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METHODOLOGICAL BASIS FOR DESIGNING THE EDUCATIONAL PROCESS IN A DIGITAL EDUCATIONAL ENVIRONMENT

Zholdasbaeva Ayzhamal Rustembay kyzy

English teacher

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Abstract: This article analyzes the methodological foundations of designing the educational process in a digital educational environment from a scientific and pedagogical perspective. Current issues of designing the content, methods, and organizational forms of education based on modern pedagogical design principles in the context of digital transformation are highlighted. The study analyzes the capabilities of ADDIE, SAM, and Backward Design models and substantiates the methodological aspects of their application in digital educational platforms. It also reveals the role of artificial intelligence technologies, Learning Management System (LMS), Learning Analytics, and adaptive learning tools in improving the quality of education. The research results show that organizing pedagogical design in a digital educational environment based on a competency-based approach increases educational efficiency.

Keywords: digital educational environment, pedagogical design, educational design, ADDIE model, SAM model, Learning Analytics, LMS, artificial intelligence, competency-based approach, adaptive learning.

Introduction. In recent years, the rapid development of digital technologies has brought about fundamental changes at all levels of the education system. In particular, the development of artificial intelligence, cloud technologies, Big Data, virtual and augmented reality, adaptive learning systems, and digital educational platforms is shaping new methodological approaches to organizing the educational process. Modern education is no longer just a process of information transfer; it requires designing education in a digital environment, taking into account the individual needs, abilities, and competencies of the student. Therefore, pedagogical design is recognized today as one of the key factors ensuring the quality of education.

Research conducted by the world's leading universities and international organizations recommends the use of scientifically grounded models of pedagogical design as an important condition for the effective organization of education. Specifically, in strategic documents developed by UNESCO, the OECD, and the European Commission, the development of teachers' pedagogical design competence in the context of digital transformation is identified as one of the priority areas of educational policy.

The digital educational environment is fundamentally transforming the traditional relationship between teacher and learner. Now, when planning the educational process, there is a need for the comprehensive use of electronic educational resources, multimedia tools, AI-based auxiliary systems, virtual laboratories, LMS platforms, and educational analytics tools. The effectiveness of these tools depends, first and foremost, on how well the educational process is designed.

Models such as ADDIE, Dick and Carey, Backward Design, ASSURE, and SAM are widely used in the theory of pedagogical design. These models allow for the determination of learning objectives, the development of educational content, the selection of teaching methods, the establishment of evaluation criteria, and the monitoring of learning outcomes. In recent years, these

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models have been integrated with artificial intelligence and Learning Analytics technologies, serving as an important methodological basis for creating adaptive learning systems.

In the Republic of Uzbekistan, the development of digital education is also defined as one of the priority areas of state policy. The "Digital Uzbekistan - 2030" strategy, reforms aimed at transforming the higher education system, and regulatory documents adopted on the implementation of artificial intelligence technologies require the organization of the educational process based on modern pedagogical design. At the same time, there remains a need to expand scientific and methodological research on the creation of digital educational resources in higher education institutions, the design of electronic courses, and the effective use of LMS platforms[3].

At the same time, an analysis of existing scientific research shows that although the theoretical foundations of pedagogical design models have been sufficiently studied, their integration with artificial intelligence, adaptive learning systems, and learning analytics tools, as well as the methodological aspects of their application in the context of the national education system, are still among the issues requiring in-depth scientific research. It is precisely this aspect that determines the scientific novelty and relevance of this research.

Main part. In the context of digital transformation, designing the educational process has become one of the most critical stages of pedagogical activity. While in traditional education, the teacher primarily acted as an educator, in the digital educational environment, they also serve as a designer, facilitator, and educational analyst of the educational process. Therefore, the process of pedagogical design is becoming a central element of modern didactics.

In scientific literature, pedagogical design is defined as "the process of planning and organizing the educational process on a scientific basis that ensures the achievement of educational goals." In this process, all elements of education - goal, content, method, means, control, and result - are developed in a mutually integrated manner.

Today, several international models of pedagogical design are successfully applied in practice. Among them, the ADDIE model is the most universal methodological basis.

The ADDIE model consists of five stages:

1) Analysis (analysis);

2) Design (design);

3) Development (development);

4) Implementation;

5) Evaluation.

The advantage of this model is that it allows for step-by-step work when creating digital courses. First, the needs and competencies of the students are determined, and then the learning objectives are developed. At the next stage, electronic educational resources will be created, placed on the LMS platform, and the educational process will be organized. In the end, the effectiveness of the course will be evaluated using Learning Analytics tools.

In recent years, the ADDIE model has been integrated with artificial intelligence technologies. For example, generative artificial intelligence systems such as ChatGPT, Gemini, and Copilot are used

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in the development of educational materials, the creation of test tasks, and the formation of individual learning trajectories.

Another widely used model in modern pedagogical design is the Successive Approximation Model (SAM).

