The Role of Adaptive Technologies Based on Artificial Intelligence in Modern Education

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Abstract: This article analyzes the importance, advantages and limitations of the use of adaptive learning technologies in the modern educational process. Various practical applications of these technologies are also discussed, including language learning platforms, mathematical problem-solving systems, and opportunities for students with special needs.

Introduction: Modern educational systems widely use technologies to increase the effectiveness of the educational process. In particular, Artificial Intelligence (AI) technologies occupy a significant place in adaptive education systems. This article analyzes the importance, advantages and possibilities of practical application of adaptive education systems. In recent years, extensive reforms have been implemented in all areas in our country. In particular, recognizing the great importance and potential of artificial intelligence (AI) technologies, special attention is paid to their development.

Today, there is a set of circumstances that make it necessary to learn to adapt to the individual needs of students. Language skills, prior knowledge and experiences, and learning difficulties create a diversity of learning needs.

Until recently, we focused on bringing technology into the classroom. By now, the question has shifted to whether technology should be in the classroom or whether it should be a requirement for every student. These factors have created the perfect environment for the development of flexible learning, leading to a critical look at the classroom resources needed for individualized access to each student.

In the era of growing technological development, Artificial Intelligence is becoming the main factor affecting the development of various spheres of life. It is recognized that these technologies have the potential to bring enormous benefits, from productivity and efficiency gains to advances in science and innovation. In turn, it is necessary to increase the number of qualified personnel to introduce artificial intelligence to science. After all, experts who are masters of their profession will be the main factor in the penetration of Artificial Intelligence into all areas.

METHODS

Adaptive educational systems are systems that adapt educational materials to the needs, level of knowledge and learning styles of students. These systems create a comfortable learning environment for each student by personalizing the educational process. SI technologies allow analyzing a large amount of data and making quick decisions in this process. Adaptive educational systems are systems that adapt educational materials to the needs, level of knowledge, interests and preferences of students. These systems use Artificial Intelligence (AI), machine learning and Big Data analysis technologies to personalize the learning process. The main goal is to create an individual study plan for each student and improve their educational experience.

Adaptive learning in education is a form of learning in which a student is first diagnosed, and then a program determines a learning path tailored to their individual needs. Elements of adaptive learning are consistent across all programs.

Diagnostics determines the starting point for each student. There are different ways to assess what a

student knows or doesn't know:

• Pretest the student.

• A flexible placement program to assess students' needs from a common point of view and determine what they need over time based on how they answer questions.

After the diagnosis, the system creates a personalized learning path for each student. It usually consists of two components:

1. A "learning" component that introduces a concept or reinforces what has already been taught by the teacher.

2. A 'practice' component, usually consisting of a range of interactive element types, checks what the student has understood and provides support for students independently of the teacher.

The goal is to attract students to effective struggle. By providing students with specific needs, each student focuses on their unique ability gaps and works within their zone of proximal development. Students receive content that is not too difficult or too easy, but which is correct. Elements such as games, prizes, and other engagement methods encourage students to continue.

Adaptive learning programs are usually associated with independent practice. After all, they are perfect for students with limited access to computers. But they can also be used in many additional settings:

• Home assignments

• After school programs

• Breakout sessions

• Formative assessment to determine instruction

Programs can be used to fill different periods of the school day.

RESULTS

Adaptive learning systems based on artificial intelligence provided students with the opportunity to receive education based on an individual approach. This approach provided the following advantages:

☐ Individualized education: Educational programs are developed according to the abilities, knowledge level and interests of each student. Educational efficiency was increased by providing customized materials and tasks for students.

☐ Progress monitoring: Artificial intelligence systems constantly monitor the success and difficulties of students in the educational process, updating the curriculum according to their needs.

☐ Support: Individualized support was provided by identifying students' weaknesses and providing them

with additional resources, referrals and advice.

The level of achievement of students who used adaptive learning systems based on artificial intelligence was significantly higher than that of students who used traditional education methods:

☐ Level of knowledge: The results of tests and exams conducted among students showed that the group that used Artificial Intelligence systems was higher. This means that students acquire knowledge more deeply and widely.

☐ Overcoming difficulties: Artificial intelligence systems have helped students overcome difficulties through an individualized approach. This increased students' confidence in the educational process.

