HYBRID LEARNING IN THE MODERN EDUCATIONAL PARADIGM: THE MECHANISMS OF FORMATION OF THE INDIVIDUAL TRAJECTORY OF THE STUDENT

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Annotation. The article examines the integration of the hybrid learning model and artificial intelligence technologies in the context of the digital transformation of the modern education system. The main models of hybrid learning (HyFlex, inverted classroom, rotary model), their practical advantages and barriers to implementation are analyzed. Special attention is paid to the synergetic effect of artificial intelligence in personalizing the educational process, conducting educational analytics and forming an "intelligent hybrid ecosystem."

Keywords: hybrid learning, artificial intelligence, HyFlex, inverted classroom, digital transformation, personalized learning, learning analytics.
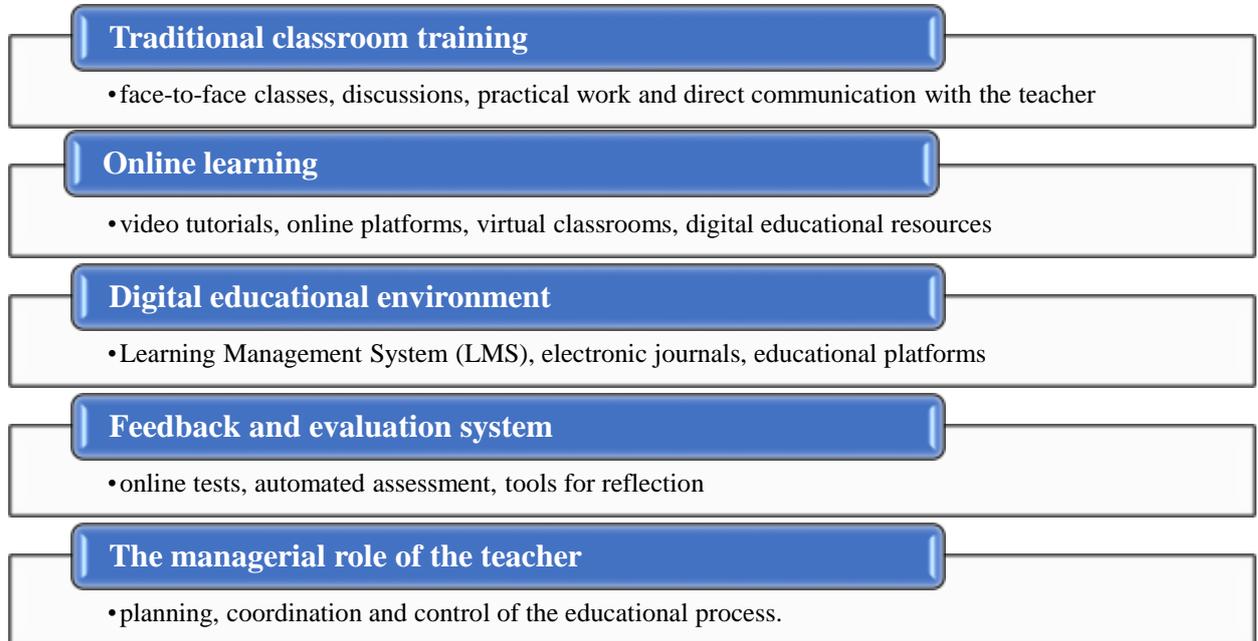
Introduction

The modern education system is developing in the context of digital transformation. The widespread use of information and communication technologies has led to the modernization of traditional teaching methods and the diversification of forms of education. In this process, the hybrid learning model has become one of the modern approaches widely used in the field of education. Hybrid learning is aimed at improving the quality of education by combining traditional face-to-face education with digital and online technologies.

Hybrid learning is an educational model based on the use of a combination of traditional classroom learning and online learning in the educational process. In this model, the forms of learning complement each other and make it possible to increase the student's activity in the learning process. Hybrid learning is often used to provide learning flexibility and accommodate individual student needs.

Results and discussion. Although the hybrid learning model is closely related to blended learning, the proportion of online and offline components in the hybrid model varies depending on the situation, and the learning process is adaptive.

The hybrid learning model consists of several interrelated components:

Traditional classroom training
- face-to-face classes, discussions, practical work and direct communication with the teacher

Online learning
- video tutorials, online platforms, virtual classrooms, digital educational resources

Digital educational environment
- Learning Management System (LMS), electronic journals, educational platforms

Feedback and evaluation system
- online tests, automated assessment, tools for reflection

The managerial role of the teacher
- planning, coordination and control of the educational process.

2. Types of hybrid learning models

The following main classifications of hybrid learning are used in scientific articles:

1. The rotational model students alternate between offline and online learning formats. Students alternate between different "stations" or forms of study according to a specific schedule:

Station rotation: Students move within a group: one group works with a teacher, another performs an online assignment, and the third creates a project.

