



Chapter I. THEORETICAL AND PEDAGOGICAL PROBLEMS OF MODERN EDUCATION

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АДАПТИВНЕ НАВЧАННЯ ЯК ЧИННИК ОПТИМІЗАЦІЇ ОСВІТНЬОГО ПРОЦЕСУ У ЗАКЛАДАХ ВИЩОЇ ОСВІТИ

Анотація. На підставі контент-аналізу наукової літератури з окресленої проблеми та вивчення практичного досвіду організації освітнього процесу здобувачів вищої освіти, які навчаються за індивідуальною програмою підготовки та варіантів застосування різноманітних форматів навчання, авторами розкрито сутність адаптивного навчання та описано особливості його застосування в закладах вищої освіти (ЗВО) в умовах воєнного стану.

Методологічними засадами дослідження виступають концептуальні розробки вітчизняних та зарубіжних учених у галузі педагогіки вищої школи, адаптивного навчання, вивчення інноваційних методик організації освітнього процесу в закладах вищої освіти із використанням форматів адаптивного навчання. Під час роботи над організацією дослідження використовувалася комплекс загальнонаукових методів: теоретичні, емпіричні та методи контент-аналізу даних. Теоретичні методи сприяли узагальненню та аналізу психолого-педагогічної літератури, нормативно-правової бази щодо розвитку і впровадження в освітній простір адаптивного навчання. Емпіричні методи підбору науково-дослідницького матеріалу (опитування здобувачів вищої освіти, опрацювання нормативно-правової бази), бесіди з науково-педагогічними працівниками щодо їхньої готовності до реалізації ідей, форм та моделей адаптивного навчання в освітній процес сучасних закладів освіти.

Застосування в освітньому процесі ЗВО технологій адаптивного навчання дозволяє запобігти появі освітніх втрат та прогалин у знаннях за умови індивідуальної підготовки здобувачів вищої освіти. Автори наголошують, що адаптивне навчання передбачає гнучку систему організації навчальних занять з урахуванням індивідуальних особливостей здобувачів освіти. При цьому процесі особлива увага приділяється особистості студента, провідним видам діяльності, особистісним та професійним якостям, рівню сформованості компетентностей.

Наголошується, що оптимальним рішенням для застосування технологій адаптивного навчання є організація навчальної взаємодії з персональним викладачем за індивідуальним графіком у зручний для всіх час.

Ключові слова: адаптація, адаптивне навчання, технології адаптивного навчання, заклади вищої освіти, інновації в навчанні, персоналізований підхід.

ADAPTIVE LEARNING AS A FACTOR IN OPTIMIZING THE EDUCATIONAL PROCESS IN INSTITUTIONS OF HIGHER EDUCATION

Abstract. On the basis of the content analysis of the scientific literature on the outlined problem and the study of practical experience of organising the educational process of higher education applicants studying on an individual training programme and options for using various learning formats, the authors reveal the essence of adaptive learning and describe the features of its application in higher education institutions (HEIs) under martial law.

The methodological foundations of the study are the conceptual developments of domestic and foreign scientists in the field of organization of adaptive learning, the study of innovative methods of organization of the educational process in institutions of higher education using adaptive learning formats. The methodological foundations of the study are the conceptual development of domestic and foreign scholars in the field of adaptive learning, the study of innovative methods of organising the educational process in higher education institutions using adaptive learning formats.

The research was organised using a set of general scientific methods: theoretical, empirical and data content analysis methods. Theoretical methods contributed to the synthesis and analysis of psychological and pedagogical literature, the regulatory framework for the development and implementation of adaptive learning in the educational space.

Empirical methods of selecting scientific and research material (surveys of higher education applicants, development of the regulatory framework), interviews with academic staff on their readiness to implement ideas, forms and models of adaptive learning in the educational process of modern educational institutions. The use of adaptive learning technologies in the educational process of higher education institutions allows to prevent the appearance of educational losses and gaps in knowledge, provided that students are individually trained, and acquire the desired level of knowledge. The authors emphasise that adaptive learning provides a flexible system of organising training sessions taking into account the individual characteristics of higher education applicants. In this process, special attention is paid to the student's personality, the leading kinds of activities chosen by him/her, personal and professional qualities, and the level of competence. It is noted that the optimal solution for the use of adaptive learning technologies is to organise learning interaction with a personal tutor according to an individual schedule at a convenient time for everyone.

