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METHODOLOGY OF MODELING THE LESSON PROCESS BASED ON ADAPTIVE DIDACTICS

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Abstract: *The article examines the methodology of modeling the lesson process based on the principles of adaptive didactics. The problem is analyzed from a theoretical and methodological perspective, as the traditional "one-size-fits-all" approach no longer meets the individual needs of students in a modern educational environment. The educational outcome depends on how accurately the teacher can adapt the content, methods, and pace of learning to the individual characteristics of students. The purpose of the article is to define the key components and conditions for modeling a lesson process that ensures the effective development of each student. The research is based on the analysis of studies on adaptive learning, differentiation of instruction, and pedagogical modeling. The article clarifies the distinction between traditional and adaptive lesson models. It proposes a structural model consisting of diagnostic, target, content, technological, and reflective blocks. The main result is a methodology that allows the teacher to design flexible educational trajectories. The study argues that the adaptive lesson process is most effective when continuous diagnosis of learning progress is integrated with real-time pedagogical adjustment.*

Keywords*: adaptive didactics, lesson modeling, individualization, differentiation, educational trajectory, pedagogical diagnostics, flexible learning.*

МЕТОДОЛОГИЯ МОДЕЛИРОВАНИЯ УЧЕБНОГО ПРОЦЕССА НА ОСНОВЕ АДАПТИВНОЙ ДИДАКТИКЕ

Annotatsiya: *В статье рассматривается методика моделирования учебного процесса на принципах адаптивной дидактики. Проблема анализируется с теоретико-методологической точки зрения, поскольку традиционный «унифицированный» подход больше не отвечает индивидуальным потребностям учащихся в современной образовательной среде. Образовательный результат зависит от того, насколько точно учитель может адаптировать содержание, методы и темп обучения к индивидуальным особенностям учеников. Цель статьи*

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— определить ключевые компоненты и условия моделирования учебного процесса, обеспечивающего эффективное развитие каждого ученика. Исследование основано на анализе работ по адаптивному обучению, дифференциации instruction и педагогическому моделированию. В статье уточняется различие между традиционными и адаптивными моделями урока. Предложена структурная модель, включающая диагностический, целевой, содержательный, технологический и рефлексивный блоки. Основным результатом является методика, позволяющая учителю проектировать гибкие образовательные траектории. В исследовании обосновывается, что адаптивный учебный процесс наиболее эффективен, когда непрерывная диагностика учебного прогресса интегрируется с оперативной педагогической коррекцией.

Ключевые слова: *адаптивная дидактика, моделирование урока, индивидуализация, дифференциация, образовательная траектория, педагогическая диагностика, гибкое обучение.*

ADAPTIV DIDAKTIKA ASOSIDA DARS JARAYONINI MODELLASHTIRISH METODIKASI

Annotatsiya: *Maqolada adaptiv didaktika tamoyillari asosida dars jarayonini modellashtirish metodikasi ko‘rib chiqiladi. Muammo nazariy va metodologik nuqtai nazardan tahlil qilinadi, chunki an’anaviy "barcha uchun bir xil" yondashuv zamonaviy ta’lim muhitida o‘quvchilarning individual ehtiyojlariga javob bera olmaydi. Ta’limiy natija o‘qituvchi ta’lim mazmuni, usullari va o‘qitish sur’atini o‘quvchilarning individual xususiyatlariga qanchalik aniq moslashira olishiga bog‘liq. Maqolaning maqsadi har bir o‘quvchining samarali rivojlanishini ta’minlaydigan dars jarayonini modellashtirish uchun zarur asosiy shartlarni va komponentlarni aniqlashdan iborat. Tadqiqot adaptiv o‘qitish, ta’limni differensiatsiyalash va pedagogik modellashtirishga oid ilmiy ishlarning tahliliga asoslanadi. Maqolada an’anaviy va adaptiv dars modellari o‘rtasidagi farq aniqlab beriladi. Diagnostik, maqsad, mazmun, texnologik va refleksiv bloklarni o‘z ichiga olgan struktural model taklif etiladi. Tadqiqotning asosiy natijasi o‘qituvchiga moslashuvchan ta’lim traektoriyalarini loyihalash imkonini beruvchi metodikadir. Tadqiqotda o‘quv progressining uzluksiz diagnostikasi operativ pedagogik tuzatish bilan integral tarzda tashkil etilgandagina adaptiv dars jarayoni eng samarali bo‘lishi asoslab beriladi.*

Kalit so‘zlar: *adaptiv didaktika, dars jarayonini modellashtirish, individualizatsiya, differensiatsiya, ta’lim traektoriyasi, pedagogik diagnostika, moslashuvchan o‘qitish.*

INTRODUCTION

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Modern educational systems require teachers to act not merely as deliverers of knowledge, but as specialists capable of solving complex pedagogical tasks. In any classroom, students vary in their abilities, prior knowledge, thinking speed, and interests. The traditional lesson model, which focuses on delivering the same material in the same way to all students at the same time, often leads to a dilemma where the pace is "too slow for capable students and too fast for those who are struggling."

The relevance of this topic lies in the fact that adaptive didactics is an approach that allows the teacher to adjust the learning process in real-time according to student needs. In this context, "adaptability" refers not to software, but to the pedagogical process itself. While much attention is currently paid to adaptive technologies, the methodological aspects of how to structure a lesson itself based on adaptive principles remain underexplored.

Modern research indicates that organizing individual educational trajectories positively impacts students' academic success (Tomlinson, 2017). Furthermore, pedagogical modeling is a fundamental tool that enables teachers to apply their theoretical knowledge and prior experience to new pedagogical situations (Akopyan, 2019). However, there is a lack of clarity regarding the specific algorithm for modeling a lesson based on adaptive didactics and the criteria for its effectiveness.

