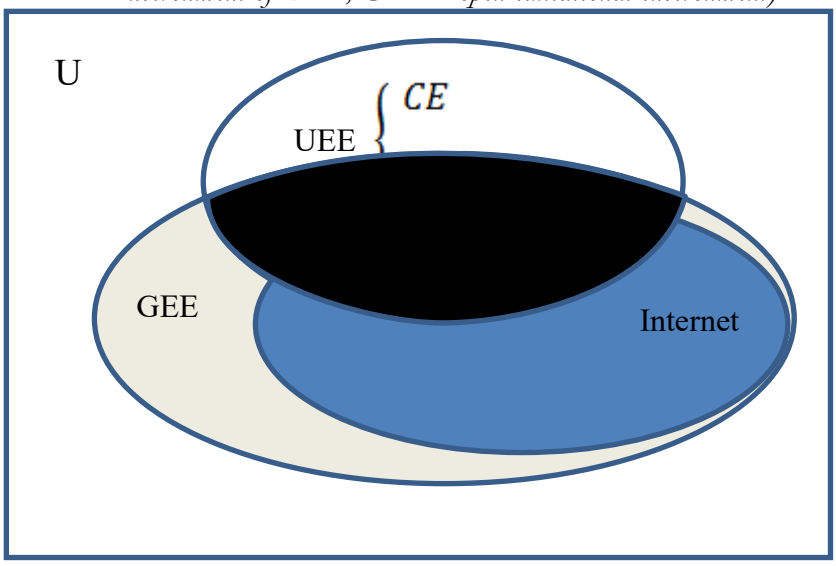
These movements of thought, which in principle, occur in parallel. Therefore, to a certain extent, they can be considered for the time being independently of each other (Tytyanchuk, 2019). Thus, under this approach, there is also a synergistic effect as a result of transdisciplinary research.

4. Arguments to support the thesis

The educational and scientific IEE of can be represented as combination a closed and open part. Moreover, the size of the closed and open parts and their mutual relationship (in terms of the volume of issues to be solved and its materials) are different for different universities: it is enough to compare the educational institution of the military department

(the most closed educational institution) and open universities (Strekalova, 2020). As part of our research, we will consider an open educational environment (Fig. 1).

Figure 1. *Educational environment*
(U – Universum – global educational space; UEE – HEI educational environment; CE – closed (corporate) educational environment of IHE; OEE – Open Educational Environment of IHE; GEE – open educational environment)



Source: Authors' own conception

The use of ICT in the field of education affects the content and forms of training and management of scientific and research activities and has led to the emergence of the term IEE, usually understood as a set of computer tools and methods their functioning, used for the implementation of scientific and educational activities. Note that we choose the modularity principle as the most promising for IEE design, which implies the presentation of a separate course as a complete module in a narrow subject area that is not related to other courses, reference materials, etc.

Moreover, the basic principles of designing the educational environment of any educational institution, and in our case, institutions of higher education, are: activity-based – a special organization of educational and educational activities with a clearly defined goal, planning, execution, tracking the result, assessing it, self-control in the process (explains and designs neoplasms); culturological - determines the sources and factors of development of the personality - the bearer of culture, not only contains a part of culture, projects its development based on the development of

culture, but is also the creator of culture as a system of values (Artyukhina, 2007). Thus, designing an educational environment is a process of implementation and assessment of the real or virtual environment in learning. However, there is no simple recipe for designing this environment, which will always change according to the changes of educational goals. That is, agreeing with other authors, we note that the design of the educational learning environment in the 19-20 century's was very different from of the educational environment in the 21st century (Ifenthaler, 2012). In addition, in this context, the design of the educational environment is aimed at solving three strategic tasks, in particular, at organizing conditions and opportunities for effective development and self-development of the individual; creating conditions and determining priorities for educational, self-educational activities of a pupil (student), implementation of an individual educational trajectory; organization of conditions and opportunities for the formation of the student's life competence (Antonova, 2011). It should be taken into account that in addition to teaching activities (direct transfer of knowledge from teacher to student), the institution of higher education (hereinafter IHE) carries out several other types of activities, the consideration of some of which (economic, legal, commercial, etc.) is outside the scope of our study. Research activities of the university are inseparable from teaching activities. It is carried out not only by the same subjects, but is also an integral part of the educational process. Thus, for an institution of higher education, it is more expedient to talk about the educational and scientific environment, which is understood as the environment of the activities of the participants in the scientific and educational process (student, listener, teacher, methodologist, scientist, administrative, managerial and support personnel), in which the necessary sufficient and safe conditions for its implementation. The environment is a supporting part of the pedagogical system, an essential space surrounding the user, where the educational process unfolds (Bykov, 2018; Bykov et al., 2019). Thus, we came to definition of the information and educational environment, designed on the basis of a transdisciplinary approach, as a set of systems, technologies, means, relations, conditions, phenomena interacting with the educational process, providing effective training of students and support for related processes in the construct of the subject-subject interaction "educator ↔ applicant for education".