Keywords: adaptation, adaptive learning, adaptive learning technologies, higher education institutions, innovations in education, personalised approach.

INTRODUCTION

The problem formulation. A specific feature of the current stage of development of the educational space of Ukraine is the transition from traditional learning to new pedagogical forms of organising educational interaction, which create a favourable environment for the development of a fully developed personality of a higher education applicants.

In accordance with these priorities, higher education institutions face the need to adapt educational systems and pedagogical technologies to the diverse needs and demands of students and academic staff in organising the educational process, based on the realities of martial law, the location of the university, formats (traditional, distance, mixed) and modes (synchronous and asynchronous) of learning.

The content of the didactics contains a large number of pedagogical innovations, non-standard formats for organising the educational process, which take into account the social needs of society and respond to the realities



of wartime. The implementation of such social demands has led to the need to find new methods and strategies for organising the educational process. Adaptive learning belongs to such formats of educational interaction.

The use of adaptive technologies as a means of improving the professional training of future specialists is of particular relevance.

Given the described realities, a personalised approach to the organisation of student learning, based on the position of student centrism, is of particular relevance and is one of the topics that are widely discussed in the context of the development of higher education pedagogy.

Analysis of scientific research. Adaptive processes that are increasingly taking over the educational space of higher education institutions every year lead to the development of new research and innovative projects that will help optimise the educational process. Today, scientific and pedagogical sources consider adaptive learning in the context of traditional approaches to the organisation of the educational process and in the context of the digitalisation of education.

A significant number of scholars' works are devoted to the study of the problem of using adaptive technologies in the education system: social adaptation is in the circle of scientific interests (I. Haletska, L. Tkachenko, I. Shaposhnikova, V. Shulga). A separate group includes scientific research that addresses the problems of adaptive learning as a component of the professional training of students (O. Vynnychuk, M. Lazarev, M. Litvinova, N. Morze, T. Opaliuk, and others). The issue of adaptation of the educational process to the realities of wartime is studied by M. Levchenko, O. Kovtun, A. Kokareva, I. Kramarenko.

AIM AND TASKS RESEARCH

The purpose of the article is to reveal the essence of adaptive learning and describe the peculiarities of its application in higher education institutions under martial law based on the content analysis of scientific literature on the outlined problem and the study of practical experience in organising the educational process of higher education students studying under an individual training programme and options for using various learning formats.

RESEARCH METHODS

The methodological basis of the study is the conceptual development of domestic and foreign scientists in the field of adaptive learning, the study of innovative methods of organising the educational process in higher education institutions using adaptive learning formats.

A set of general scientific methods was used to organise the study. Theoretical methods contributed to the generalisation and analysis of psychological and pedagogical literature, regulatory framework, which made it possible to identify key aspects of the problem of adaptive learning. Empirical methods of selecting research material (surveys of higher education applicants, study of the regulatory framework), interviews with academic staff on their readiness to implement ideas, forms and models of adaptive learning in the educational process of modern educational institutions.

RESULTS OF THE RESEARCH

«Adaptive learning is a learning technology that is based on building an individual learning trajectory for education applicants, taking into account his or her current knowledge, abilities, motivation and other characteristics» (Sikora, 2022).

Adaptive learning is the provision of full-fledged learning on an individual basis according to a personally created programme and taking into account the individual trajectory of personal development.

Adaptive learning is becoming more and more popular in modern education, as it allows for the needs and abilities of each student to be taken into account. Adaptive learning can optimise the educational process in higher education institutions in several ways. It allows you to create personalised learning paths that take into account the level of preparation, learning style and interests of each student. This helps to increase their involvement and motivation to acquire knowledge and develop professional competences. Adaptive technologies can provide real-time feedback, allowing teachers to respond quickly to students' needs. It also promotes the development of independent learning skills, which is key in the modern world (Liashenko, 2017).