☐ Motivation: The motivation and interest in the learning process of students who received education through artificial intelligence systems was high. This, in turn, had a positive effect on their educational results.

Monitoring of the educational process Artificial intelligence systems constantly monitored and analyzed the educational process. This produced the following results:

☐ Real-time analysis: Students' results and learning progress were monitored and analyzed in real-time. This made it possible to adapt the educational programs dynamically.

☐ Maintaining balance: Students' strengths and weaknesses were determined, and necessary measures were taken to maintain balance in the educational process.

☐ Effective distribution of resources: Educational resources are allocated according to the needs and abilities of students. This increased the effectiveness of the educational process.

The level of satisfaction of students and teachers who used adaptive learning systems based on artificial intelligence was higher compared to traditional educational methods:

☐ Learner Satisfaction: Learners are satisfied with the personalized approach and support provided through AI systems. They felt supported and motivated during the learning process.

☐ Teacher satisfaction: Teachers have been able to better understand and respond to the individual needs of their students through AI systems. This also increased the level of satisfaction of teachers.

☐ Satisfaction of educational institutions: Educational institutions had the opportunity to improve the level of students' learning and effectively manage the

educational process through artificial intelligence systems. This improved the overall results of educational institutions.

DISCUSSION

During the analysis of the results of this research, a number of important aspects related to the introduction of adaptive learning systems based on Artificial Intelligence (AI) into the educational process were identified. The results showed that Artificial Intelligence systems not only help to increase the efficiency of students' learning, but also make the educational process more personalized and adapted to individual needs. Below are the key aspects of the analysis:

The results of the study showed that adaptive learning systems based on artificial intelligence help to make the educational process more effective, taking into account the individual needs of students. By providing customized curriculum and materials for each student, students have the opportunity to learn according to their abilities. The following results were achieved through this approach: ⬚ Student success rate: Students trained with SI systems achieved higher results than students trained with traditional educational methods. ⬚ Pupils' activity and participation: Pupils' interest and participation in the educational process increased. This increased their motivation and made the learning process more effective.

The level of learning and the quality of knowledge of students has increased significantly through Artificial Intelligence systems. The results of tests and exams conducted with students during the research revealed the following indicators:

⬚ Test results: Students trained with the help of artificial intelligence systems received higher grades in tests and exams compared to students trained with traditional educational methods. This shows the quality and depth of students' knowledge.

⬚ Retention of knowledge: The ability of students to remember and apply the learned knowledge in practice has also improved. Artificial intelligence systems have enabled students to repeat and consolidate knowledge, making their learning process more efficient.

Adaptive learning systems based on artificial intelligence have provided a number of advantages not only for students, but also for teachers and the education system:

⬚ Convenience for teachers: Artificial intelligence systems have made it possible for teachers to understand the individual needs of students and provide education accordingly. This eased the work of teachers and made their role in the educational process more effective.

⬚ Effectiveness of the educational system: Artificial intelligence systems made it possible to optimize the educational process and increase its efficiency. This improved the overall results of the educational system and increased the competitiveness of educational institutions.

The introduction of adaptive learning systems based on artificial intelligence into the educational process also included technological integration and innovation:

⬚ Technological development: new technologies and innovations were introduced in the educational process with the help of artificial intelligence systems. This made the educational process more advanced and modern.

⬚ Data analysis: Artificial intelligence systems made it possible to analyze data in the educational process and use it effectively. This helped to increase the success rate of students and make the educational process more effective.

CONCLUSION

Adaptive learning systems based on artificial intelligence have brought great changes in the educational process. Adaptive learning systems based on artificial intelligence have provided students with an opportunity to learn based on an individual approach, helping to make their learning process effective and interesting. These systems have improved the learning process of students, adapted educational programs according to their abilities and monitored results in real time, and these systems have helped to increase the motivation of students and make the learning process interesting.

In fact, adaptive learning has become an integral part of the curriculum. As tools become more sophisticated and different needs emerge, personalized learning has become more important to ensure that every student gets what they need and to give teachers the control and support they need.

In short, Artificial Intelligence technologies are bringing great changes in the field of education. With the help of adaptive educational systems, the educational process can be adapted to individual needs, making the learning process of students effective and interesting. Therefore, the role and importance of artificial intelligence technologies in the field of education is increasing, and the researches and practices conducted in this direction will serve to further improve the quality of education in the future.

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