CURRENT RESEARCH JOURNAL OF PEDAGOGICS (ISSN: 2767-3278)

VOLUME: Vol.06 Issue04 2025
DOI: - 10.37547/pedagogics-crjp-06-04-02
Page: - 6-11
RESEARCH ARTICLE OPEN ACCESS

The Impact of Artificial Intelligence Technologies on Educational Effectiveness in The Process of Independent Learning

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Received: 09 February 2025 **Accepted:** 12 March 2025 **Published:** 08 April 2025

ABSTRACT

Technological advancements are driving profound transformations in the education sector, reshaping teaching methodologies and learning experiences on a global scale. One of the key developments in this period is artificial intelligence (AI), a system that can offer accessible solutions to various problems. In education, AI is now being used to help manage and improve the learning process, supporting teachers in delivering new content more effectively. AI plays a significant role in autonomous, curriculum-based learning, which focuses on putting students at the center of their education. By integrating AI, schools can create more engaging and enjoyable learning experiences, helping students get the most out of their education. This study explores how AI impacts autonomous, curriculum-driven learning. Using a descriptive qualitative approach and a review of existing literature, the research shows that AI improves student understanding by making learning more interactive. This is achieved through a variety of teaching methods, models, and tools that are customized to meet students' individual needs. Key ways in which AI is transforming education include: 1) using AI to support personalized learning, and 2) aligning AI with independent, curriculum-based learning that promotes student autonomy. Ultimately, AI can be a valuable tool for creating better teaching materials and improving the overall learning process.

Keywords: Artificial Intelligence, Independent Learning, Educational Technology, Personalized Learning, Student-Centered Learning, AI in Education, Curriculum Innovation.

INTRODUCTION

The national and provincial governments in Uzbekistan have continuously worked to improve the quality of education. They are focused on updating the curriculum to keep pace with educational advancements. A key innovation in education is the independent curriculum, which allows educators to tailor their teaching materials to better meet the needs of students. This curriculum supports the idea of autonomous learning, emphasizing a student-centered approach. In this model, teachers act as facilitators, guiding students to learn not just from the teacher but from a variety of sources like discussions, the internet, literature, and hands-on projects, with support from teachers along the way. This active learning process helps students gain a deeper understanding and unlock their full potential.

As technology advances, it has significantly impacted the education sector. The digital age has brought about impressive technological progress, especially in the form of Artificial Intelligence (AI). AI is designed to provide the right information when needed, helping teachers solve various challenges they face in today's digital classroom. It enables teachers to create personalized instructional materials tailored to student needs, enhancing the overall teaching and learning experience.

AI has revolutionized many fields, and education is no exception. AI systems are built to mimic human intelligence, offering smart solutions and tackling complex

tasks quickly and efficiently. By learning from experience and correcting mistakes, AI continuously improves its capabilities. It plays a crucial role in education by helping to streamline tasks and produce optimal results.

In the classroom, AI is a tool for enhancing learning. Educators use it to create more engaging and interactive teaching resources, aiming to improve educational quality. However, AI should be seen as a supportive tool, not a replacement for teachers. Educators remain essential in guiding and mentoring students, ensuring that AI is used effectively to complement traditional teaching methods. As technology evolves, educators must stay up to date and use these advancements wisely to improve learning outcomes.

AI offers significant benefits in the educational field. By leveraging AI, teachers can design better learning materials, making the classroom experience more interactive and enriching for students. AI helps streamline administrative tasks, such as creating instructional tools, selecting teaching methods, and choosing appropriate media. It also provides suggestions for adaptive teaching strategies, ensuring that educators can create an engaging and effective learning environment.

METHODOLOGY

The study aims to elucidate the application of artificial intelligence in autonomous curriculum-based learning, highlighting its advantages and disadvantages. Utilizing descriptive qualitative research methodologies. The descriptive method concentrates on real issues pertaining to a certain occurrence. Descriptive qualitative research aims to elucidate an event and its occurrences, subsequently articulating the inherent meanings [1]. This study approach aims to assess field data by concentrating on real issues associated with occurrences. This methodology aims to elucidate the phenomenon in a thorough and comprehensive manner. Qualitative approaches can be employed to investigate the adoption of technology advancements within the flexible framework of the autonomous curriculum, which may influence classroom learning and the long-term development of students. The literature review method is employed to identify existing research findings pertinent to the subject under investigation, offering researchers comprehensive and profound insights while enhancing their understanding of the research topic being examined.

Findings and Analysis

1. Artificial Intelligence (AI)

Artificial Intelligence, or AI, combines two key ideas: “artificial,” meaning man-made, and “intelligence,” referring to the ability to think and reason like a human. In simple terms, AI is software developed to process data and make decisions in a way that mimics human intelligence. With rapid technological progress in the digital age, AI has become widely used across many industries, especially in education. Its use in education has changed the way we create teaching materials, conduct lessons, assess learning, evaluate overall educational performance, and even design curricula [1,2].