Adaptive learning technologies can be used in different ways.

Firstly, these are adaptive platforms and software that adjust the educational content of a discipline (educational component of an educational and professional programme) to individual needs and opportunities to organise learning interaction of students, offering materials and tasks of the appropriate level of complexity.

Secondly, it is the use of analytics of educational data from electronic journals, digital platforms (Zoom, Google Meet, Classroom, Moodle, D-learn) to monitor student progress and adjust the educational process in online and offline modes. Finally, it is the use of intelligent tutors or chatbots that can provide students with instant feedback and support.

Adaptive learning is implemented at three educational levels:

- at the level of certain territories (as the educational space of a country, region, city, where there are enough higher education institutions of different types and levels);
- at the level of a higher education institution (adaptive university);
- at the level of the classroom (adaptive learning system).

Adaptive learning involves a flexible system of organising classes, taking into account the individual characteristics of students. In this process, special attention is paid to the student's personality, chosen leading activities, personal and professional qualities, and the level of competence.



When applying an adaptive learning system in a modern higher education institution, a teacher must clearly understand what tasks can be achieved through the use of this type of learning and what problems need to be solved for its successful implementation.

There are several popular platforms that can be useful for adaptive learning. For example, Smart Sparrow allows you to create interactive courses with adaptive elements. In this context, it is interesting to note the developments of Knewton (USA), which has developed the adaptive learning platform of the same name and is successfully leading the way among progressive platforms of this type.

Knewton offers an adaptive learning platform that uses data analysis to personalise learning. Adaptive learning researcher Yu. Nosenko notes that «Knewton's adaptive learning platform provides continuous adaptability, constantly accumulating data about each pupil/student and properly building an individual learning trajectory, generating appropriate recommendations in real time» (Nosenko, 2018).

Another effective resource is DreamBox. This educational platform specialises in adaptive mathematics teaching for different levels.

These programmes can be integrated into the educational process in order to make the learning of higher education applicants more effective and individualised.

We agree that «of course, there are no identical pupils/students - each person learns, perceives and assimilates didactic material at his/her own pace, based on his/her own previous experience, mental characteristics (voluntary attention, memory, intellectual capabilities, specificity of thinking, temperament) etc. In this regard, the creation of a universal software tool that can quickly and efficiently, in real time, «track» all these features and «respond» appropriately is an extremely difficult task» (Nosenko, 2020). Adaptive learning is a type of learning in which education applicants are provided with appropriate individual resources (textbooks, didactic materials, software, video support of lecture material), options for learning in simulation laboratories, workshops and seminars to meet the realisation of their unique abilities and the goals and mission of the individual trajectory of personal development through adaptive learning technologies.

The combination of components of adaptive learning, educational content through the educational content of first-, second-, and third-order disciplines forms an integral adaptive system, the model of which is shown in Fig. 1.1.

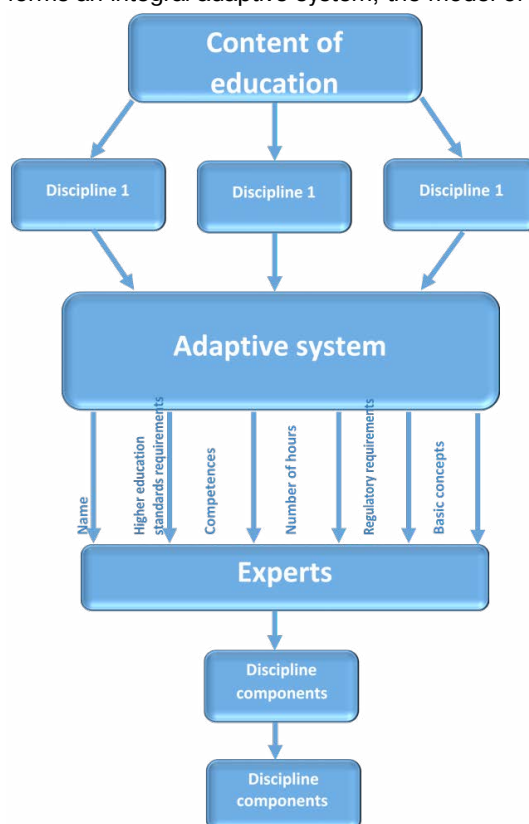


Fig. 1.1. The system of adaptive learning in HEI.

