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Methodological approaches as a scientific basis for creating a pedagogical concept of distance learning organization in higher education institutions

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Abstract The article examines e-learning as a special form of education and a pedagogical system based on the use of digital technologies. The content of the structural components of e-learning at universities is a pedagogical system that includes goals, means of communication, content of educational information, and subjects of the educational process. with guaranteed achievement of results as a system-forming factor. The following features of the means of communication between the subjects of the educational process are taken into account: students, teachers, tutors, specialist experts, resource developers (designers of pedagogical situations) and their functions. Scientific, methodological and technological support for achieving the desired result of e-learning at universities has been built, taking into account the individual needs of students, expanding the functions of teachers and implementing educational information through digitalization. A diagnostic toolkit has been developed for conducting a predictive pedagogical examination to develop, clarify and adjust students' individual educational trajectories, taking into account expert opinions.

Keywords: educational system, educational institutions, technology, educational process

1. Introduction

The rapid development of information technology, the transition to a digital economy, the creation and improvement of various social and professional networks, and the availability of information require modernization of the classical education system and the filling of new content (Mojsa-Kaja et al., 2015).

. A new direction in the development of education is the transition from the classical educational space (building, book, teacher) to a virtual educational space created by computer hardware and software, as well as the creation of the e-learning system "electronic learning (E-learning)", the basis of which consists of special computer technologies that provide training within the academic discipline according to optimal individual programs for the management of the learning process (Jiang et al., 2017).

In recent publications (Borle et al., 2021; Jarmas & Raed, 2018; Keller & Kesberg, 2017; Mojsa-Kaja et al., 2015; Jiang et al., 2017; Menghi et al., 2019; Mancini et al., 2022; García-Carmona et al., 2019; Maslach et al., 2001; Grant, 2013; Reynolds, 2020), the theoretical potential for significantly enhancing the effectiveness of e-learning over traditional learning is evident. These works also highlight the possibility of implementing various educational opportunities based on procedural and technological components. These opportunities include the individualization of the education process, fostering innovation, promoting mobility, ensuring accessibility, and enhancing efficiency, particularly in terms of time parameters.

Current attention is given to the technological and procedural components of e-learning "E-learning", missing the human component and the closely related scientific achievements of pedagogy as a science of learning education and training of a person, which does not allow in practice to realize all the educational opportunities of e-learning.

The integrated application of scientifically based modern pedagogical approaches to organizing e-learning "E-learning" to set an educational goal, organizing the educational process in the virtual educational space, continuously conducting

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pedagogical measurements and correcting the educational process depending on the results obtained, combined into a single pedagogical concept, will ensure the effectiveness of e-learning “E-learning” learning". Meeting its modern requirements will mean an innovative approach to teaching. This approach will provide a well-designed interactive learning environment to any student, anywhere and at any time, using the resources of various digital technologies along with other forms of teaching materials that are suitable for open learning environments. E-learning allows for the transition from a data management system to a knowledge management system.

At the scientific and theoretical level, the relevance of the problem under consideration is determined by the importance of developing pedagogical approaches to organizing e-learning at the university. These approaches need to be combined into a pedagogical concept and scientifically based practical recommendations developed for teaching teams on the selection and application of technological and procedural components of e-learning, features of the organization of the educational process, depending on the individual educational goals of students.

The scientific and methodological level of relevance of the problem under consideration is determined by the need to develop a set of pedagogical conditions for the transition to e-learning, training teaching staff to work in the virtual educational space of the university, transitioning to tutoring as one of the forms of interaction with students, and developing and applying educational content.

The sociopedagogical level of relevance is determined by education for the socialization of the student’s personality, the need to ensure, when organizing e-learning at a university, not only activity and competence but also social and ethical components of the educational student's goals (Grant, 2013).

Thus, the development of a pedagogical concept for organizing e-learning at a university is an urgent pedagogical problem, determined by the following reasons:

- Organizing e-learning at a university is essential for solving socioeconomic problems related to the development of the country and the individual;

- globalization of the labor market, the emergence of new professions, and variable professional competencies significantly influence a person’s life; demand that he or she enter the labor market; require him or her to take an active position in the context of obtaining general and vocational education; and form and develop relevant competencies that are in demand both by the student himself or by the state both by society and acceptable to them;

- the process currently being implemented in the higher education system, using individual elements of e-learning, does not sufficiently take into account the individual educational needs of the student; his personal, physiological, social, age and other characteristics; and has fairly low variability and adaptive capabilities in relation to individual capabilities of the student;

- The new technological base of e-education requires the creation of human–machine educational systems, the educational space and educational environment of which are implemented using artificial intelligence. The individual educational trajectory is calculated and optimized based on pedagogical models that provide students with guaranteed achievement of their educational goals;