"Inverted class": the most popular model. The theory is studied by students at home online (videos, articles), and only practical tasks and discussions are conducted in the classroom.

2.Flexible model. Online learning is dominant, and the teacher acts as a consultant and guide. In this model, basic training takes place on an online platform. The teacher consults in the classroom only if necessary or works with small groups. The student independently adjusts the progress schedule.

3. The self-promotion model. When a student studies at a traditional school or university, he chooses the additional courses he needs in an online format. This model increases the student's freedom of choice.

4. Extended virtual model. Most of the training (80-90%) takes place remotely. Students visit the classroom only for sessions, exams, or mandatory face-to-face meetings (1-2 times a week). Offline classes are rarely held, and learning is mostly done online.

5. The HyFlex model.The most modern and sophisticated model. The student decides for himself how he will attend each lesson: either physically attends the classroom, or simultaneously connects online (synchronously), or later sees the recording (asynchronously).

A number of important advantages of the hybrid learning model:

- students' independent work is developing
- increased flexibility and accessibility of training
- It will be possible to personalize the learning process.
- Digital literacy is being formed
- time and resources are used efficiently

   Materials and methods: Hybrid learning is not just a combination of classical forms of education and digital technologies, it is a qualitatively new level of the educational process.

   1. Development of students' independent work. In this model, the student transforms from a passive listener into an active subject. In hybrid learning, students learn to plan their time, independently search for and analyze information. The online component requires internal discipline and motivation from the student. These skills will form the basis for the implementation of the concept of "lifelong learning" in the future.
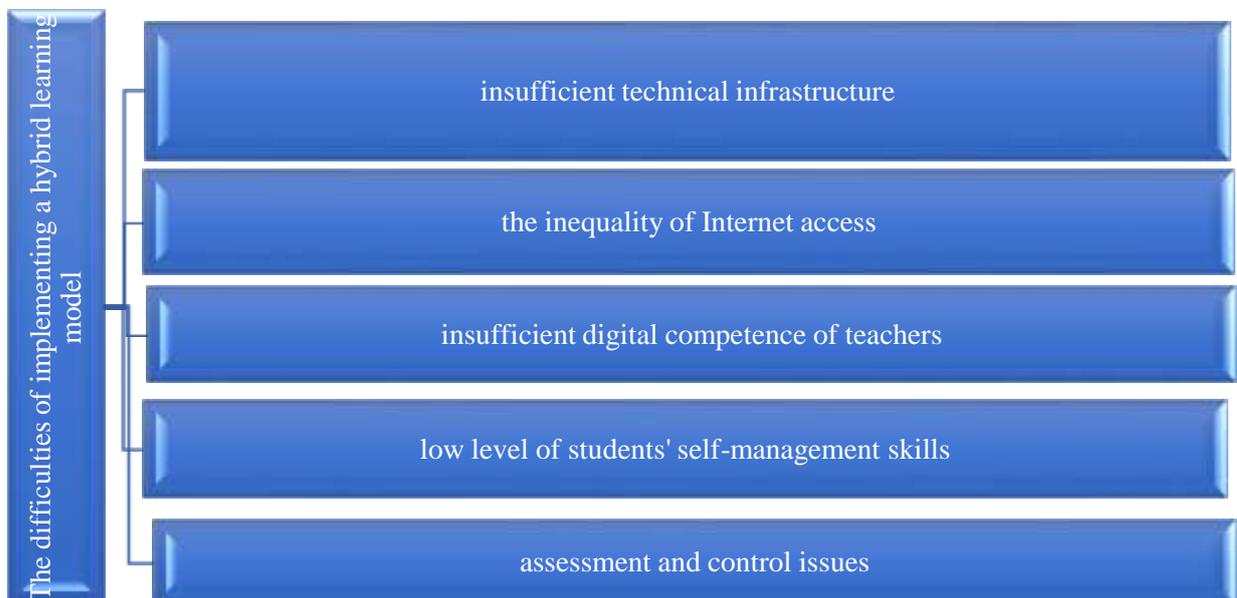
   2. Flexibility and accessibility of training. The hybrid model eliminates geographical and physical barriers in education. Students can combine synchronous (Live broadcast) and asynchronous (notes, assignments) formats. This is especially important for students who study remotely or combine work and study. Students who cannot come to the classroom for health reasons or other reasons do not stay out of the learning process. Educational content will be available at any time and from any device.

3. Personalization of the learning process. The one-for-all approach in the traditional system alternates with an individual trajectory in the hybrid model. Each student learns a topic depending on the speed of their perception. It is possible to repeat difficult moments and quickly go through clear sections. The teacher can give assignments that correspond to the level of each student, based on digital data.

