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ARTIFICIAL INTELLIGENCE IN THE TRANSFORMATION OF THE HIGHER EDUCATION SYSTEM OF UZBEKISTAN: GLOBAL TRENDS AND PRACTICAL STRATEGIES

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ABSTRACT

This study analyzes the theoretical and methodological foundations of implementing artificial intelligence (AI) technologies in the higher education system, as well as their practical effectiveness. The article examines in detail the experiences of technologically advanced countries such as the United States, China, and South Korea, and proposes a "Digital University" model adapted for higher education institutions (HEIs) of Uzbekistan. The study scientifically substantiates the role of AI in improving the quality of education, creating individualized learning trajectories, and optimizing teachers' workload.

Keywords: Artificial intelligence, higher education transformation, digital university, adaptive learning, academic analytics.

Introduction

O'ZBEKISTON OLIY TA'LIM TIZIMINI TRANSFORMATSIYA QILISHDA SUN'IY INTELLEKT: GLOBAL TENDENSIYALAR VA AMALIY STRATEGIYALAR

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ANNOTATSIYA:
Ushbu tadqiqotda oliy ta’lim tizimida sun’iy intellekt (SI) texnologiyalarini joriy etishning nazariy-uslubiy asoslari va ularning amaliy samaradorligi tahlil qilinadi. Maqolada AQSH, Xitoy va Janubiy Koreya kabi texnologik yetakchi davlatlarning tajribalari batafsil ko‘rib chiqilib, O‘zbekiston oliy ta’lim muassasalari (OTM) uchun moslashtirilgan "Raqamli universitet" modeli taklif etiladi. Tadqiqot davomida SIning ta’lim sifatini oshirish, individual o‘quv trayektoriyalarini yaratish va o‘qituvchilarning ish yuklamasini optimallashtirishdagi roli ilmiy asoslab berilgan.

Kalit so‘zlar: sun’iy intellekt, oliy ta’lim transformatsiyasi, raqamli universitet, adaptiv o‘qitish, akademik tahlil.

I. INTRODUCTION: DIGITAL EVOLUTION IN EDUCATION

As humanity enters the era of the fourth industrial revolution (Industry 4.0), the education system is emerging as the locomotive of this process. Artificial intelligence is no longer just an auxiliary algorithm, but a fundamental force changing the paradigm of education. The tasks set out in the Strategy of the Republic of Uzbekistan "Digital Uzbekistan - 2030" and the "Concept for the Development of the Higher Education System until 2030" envisage a radical modernization of educational processes. In this process, generative artificial intelligence (GenAI) and machine learning (Machine Learning) technologies serve to personalize the learning process of students, and free teachers from routine tasks and direct them to more creative and scientific activities.

II. FUNCTIONAL MODELS OF ARTIFICIAL INTELLIGENCE IN EDUCATION

To understand the role of AI in education, it is necessary to analyze its three main functional models:

2.1. Adaptive Learning Model

In this model, the AI system monitors each student's actions (speed of answering questions, type of errors, areas of interest). If a student has difficulty understanding a mathematical formula, the system presents the topic to him in a different way - in the form of video, infographics or simplified text.

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2.2. Intelligent Tutoring Systems (ITS)

This is a digital embodiment of the principle of "one tutor per student". ITS provides professional advice to the student outside of class, finds answers to his questions and guides him in solving complex problems.

2.3. Academic Analysis and Prediction (Learning Analytics)

The system can predict with 90% accuracy through "Big Data" analysis which student is at risk of being expelled or which student has high potential in a particular subject. This allows the university administration to take the necessary measures in a timely manner.

III. INTERNATIONAL EXPERIENCE: ANALYSIS IN THE CROSS-COUNTRY SECTION

3.1. USA: Academic performance using algorithms

In US universities (MIT, Stanford, Harvard), AI has become an integral part of educational management.

• Proven fact: after Arizona State University (ASU) began using adaptive AI platforms in teaching mathematics, the rate of successful completion of the course by students increased by 17%, and the number of dropouts decreased by 45%.

• Jill Watson case: The Georgia Institute of Technology experience showed that the AI assistant reworked more than 10,000 student questionnaires, saving teachers 60% of their time.

3.2. China: State control and the technological race

China is the world's largest experimental field for the introduction of AI in education.

• Proven fact: More than 60,000 schools and universities in China use systems such as "Zhihu" and "Squirrel AI". These systems analyze the student's level of knowledge in 10,000 small points.

• Result: Chinese students show the highest results in international PISA tests and economic analysis subjects, which is seen as a direct result of digital adaptive systems.

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3.3. European Union: Ethics and Security Priority

In European countries (Germany, France), the main focus is on the ethical aspects of AI and data protection (GDPR). This can be an important example for Uzbekistan in terms of personal data protection.