- Changing the technological base of education and the use of pedagogical models require professionally competent, purposeful pedagogical activities by teaching staff and a change in the role and place of the teacher in the educational process (Reynolds, 2020). The teacher becomes not only a source of knowledge; he is assigned functions that are not typical for traditional training: working in virtual space, developing an individual educational trajectory (tutor), designing electronic educational resources, etc. This requires a radical change in the forms and methods of work, a fundamentally new vision of the holistic educational process, which is possible within the framework of targeted advanced training;

- Changing the technological base of education and the use of pedagogical models require the selection of educational material corresponding to its adaptation to the requirements of educational platforms; that is, the creation of specialized educational content that differs significantly from the educational and methodological support available in educational institutions.

The purpose of the article is to provide theoretical justification for the implementation of the pedagogical concept of e-learning at a university, “E-learning”, which includes specific content, forecasting, correction of the educational process and diagnostic tools for its implementation.

Objective of the article: e-learning in the education system.

Subject of the article: the essence, structure and content of e-learning and its formalization and implementation in the educational process of the university.

The theoretical and methodological basis of the study was as follows: the provisions of the general theory of management and management; research in the field of education management; the basic principles of marketing as a methodology for the activity of any enterprise in a market economy; theories and practices of marketing; education marketing concepts; work in the field of marketing of additional education; work in the field of management of educational systems; and areas of pedagogical innovation.

The article uses the ideas of system-activity-justice, personality-oriented and competence-based approaches, modeling and designing objects in integral systems.

2. Materials and Methods

The research employed a comprehensive approach involving theoretical methods such as studying and analyzing pedagogical, psychological, philosophical, and sociological literature related to the research problem, along with an examination of legislative and regulatory documents. Additionally, systematic methods, including systematization, classification, terminological analysis, pedagogical modeling, retrospective analysis, and generalization of existing pedagogical experience, were applied. The empirical aspect of the research involved a pedagogical experiment, diagnostic methods such as testing, conversation, observation, questioning, self-assessment, self-analysis, and mutual assessment, as well as the utilization of a methodology focused on professional activity motivation. The research results were then interpreted through a pedagogical lens.

Analysis of the theory and practice of education in the context of the formation of communicative self-efficacy among university students allows us to identify a number of contradictions between the following:

the focus of the state and society on effective communicative training of university graduates, which is reflected in the requirements of educational standards, and insufficient attention given to problem self-efficacy as an indicator of a new quality of communication (Maslach et al., 2001);

the existence of substantiated theoretical positions in the field of psychology and pedagogy of subjectivity and insufficient development of pedagogical conditions for the formation of communicative self-efficacy as manifestations of students' subjective position in communication (García-Carmona et al., 2019);

the presence of personal opportunities for self-realization in students and insufficient orientation of the educational process toward developing the skills of adequately assessing communicative situations, effective action to obtain a positive result, confidence in one's own capabilities and self-confidence in communication.

In accordance with the objectives, a set of complementary research methods was used:

- theoretical (analysis and synthesis, generalization, comparison, abstraction, specification, modeling, systems approach);
- empirical (questionnaires, testing, expert assessment, analysis documentation, study and generalization of experience in organizing the pedagogical process of continuous professional training);
- praximetric (assessment of student performance results);
- pedagogical experiment;
- Statistical methods for data processing.

3. Results and Discussion

The pedagogical concept of organizing e-learning at a university is an opportunity to ensure a real-time transition from a data management system to a knowledge management system; additionally, the current and future levels of student achievement of educational goals can be assessed using semantic constructions of natural language as a metric space on which the operations of fuzzy equality and fuzzy inclusion are performed.

The structural components of e-learning at a university as a pedagogical system include promising individual goals for obtaining an education, which are independently formulated by the student and adjusted as a result of conducting predictive pedagogical examination; means of communication, the specific feature of which is the immersion of participants in the educational process in the virtual space of the university; educational information in the form of structured educational content filled with specific content that meets the requirements of the virtual educational environment and social order; and subjects of the educational process, such as students, pedagogical and expert communities (teachers, tutors, expert specialists, resource developers, designers of pedagogical situations, etc.) with guaranteed achievement results as a system-forming factor.

Essentially, the term "virtual educational environment" refers to the informational content and communication functionalities of local, institutional, and global computer networks established and employed for educational objectives by all individuals involved in the educational process; "pedagogical situation", defined as a specially prepared problem task by the teacher based on the goal set by the student; "educational situation", defined as a unit of measurement of the level of development of given competencies, determined depending on the time of measurement (current, target, intermediate); "individual educational goal", realized in the target educational situation of the student; and "educational process", defined as the individual educational trajectory of a student from the input educational situation of the lower level to the target educational situation.