The research problem of this article can be formulated as follows: under what pedagogical conditions does modeling the lesson process based on adaptive didactics become effective while accounting for the individual characteristics of students? The purpose of the article is to develop the methodology for modeling the adaptive lesson process and identify its theoretical foundations. The object of the study is the lesson process in general secondary education institutions. The subject is the methodology of modeling the lesson process based on adaptive didactics.

The hypothesis of the article is that the lesson process becomes effective if it begins with diagnosis, and the goals, content, and methods are continuously regulated (adapted) according to the real capabilities of the students. Instead of a static plan, a dynamic, adaptive model must be applied in lesson modeling..

Methods

The article uses a theoretical and methodological research design. The methods include analysis of scientific literature, conceptual comparison, synthesis, and pedagogical modeling. The literature base comprises contemporary studies on adaptive learning, differentiated instruction, and pedagogical design.

The analytical procedure was organized in three stages. In the first stage, the distinctions between adaptive and traditional didactics were identified. In the second stage, the key components

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constituting an adaptive lesson model (diagnostics, goals, content, technology, reflection) were determined. In the third stage, methodological recommendations serving as practical guidelines for teachers were developed.

This article does not present a quantitative experiment. The task is to establish a theoretical basis. Before implementing an adaptive model, its structure and operational mechanisms must be clear. Applying a methodologically vague model in practice could lead to incorrect results.

Results

1. Understanding "Scientific and Practical Significance" in the Educational Context

1. Distinction between traditional and adaptive lesson models

The analysis reveals that the traditional lesson model has a linear structure: Lecture -> Consolidation -> Processing -> Assessment. In this model, the teacher is central, and students are viewed as passive recipients. In contrast, the adaptive lesson model is characterized by a cyclic or network structure. Here, after each stage, the teacher can modify the next step based on student feedback. The fundamental difference is that in the adaptive model, "feedback" and "correction" mechanisms are present from the beginning to the end of the lesson.

2. Criteria for modeling an adaptive lesson

To evaluate the effectiveness of the adaptive lesson process, five main criteria are proposed:

Criterion	Main Indicator	Manifestation in the lesson
Diagnostic criterion	Knowledge of students' initial level	Identifying levels through quick tests, questions, or frontal surveys at the start of the lesson.
Goal-oriented criterion	Differentiation of objectives	Defining "minimum," "standard," and "maximum" level objectives (student choice).
Content flexibility criterion	Levels of complexity in material	Organizing a system of tasks that are simple, average, and complex within the same topic.
Technological criterion	Diversity of methods and tools	Combining individual, group, and pair work; using audiovisual and interactive tools.
Reflective criterion	Self-control and correction	Students evaluating their own activities at the end of the lesson, followed by teacher analysis.

These criteria allow a teacher to independently assess how adaptive their lesson is.

3. Methodology of modeling the lesson process based on adaptive didactics

As a result of the research, the following structural model was

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developed. The model consists of five blocks:

Diagnostic Block: Identifying students' knowledge levels, interests, and needs at the beginning of the lesson. The data from this block forms the basis for shaping the subsequent blocks.

Goal Block: Establishing "trajectories" to achieve the main objective. Each trajectory depends on the student's diagnostic results.

Trajectory A: Reinforcing the main topic (for struggling students).

Trajectory B: Fulfilling standard requirements (for average students).

Trajectory C: Additional in-depth knowledge and research (for advanced students).

Content Block: The division of educational material into "layers." Each layer corresponds to a specific trajectory. For example, in a reading lesson, one group identifies main ideas, while another analyzes the text and draws conclusions.

Operational-Technological Block: The algorithm of the teacher's activity. Here, the teacher acts as a mentor and moderator. They observe the students' difficulties during the lesson and intervene immediately when assistance is needed.

Assessment-Reflective Block: Transparency of lesson results. Assessment is not just a final control test, but includes in-process observation, peer assessment, and formative assessment.

The essence of the methodology is that the teacher prepares three scripts (scenarios) before the lesson but can mix them freely during the lesson.The analysis identifies four conditions necessary for AI technologies to achieve genuine scientific and practical significance:

Discussion

The results obtained are consistent with modern pedagogical psychology theories, particularly theories of differentiated instruction (Tomlinson, 2014). The adaptive approach contributes significantly to the student's sense of self-efficacy, as every student feels a sense of success when completing a task appropriate to their ability.

However, modeling an adaptive lesson involves certain risks. The first risk is the increased workload for the teacher. Preparing three sets of materials and tasks for one lesson is time-consuming. The second risk is classroom discipline issues. If grouping is not organized correctly, "strong" students might avoid working by claiming they are helping "weak" students. The third risk is the objectivity of assessment. It is difficult to assess students following different trajectories using a single criterion.

For master's research, this discussion is significant. Adaptive didactics is not merely a "convenience" but a necessary condition for ensuring the personal development of the student. However, implementing this model in practice requires enhancing teachers' qualifications and restructuring textbooks.

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Conclusion

The methodology of modeling the lesson process based on adaptive didactics involves constructing the educational process as a flexible and manageable system that accounts for the individual characteristics of students. The 5-block model proposed in the article (diagnostic, goal, content, technological, reflective) can serve as a clear guide for teachers in lesson planning.

The main theoretical conclusion is that an adaptive lesson is not arbitrary improvisation by the teacher, but a system built on deep analysis. The continuity of diagnostic and reflective processes forms the "heart" of the adaptive model.

Future research may involve testing this model in school practice, organizing special training to increase teacher readiness, and conducting longitudinal studies on the impact of adaptive lessons on students' academic performance.

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