3.4.Japan and South Korea are the world leaders in integrating artificial intelligence (AI) into education. Their experience is very valuable for Uzbekistan, because they consider technology not just a convenience, but a strategy for increasing national intellectual potential.

Below we analyze the experience of these two countries in using AI in education:

In the Japanese education system, AI is considered as part of the concept of "Society 5.0". Their main goal is to improve human life with the help of technology and adapt education to each individual.

• AI robots in English teaching: The Japanese government has deployed more than 500 AI robots in schools and universities to improve English language proficiency. These robots check students' pronunciation and interact with them live.

• Adaptive learning system "Qubena": Many universities in Japan use the "Qubena" system in teaching mathematics and science. AI determines where a student makes a mistake in solving a problem (for example, whether he applied a formula or made a calculation incorrectly) and gives him additional exercises to fill in that gap.

• "Digital Assistant" for teachers: In Japan, AI has reduced teachers' administrative work (attendance, test checking, writing reports) by 40-50%. This leaves teachers more time to conduct educational and psychological conversations with students.

3.5. South Korea is the first country in the world to fully transition to "Digital SI Textbooks" in all schools and universities by 2025.

• Personalized SI-based textbooks: Korean textbooks are not just PDFs, but interactive platforms. If a student quickly masters a topic, SI gives him more complex cases. If he has difficulty, it provides simple explanations and additional videos.

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• Metaverse and SI integration: "Metaverse" campuses have been created in Korean universities (for example, Yonsei or SNU). Students communicate with SI professors in a virtual world, conduct laboratory experiments virtually. This is especially effective in testing economic models.
• Behavior analysis: In "Smart Auditoriums" in Korea, SI analyzes students' facial expressions and attention during a lesson. If a student is bored or does not understand, the system signals the teacher or suggests changing the teaching style.

COMPARATIVE TABLE: JAPAN AND SOUTH KOREA

Feature	Japan	South Korea
Main emphasis	Robotics and speech development	Digital Textbooks and the Metaverse
Purpose	Reducing workload	Creating a Fully Digital Learning Environment
In economic education	Simulators and analytical models	AI-Forecasting and Cyber-Finance
Approach	Slowly, adapting to tradition	Aggressive and Rapid Technological Transition

What are "Metaverse" campuses?
"Metaverse" campuses are a 1:1 replica of the physical territory of a university (buildings, auditoriums, libraries) in the digital world (virtual reality). This is not just a video game, but a holistic digital ecosystem where students and professors communicate in real time through their avatars, conduct classes and conduct scientific research.
To better understand this concept, let's dwell on its main features:

1. How does a "Metaverse" campus work?

A student creates his virtual avatar and enters a digital copy of the university through VR glasses or a regular computer. There he:
• Enters a virtual auditorium and attends a lecture;
• Meets with other students in the "campus" garden and discusses the topic;
• Can simulate chemical experiments or financial markets in a virtual laboratory.

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2. How does a Metaverse campus differ from regular "Online-Zoom" classes?

Feature	Zoom / Distance Learning	Metaverse Campus
Sense of Participation	Student sits facing the screen (passive)	Student "walks" around campus (active)
Communication	Only takes turns speaking	Group gathering, gestures
Practice	Only video viewing is possible	Touching devices, experimenting
Social Environment	Connection is disconnected when the lesson is over	Can stay on campus after class

Why are Japan and South Korea investing heavily in this?

• Elimination of distance barriers: A student anywhere in the world will feel like they are in the center of a university in Seoul or Tokyo.

• Safe practice: For example, medical students can practice virtual surgery, and finance students can study stock market simulations without any real losses.

• Economic efficiency: There is no need to build new buildings to accommodate thousands of students, it is enough to expand server capacity.

Benefits for finance students:

A "Virtual Stock Exchange Center" will be created on the Metaverse campus. There, students will learn how stock trading is going on, not on monitors on the walls, but in 3D space, moving around graphs and visually analyzing the correlation of data.

In short: Metaverse campus is the future of education, which completely eliminates the view that "distance learning is boring and ineffective."

In your work, it would be very appropriate to present this technology as a "Future Innovation Model" for Uzbek universities.

IV.RECOMMENDED AI APPLICATIONS AND TOOLS FOR UZBEKISTAN

As a practical part of the article, we recommend the following tools that are recognized in the world today and are available to Uzbek students:

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4.1. Academic writing and language learning:

1. Grammarly AI: Not only corrects grammar, but also helps to choose the tone of the text (formal, academic, friendly).
2. DeepL Write: Provides 3-4 times more accurate results than Google Translate when translating and editing texts with high accuracy.

4.2. Scientific research and data analysis:

1. Perplexity AI: This is a "smart encyclopedia" that shows a clear source (link) for each piece of information. This is important in the fight against plagiarism.
2. Elicit: The best assistant for a researcher. It will find the answer you need from millions of scientific articles and write a brief summary.
3. Julius AI: Instantly analyzes complex statistical data and Excel files and draws graphs.