The methodological basis of the pedagogical concept of organizing e-learning at a university is a set of scientific approaches (axiological, systemic, environmental, cultural, technological, informational), trends, contradictions, dependencies, principles, essence and content, and criteria for the effectiveness of its use, allowing us to consider this process in the form of an organized set of modern electronic educational and other informational resources focused on meeting the needs of individuals in the educational process; providing educational, methodological and pedagogical support;

providing dependencies, principles, essence and content; providing access to educational materials; and facilitating telecommunication interactions between students and teachers in the interest of achieving learning goals.

The pedagogical examination of e-learning at a university includes an algorithm for selecting experts; identifying and coordinating expert opinions; transforming the obtained data; bringing them to a formalized form for further use in predictive and assessment forms; and acting as a system for forecasting the needs of the labor market, social order and the competencies they require—determining, detailing and correcting goal setting and the optimal individual educational trajectory for achieving it as subjects of the educational process.

The effectiveness of the implementation of the developed pedagogical concept for organizing e-learning in a university setting is determined by the mandatory support of students' activities based on input and final control level of development of basic competencies (cognitive, activity, motivational, ethical, social and behavioral); the ability to universally display the necessary information; reducing the time it takes for the teacher to create it; prompt introduction of changes and additions; and constant improvement of already available materials, which together make it possible to ensure individualization of training in content, teaching methods, methods of control and self-control, rate of assimilation, and level of independence, making them as accessible as possible to students.

The transition of educational institutions from classical forms of organizing the educational process to e-learning is a natural process of education development due to ongoing changes in the social, economic and technical spheres of life of the state and society. Its importance and necessity are difficult to overestimate. The development and improvement of e-learning is a movement toward a new education paradigm that most fully meets the educational needs of the 21st century. As a result of our research, a pedagogical concept for organizing e-learning at a university was created, criteria defining its effectiveness and ways to achieve educational goals were developed.

An ideal theoretical model of the pedagogical concept has been developed for e-learning at a university; this model includes a target block (social order, regulatory framework, purpose); a theoretical and methodological block (methodological approaches, basic principles ensuring the effective implementation of the concept, components of e-learning: human, procedural, technological, which contain the specifics of communication connections); a core of the concept (formalized pedagogical logical-semantic model of organizing e-learning at a university, the author's theorem about the metric nature of the educational space of a university); a content block (virtual educational space of the university, represented by the technical component, technological component, specific pedagogical means of communication); a criterion-evaluative block for diagnosing competencies, basic qualities, and evaluative scales for pedagogical examination; and the result as a system-forming factor.

4. Final considerations

1. The results of the study make a significant contribution to the development of theoretical views on the problem of organizing e-learning through the use of an example of a developed pedagogical concept for organizing e-learning at a university.
2. Reliance on methodological approaches—axiological, systemic, environmental, cultural, technological, informational, and the principles of organizing e-learning at a university—reveal its pedagogical essence and system organization and constitute the conceptual, theoretical and applied basis of the pedagogical concept of e-learning at a university.
3. The content of the main concepts of the study has been clarified ("e-learning", "virtual educational environment", "educational situation", "pedagogical situation", "educational situation", "current educational situation", "target educational situation", "intermediate educational situation", "individual educational goal") in relation to the development of a pedagogical concept for organizing e-learning at a university, allowing us to expand the content of the conceptual apparatus of higher education pedagogy.
4. The concept of metrics in the virtual educational space was introduced, and a theorem of applicability in the metric space of the operations of fuzzy equality and fuzzy inclusion was formulated and proven, which allows the use of the mathematical apparatus of fuzzy logic to formalize the individual educational goal of the student.
5. The concept of the degree of fuzzy inclusion is introduced, and the theorem of its applicability in the pedagogical model of organizing e-learning at a university is proven, which makes it possible to solve the problem of an avalanche-like increase in the number of educational situations when constructing a logical-semantic model.
6. A formalized logical-semantic model of e-learning has been developed at a university that takes into account the peculiarities of the organization of the educational process at a university and is suitable for implementation via computer technology.
7. An algorithm has been developed: conducting a pedagogical examination when organizing e-learning at a university based on the selection of experts using the "snowball" method, adapting for use in pedagogical examination, identifying and coordinating expert opinions, and transforming the obtained data and bringing them to a formalized form for further use for prognostic and evaluation purposes.

8. The requirements for the structure and content of electronic educational content are substantiated, and optimal forms of presentation are proposed for use in organizing e-learning at a university.

9. Conditions have been created for new areas of theoretical development of the problem of organizing e-learning at a university, obtained at different levels of abstraction, generalization and specification of results.

Ethical Considerations

Not Applicable.

Conflict of Interest

The authors declare no conflicts of interest.

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