The leading tools of adaptive learning are technologies, the interactive format of which allows you to establish interaction with the student in real time.

«Adaptive learning technologies are technologies that are used in the educational process and can respond in real time to student actions and support the learning process step by step» (Sikora, 2022). Such technologies play the role of a teacher's assistant, a personal tutor, and automatically provide help, advice, and support to each student individually.



Intelligent centres of adaptive technologies accumulate analytical information on how students answer questions, how quickly they cope with group or individual tasks, and how they react to difficulties. After appropriate synthesis of the information, the teacher's further actions, the amount of educational material and the time for its preparation and delivery are determined.

Adaptive learning technologies include the following components: adaptive educational content, sequence and time of study, adaptive survey, assessment forms (adaptive mode of test control and self-control).

The optimal solution for using adaptive learning technologies is to organise learning interaction with a personal tutor according to an individual schedule at a time convenient for everyone. However, such cooperation is quite resource-intensive and expensive, and cannot be successfully organised for large flows of students at the same time.

Adaptive learning technology helps to save teachers' time, provides ample opportunities for individualised learning, reveals problem areas in the educational process, analyses the appropriateness of the choice of the algorithm of students' learning activities and the time spent on studying the material.

Adaptive learning technologies with the help of digital resources and innovative interaction tools help to optimise students' learning activities in real time and build an individual flexible learning path.

Adaptive learning can be implemented in HEIs in various forms. The main ones include:

Adaptive courseware, whose software adjusts the complexity and type of learning material based on the student's level of performance.

Adaptive tests are tests that change the level of difficulty of questions depending on the student's answers to more accurately assess their knowledge. «An adaptive test should consist not only of tasks of optimal complexity relevant to the acquired level of competence of the subject of study, but also diagnose potential difficulties that may arise in the course of further study. Therefore, the set of tasks during adaptive testing for each student will be different and will differ both quantitatively and qualitatively - in terms of the difficulty of tasks, time of their execution, sequence and form of presentation, etc.» (Fedoruk, 2008).

Intelligent educational systems are systems that use artificial intelligence to personalise learning by offering relevant individual tasks and providing quality feedback. Such intelligent open systems include massive open online courses (MOOCs) with adaptive elements.

Massive open online courses (MOOCs) are online courses with large-scale interactive participation and open access via the Internet. MOOCs, in addition to traditional materials and programmes, contain innovative resources for creating platforms for interactive forums to establish effective interaction between all subjects of the educational process.

It is worth noting that in the early 2000s, video recordings of lectures on university subjects began to appear on the Internet in free access. However, it was only the process of creating massive online courses that made it possible to establish broad interactive interaction between higher education students and teachers online.

MOOCs are an innovative form of distance learning that is actively developing in the global educational practice. Such forms of education are designed for students of different levels of training - both beginners and experienced professionals.

Online courses of this format can be tailored to the individual curriculum of the education applicants, choosing the appropriate time and pace of learning, educational components of free choice, according to the level of knowledge and individual development trajectory of each participant in the educational process. These types of adaptive learning help make the educational process more individualised and effective.

«Adaptive systems and platforms are currently evolving, gradually gaining favour with users. Such systems are better and faster to set up and are open to modifications. Their algorithms process the results of each pupil/student in real time and, depending on this, adjust the content, pace, etc., which ultimately contributes to the personalisation of learning, building effective individual educational trajectories» (Nosenko, 2020).