4.3. Organization of the learning process:

1. Notion AI: Automatically systematizes lesson notes and plans for students.
2. MindMeister: Uses AI algorithms for visualization of thoughts (Mind Mapping).

V. PRACTICAL MECHANISMS OF IMPLEMENTING AI IN UZBEKISTAN'S HEIs

5.1. Transition to a "hybrid" pedagogical model

We propose not to replace the teacher with AI, but rather to cooperate with the teacher and AI.

• Proposal: 30% of the lecture should be independently mastered on online AI platforms, and the rest should be held in the form of live discussions with the teacher.

5.2. Special recommendations for Finance and Economics majors

We offer the "Digital Twin" technology for finance students. Students can create a virtual economic market using AI and see in real time what the results of various decisions (for example, increasing the interest rate) will be.

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5.3. Updating the rules of academic ethics

It is necessary to form a culture of citing AI as a "citation" (source), not prohibiting it. It is recommended that each term paper or thesis include a "Report on the use of AI" as a separate appendix.

VI. WHAT ARE THE POINTS TO TAKE FOR UZBEKISTAN?

Based on the experience of these countries, you can make the following suggestions for your work:

1. "Simulator" lessons in finance: using AI-robots or virtual assistants to explain financial markets, like Japan.
2. "Smart-test" system like Korea: Introducing SI-tests that analyze the student's knowledge not only "right/wrong", but also in which logical chain he makes a mistake.
3. Language and technology compatibility: Methodology for teaching English and ICT for economists simultaneously using SI.

Conclusion: The experience of developed countries shows that SI is not only a computer, but also an "intelligent system" that controls the quality of education.

VII. RISKS AND THEIR ELIMINATION

The following problems may arise when introducing SI:

1. Digital inequality: Regions that are not provided with the Internet and technology may be left behind.
2. Cognitive laziness: Students stop thinking independently.

• Solution: Increase the share of "question-answer" and "creative approach" in exams and assessment processes, avoid only text-based tasks.

VIII. Which AI should you use?

The answer to the question "which one is better" for you as a researcher and student depends largely on what you are using this tool for. Below we will consider each of the 4 giant AIs in the current AI market separately.

Let's analyze them from an academic and practical perspective:

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1. Gemini (Google) — Best "Ecosystem"

Developed by Google, this model is perfectly integrated with Google services (Docs, Drive, Gmail).

• Strengths: It retrieves data from Google search in real time, works very fast and can analyze large documents (for example, 100-page books) at once.

• Who is recommended for: For those who write articles in Google Docs, analyze YouTube videos, or conduct research based on the latest news.

2. Claude (Anthropic) — Best "Academic Writer"

Claude is distinguished by his "human" tone and extremely clear logical thinking.

• Strengths: It is currently the leader in text editing, academic writing, and long document analysis. It makes fewer errors (hallucinations) than ChatGPT.

• Recommended for: Editing your 60-page paper, polishing your text style, and explaining complex scientific ideas.

3. ChatGPT (OpenAI) — Best "Universal Assistant"

The most popular and versatile model. The GPT-4o model is very strong in analyzing voice communication and images.

• Strengths: Unrivaled in creativity, programming (coding), and giving general advice in any field. Its mobile app is very convenient.

• Recommended for: For those looking for creative ideas, writing code, or performing various small tasks every day.

4. Copilot (Microsoft) — Best "Office Assistant"

Based on GPT-4 technology, but integrated into Microsoft Office applications (Word, Excel, PowerPoint).

• Strengths: Shows clear sources (links) when searching for information and provides free GPT-4 capabilities.

• Recommended for: For those who do calculations in Excel, prepare PowerPoint presentations, and work with sources.

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Short comparison table:

Criteria	Gemini	Claude	ChatGPT	Copilot
Writing style	Normal / Informative	Academic / Natural	Creative / Systematic	Clear / Short
Information novelty	Very High (Google)	Average	High	Very High (Bing)
Programming (Code)	Good	Very good	Excellent	Good
Document analysis	Excellent (Large Volumes)	Excellent (Qualitative analysis)	Good	Average

Final recommendation:

• If you are writing articles and theses: the combination of Claude and Gemini will give the best result.
• If you need an interactive assistant and creativity: ChatGPT.
• If you are working with concrete facts and sources: Copilot or Perplexity AI.

IX. CONCLUSION

In conclusion, it can be said that artificial intelligence provides an opportunity for Uzbekistan's higher education system to "leapfrog" to the global level. International experience has shown that in universities where AI is introduced, student learning increases by an average of 20-30%. It is time for Uzbek universities to accept AI not only as a teaching tool, but also as the intellectual foundation of a new era.

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