4. Formation of digital literacy. One of the main competencies of the 21st century is the ability to work freely in a digital environment. Students master not only LMS platforms, but also collaborative tools (Zoom, Teams, Miro), cloud technologies and digital etiquette. In a hybrid environment

5. Efficient use of time and resources. This advantage has a positive effect on both the student and the educational institution. Save time and money on the road. The educational institution can effectively manage the classroom fund, electricity and other material resources. High-quality digital content (video lecture, interactive test), prepared by the teacher once, will be used for several years and for many groups, which will focus the teacher's efforts on strategically important tasks.

The advantages of hybrid learning not only improve the quality of education, but also create conditions for the formation of a flexible personality adapted to the modern labor market. This model is an effective tool for democratizing education and adapting it to the needs of each individual.

The difficulties of implementing a hybrid learning model

- insufficient technical infrastructure
- the inequality of Internet access
- insufficient digital competence of teachers
- low level of students' self-management skills
- assessment and control issues

The modern education system is undergoing drastic changes under the influence of the global digitalization process. The accelerated development of information and communication technologies requires modernization of the forms and content of education, flexible and effective organization of the learning process. In this context, artificial intelligence (AI) and hybrid learning are becoming one of the main

mechanisms for improving the education system. These technologies allow us to take into account the individual characteristics of students, personalize the learning process and improve the quality of education.

Artificial intelligence is a set of computer systems and algorithms capable of simulating human intellectual activity. In the field of education, AI is used to automate the learning process, analyze learning data, predict student academic achievements, and adapt learning content.

The content of AI in education includes the following areas:

* continuous monitoring of students' learning activities;

* Provision of personalized learning materials;

* Adaptive assessment and feedback systems;

* the use of virtual teachers and intelligent assistants;

* analytical processing of learning outcomes.

The importance of artificial intelligence and hybrid learning is determined by several aspects.

First, the personalization of learning.Artificial intelligence technologies make it possible to form an individual learning trajectory, taking into account the level, pace and needs of each student in a hybrid learning environment.

Secondly, the effectiveness of the educational process. Hybrid learning reduces time and space constraints, and artificial intelligence algorithms optimize the learning process by analyzing learning data.

Third, improving the quality of education. Analytical tools based on artificial intelligence make it possible to identify weaknesses and provide timely support to students.

Fourth, the transformation of the teacher's role.Artificial intelligence and hybrid learning transfer the teacher to the role of a guide and consultant, rather than an information provider.

Artificial intelligence and hybrid learning are closely related. Hybrid learning creates a favorable environment for the introduction of artificial intelligence technologies, and artificial intelligence increases the effectiveness of hybrid learning. Artificial intelligence algorithms combine online and offline learning data and comprehensively analyze a student's learning activities.

When implementing artificial intelligence and hybrid learning, a number of problems arise. These include data security, digital inequality, digital teacher competence, and insufficient technological infrastructure. Therefore, the implementation of these technologies should be carried out systematically and in stages.

Artificial intelligence and hybrid learning are important areas of modernization of the education system. They allow you to personalize the learning process, improve the quality of education and ensure the flexibility of the education system. In the future, artificial intelligence and hybrid learning will become the basis for the sustainable development of education.

The combination of a hybrid learning model and artificial intelligence forms an "intelligent hybrid ecosystem" in the education system. This is not just a change in the format of education, but a technological transformation that takes the quality of education to a new level.

The synergetic effect of AI in hybrid learning:

Direction	Hybrid learning before AI	Hybrid learning integrated into AI
Feedback	Only at the touch of the teacher	In real-time mode
Content	A standard program, common to all	Content tailored to individual abilities
Control	Checking after class	Process monitoring
The role of the teacher	Informant and verifier	Mentor, coach and moderator

Artificial intelligence is the "intellectual core" of hybrid learning. This bridges the gap between online and offline components, making learning smoother and more productive. In the future, artificial intelligence will not replace the teacher, but will infinitely increase his capabilities and create conditions for individual attention to each student.

Conclusion. Thus, the hybrid learning model is a modern educational approach that combines the advantages of traditional and digital learning. It allows you to take into account the individual characteristics of students, flexibly organize the learning process and improve the quality of knowledge. In the future, the hybrid learning model is likely to become one of the main forms of the education system.

The hybrid learning model is not a temporary solution caused by the pandemic, it is a stage in the evolutionary development of higher education. To increase its effectiveness, it is necessary to improve the infrastructure at the state level, and at the University level, to review the methodological training of teachers. By removing

barriers, we gain the opportunity to democratize education and bring its accessibility to a new level.

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