Adaptive learning can be applied to various subjects in higher education institutions. In pedagogy, adaptive platforms can be used to study the theory and practice of teaching, allowing students to learn on an individual trajectory.

In psychology, adaptive systems can help learn complex concepts through personalised tasks and tests that adapt to the student's level of knowledge.

In the field of economics and management, adaptive learning can help students learn complex concepts at their own level by providing content and tasks that are relevant to their knowledge and skills.

Such technologies can also be useful in other fields, such as philology, foreign languages, medical disciplines, as a variant of a workshop or final colloquium, art history, computer science, etc.

In general, adaptive learning is used in all disciplines where it is possible to personalise the learning process according to the level of knowledge and abilities of students.

The use of adaptive learning technologies in the educational process of higher education institutions helps to prevent educational losses and gaps in knowledge, provided that students are individually trained, and acquire the desired level of knowledge.

The analysis of trends in educational processes confirms the effectiveness of adaptive learning technologies in case of the need for changes in the educational process.

Adaptive learning is often called universal because it can be adapted to different educational contexts. However, it is worth noting that the use of adaptive learning has its positive and negative aspects.

Among the positive aspects are the following:



- Individualisation of the educational process - learning is tailored to the needs and level of each student, which significantly increases efficiency.
- Flexibility of the learning mode gives students the opportunity to study at their own pace, focusing on the aspects that are problematic for them.
- Adaptive systems provide instant feedback, which helps to quickly establish communication, identify and eliminate knowledge gaps.

Among the negative aspects of implementing adaptive learning is the high cost of developing and implementing adaptive systems can be expensive. This includes purchasing software, setting it up, maintaining it, and updating it.

Technical limitations on the use of adaptive learning technologies. Not all educational institutions have the necessary infrastructure to support adaptive technologies. In addition, teachers need to be trained and adapt their working methods to new technologies. This may require additional effort and time, which can be problematic in resource-limited environments.

Thus, the implementation of adaptive learning requires careful planning, resources, and close monitoring to avoid or minimise these negative effects.

Teaching in an adaptive system is not only about communicating new information to students, but also about teaching them how to work independently, self-control, mutual control, research techniques, the ability to acquire knowledge, summarise and draw conclusions, and capture the main points in a condensed form. The ability to work independently is something a student must learn. The main feature of the adaptive learning system is a significant increase in the time for independent work in the classroom and, as a result, the normalisation of students' workload with independent work at home.

Thus, adaptive learning is an innovative educational technology or virtual educational system designed to ensure equal access to quality education for all categories of higher education applicants. It is the combination of educational equipment and learning software into a single solution for all students to gain knowledge. By using adaptive learning technologies in the educational process, teachers can offer students a unique combination of sequencing of content and providing instructions that act as good motivators for mastering academic disciplines (Liashenko & Zhuk, 2008).

Continuous improvement of applied skills and the need for new professional competencies. In order to work with adaptive learning technologies, teachers may need additional knowledge and practical skills in working with software to effectively implement them in their disciplines. Adaptive learning can improve the quality and effectiveness of the educational process by making it more personalised and efficient, and it also helps to increase accessibility by providing a variety of learning and feedback methods to help students with different abilities and backgrounds. In general, adaptive learning can significantly improve the quality of education, but requires careful planning, clear analysis, and well-thought-out implementation techniques.

CONCLUSIONS AND PROSPECTS OF FURTHER RESEARCH

Thus, it is worth noting that the implementation of adaptive learning in a higher education institution is a complex, long-term process associated with systemic transformations, restructuring of the educational process (pedagogical system of higher education institutions) in accordance with the needs and demands of higher education applicants, taking into account their individual educational trajectories and developmental features. Identification of priority learning objectives during updating the content of syllabuses, educational professional programmes, information and didactic materials. The successful application of adaptive learning involves updating the content of the educational components of the EPP (competences, programme learning outcomes).

Further scientific research is associated with the improvement of the mechanisms for implementing adaptive learning technologies and effective software and methodological support for the educational process.

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