The main advantage of this model is that it is based on the principle of iterative development. That is, the course is tested and improved not after it is fully ready, but at the end of each stage.

In the digital educational environment, the SAM model demonstrates high efficiency, especially in the creation of electronic courses in a short period of time. This model serves to establish a mechanism for regular feedback between teachers and students.

The Backward Design model, developed by Grant Wiggins and Jay McTigh, is considered one of the most important methodological foundations of competency-based education today.

According to this model, pedagogical design is carried out in the following sequence:

- determining the final learning results;

- developing evaluation criteria;

- designing educational activities.

This approach allows for the organic connection of all elements of the educational process with the final competencies.

On digital platforms, the Backward Design model is widely used to create adaptive courses.

Pedagogical design based on artificial intelligence One of the most significant innovations in the field of pedagogical design in 2024-2026 was the rapid development of generative artificial intelligence technologies.

Using artificial intelligence:

- individual training courses will be developed;

- automatic tests are created;

- evaluation criteria are formed;

- the student's level of knowledge is predicted;

- adaptive tasks are recommended;

- educational analysis is conducted.

As a result, the individualization of the educational process is significantly increasing.

At the same time, it is necessary to strictly adhere to the principles of academic integrity, personal data protection, and algorithmic objectivity when using artificial intelligence.

During the study, the methodological foundations for designing the educational process in a digital educational environment were systematically analyzed, and the impact of modern pedagogical design models on educational efficiency was evaluated. An analysis of scientific literature,

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international experience, and existing pedagogical practices has shown that the effectiveness of the educational process in a digital educational environment depends primarily on its design based on the principles of scientifically grounded pedagogical design. Using digital platforms alone does not guarantee high results. In cases where e-learning resources are not developed based on didactic principles, there is a decrease in student motivation, a decrease in the level of knowledge acquisition, and insufficient effectiveness of educational activities.

The analysis showed that the application of modern pedagogical design models allows for the organization of all stages of the educational process as a unified system. In particular, the ADDIE model is highly effective in identifying educational needs, setting learning goals, creating digital learning materials, and consistently organizing the stages of evaluating results. At the same time, the quality of educational materials significantly increases due to the possibility of continuous improvement based on user feedback in electronic courses developed on the SAM model.

The implementation of artificial intelligence technologies in the digital educational environment has initiated a new stage of pedagogical design. During the study, the possibilities of preparing electronic educational materials, developing individual assignments, creating adaptive tests, and automatically analyzing educational results using generative artificial intelligence tools were studied. It has been established that the use of artificial intelligence technologies serves to increase the individuality of education while reducing the teacher's time expenditure. However, the use of these technologies without pedagogical supervision can lead to a violation of the principles of academic integrity. Therefore, pedagogical monitoring and ensuring digital ethics in the use of artificial intelligence is one of the important methodological conditions.

As a result of using Learning Analytics tools, it is possible to quickly obtain information about students' learning activity, the quality of task completion, course progress dynamics, and individual difficulties. Based on this information, the teacher can redesign the educational content, recommend additional resources, or organize individual consultations. This significantly increases the effectiveness of adaptive learning.

Based on the research results, a conceptual model for designing the educational process in a digital educational environment has been developed. This model consists of the following interrelated components:

- diagnostic and analytical component;

- targeted design component;

- digital resource development component;

- interactive educational component;

- Monitoring and Learning Analytics component;

- reflexive-improvement component.

The organic integration of these components ensures the continuous improvement of the educational process and serves to enhance the quality of learning outcomes.

The results obtained align with international research and confirm that pedagogical design in a digital educational environment is an integral part of a teacher's activity. At the same time, the study

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revealed that the level of use of pedagogical design models in creating digital courses in our country's higher education institutions is insufficient. In most cases, although electronic courses are technically perfect, their didactic design has not been thoroughly developed. This leads to a decrease in the effectiveness of education.

In order to eliminate this problem, it is advisable to organize special professional development courses in pedagogical design in higher education institutions, develop methodological manuals for using educational tools based on artificial intelligence, and integrate Learning Analytics systems into all LMS platforms.

Overall, the research results showed that improving the methodological foundations of designing the educational process in a digital educational environment is an important factor in improving the quality of education, developing students' independent learning activities, forming individual educational trajectories, and developing modern competencies.

Conclusion. Effective organization of the educational process in the context of digital transformation requires the development of a scientifically grounded methodology for pedagogical design. The research results showed that the integrated use of ADDIE, SAM, and Backward Design models in the digital educational environment ensures the systematicity, flexibility, and effectiveness of the educational process. Additionally, the integration of Learning Analytics, LMS platforms, and artificial intelligence technologies with pedagogical design allows for the organization of student-centered learning that takes into account the individual needs of learners. In the future, the deeper integration of artificial intelligence, adaptive learning systems, and educational analytics tools into the pedagogical design process will remain one of the priority areas for improving the quality of digital education and developing student-centered education.

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