The current situation is that the methodological aspects of IEE lag behind the development of technical means, since in the methodological plan IEE integrates the knowledge of such diverse sciences as psychology, pedagogy, mathematics, cybernetics, computer science, etc. (Cheremisina et

al., 2014). Consequently, there is a way out that allows you to find a solution to the current problem, namely, this can be the use of the methodology of the transdisciplinary approach in the design of the IEE.

Technologically, the organization IEE on cloud technologies corresponds most fully to the transdisciplinary approach.

"The usage of cloud technologies for building IEE makes it possible to abandon the necessity of maintaining the complex infrastructures for storing and processing data in the information environment by the organizations or on individual computers and to organize an effective network cooperation between teachers and students" (Samerkhanova, 2017). To design a cloud-based IEE means theoretically researching significant target and content-technological (methodological) aspects of the scientific and educational process, should be carried out in this environment, and on this basis, characterize its composition and structure (its statics and dynamics) necessary for this, taking into account the development the structure of the environment, the influence and peculiarities of the relationship of its parts with other elements of the PC, as well as with the environment surrounding the IHE, in accordance with the dynamics of the goals of creating and using the environment, as well as psychological, pedagogical, scientific, technical and resource limitations of its functioning and development (Bykov et al., 2019). At the same time, methodically, the use of a transdisciplinary approach implies the use of a single term field within the IEE of the IHE, uniformity of approaches to the design of individual training courses, the creation of special services and services for monitoring research, analytics, unification of approaches to the development of electronic educational resources, etc.

Let's just say that the principles of forming a transdisciplinary cloud-oriented IEE institution of higher education should cover the universal principles of scientific knowledge (principles of scientific nature, historicism, consistency, variability, culturology, dynamism, predictability) general methodological principles (determinism, development); specific methodological principles of acmeology (subject of activity, optimality) principles of interaction (co-existence of subjects of the educational environment, the principle of participation in the design of all subjects of the educational environment of professional training) (Yaroshinska, 2015); principles of open education and science, as well as specific principles: adaptability; personalization of the delivery of services; unification of infrastructure; "full-scale interactivity; flexibility and scalability; consolidation of data and resources; standardization and compatibility; safety and

reliability; innovativeness, characteristic specifically for cloud-based IEE" (Bykov & al., 2019).

The following projects can be considered as examples of the implementation of projects that are similar in their specifics to the transdisciplinary ILE, which implements the principle of open education and offers users free access to a wide range of courses on various topics: Coursera; MIT Open Course Ware; Udacity. These projects are supported by leading US and European universities. Each project forms a community of students and teachers and provides opportunities for free communication and study of educational material through the use of to the use of ICT, including providing functions for watching video lectures, conducting audio and video conferences, as well as all other functions inherent in IEE (Cheremisina et al., 2014).

Therefore, the team of authors sees a huge role in giving a new direction to comparative studies in the study of foreign experience, precisely, on the basis of a transdisciplinary approach. Undoubtedly, the consequence of the proposed will be the emergence of a new, promising, self-sufficient system of professional training and further development the activities of scientific and teaching staff of the 21st century.

Conclusion

The challenges of our time have made it necessary to search for new methodological approaches for improving the quality of the higher education. The rapid development of info-communication technologies necessitated the introduction of a transdisciplinary approach to building an educational and scientific environment based on the principles of open education and its modernization to an open information and educational environment.

The introduction of modern technological and methodological approaches to the construction of the IEE of the university blurs its boundaries, making it part of the global open information and educational space.

It should be noted that the transdisciplinary approach as a means of increasing the efficiency of the IEE implies an increase in the info-communicative competence and the development of transdisciplinary competence of all participants. Moreover, this causes a change teaching methods, an increase in the role of digitalization of education, an accentuation of the role of remote education, etc

Also, in the context of the study, there is a reasonably need for the creation and development of the Ukrainian scientific school of transdisciplinarity.

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