In Uzbekistan, schools and universities have started using autonomous curricula—learning programs tailored to the needs of each student—to provide more meaningful educational experiences [2,3]. AI is essentially software built to work on computers or machines, designed to solve problems quickly and efficiently [3]. As technology continues to evolve, AI is increasingly being developed to work independently and carry out complex tasks. Additionally, identify four methodologies employed in the creation of artificial intelligence (AI):

Turing Test Methodology

This method focuses on creating AI that behaves like a human. Based on the famous Turing Test, it evaluates whether a machine can imitate human responses so well that it’s hard to tell the difference. AI built this way is designed to communicate, solve problems, and perform tasks just like a person would.

Cognitive Model Approach

Here, the goal is to design AI that can think like a human. This involves using computer models that simulate human thought processes, allowing the AI to understand situations, make decisions, and solve problems in a human-like way.

The Law of Thought Approach

This method is about teaching AI to think logically. It aims to create systems that reason through problems and come to accurate conclusions using structured thinking. AI developed using this approach relies heavily on logic and

critical thinking to make decisions.

Rational Agent Framework

This approach is focused on building AI that acts rationally and efficiently. It involves creating systems that can adapt to different situations and make the best possible decisions using logical reasoning. The goal is to maximize outcomes through smart and efficient actions.

In short, AI is developing rapidly in today's tech-driven world. It stands out as one of the most important innovations of our time, capable of performing complex tasks and providing effective, intelligent solutions.This is an overview of artificial intelligence (AI):

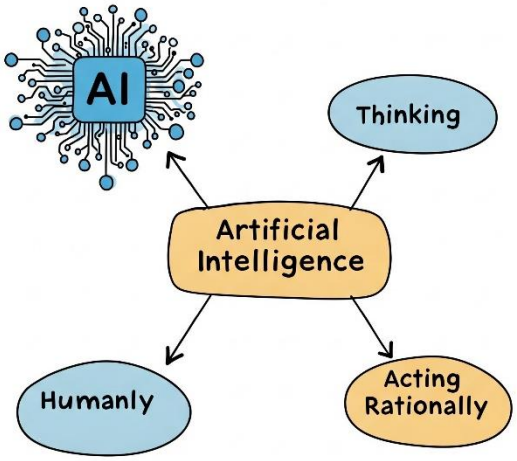

Image 1. Artificial Intelligence (AI)

Artificial Intelligence (AI) is a fast-evolving technology designed to mimic human intelligence. It focuses on two main areas: thinking (cognition) and doing (action). On the thinking side, AI uses cognitive models to process information much like the human brain does. On the action side, it can behave like humans—something tested through methods like the Turing Test, which checks if a machine can act indistinguishably from a person. But AI goes beyond imitation—it can also make decisions based on logic and reasoning, acting as a rational agent in our modern digital world. AI includes various systems that give computers the ability to think and reason. According to Rifky , AI's key cognitive features include:

1. Learning – AI learns by collecting and processing data. Once the data is gathered, it's turned into useful information. Over time, this helps AI improve and handle more complex problems through structured learning.

2. Reasoning – This allows AI to choose and apply the right methods or algorithms to solve problems and make smart decisions based on data.

3. Self-correction – As AI works, it can identify and fix its own mistakes, which helps it become more accurate and effective over time.

4. Creativity – AI can come up with new ideas or create original works like artwork, music, writing, and more. It's being used to generate content in a variety of creative fields.

Thanks to digital advancements, especially in education, AI is progressing rapidly in these four areas. It can now collect and process data (learning), make informed decisions (reasoning), fix its own errors (self-correction), and even create original content (creativity).

AI is a powerful innovation that can handle complex tasks like analyzing data, answering questions, generating images, and processing sound. These capabilities speed up workflows and improve results—particularly in education. Teachers and educators are using AI to organize teaching materials, discover interactive tools, and create more engaging learning experiences.

Independent Curriculum-Based Learning

This curriculum embodies the principle of Freedom of Learning. The formulation of the autonomous curriculum is predicated on the challenges and impediments encountered in the last curriculum. The curriculum seeks to offer freedom to educators throughout the planning phase, namely in the development of the Learning Objectives Flow (ATP) and Teaching Modules, which are informed by the Learning Outcomes (CP) established by the Ministry of Education and Culture, in accordance with the Pancasila Student Profile. The creation of teaching resources is a pressing issue that educators must address systematically and strategically, by developing the instructional content to be delivered to students, ensuring that the learning process is conducted effectively to meet established educational objectives [4,5]. The subsequent table pertains to the concept of the curriculum, specifically:

Table 1. The Concept of Freedom of Learning

№	The Concept of Freedom of Learning
1	The implementation of USBN is regulated directly by the school.
2	The abolition of the UN was replaced by a new system, namely the Minimum Competency and Character Assessment.
3	Developing student competencies from cognitive, affective, and psychomotor aspects in order to become competent human resources.
4	Simplification of Learning Modules.
5	Determination of zoning system policies in the admission of new students, except for the 3T area.

Based on the information provided, the government gives schools the authority to manage how learning is carried out, allowing them to adjust the process to fit the specific needs of each institution. This independent, or "autonomous," curriculum brings several benefits for teachers:

1. They're no longer bound to rigid learning goals.

2. They can adjust lessons to suit the learning styles and characteristics of their students.

3. It gives teachers the freedom to explore each student's potential in a fun and supportive environment.

4. The simplified structure of this approach helps ease the workload for educators.

With this system, schools have more control over how the curriculum is delivered and managed. Teachers play a central role in making it work in the classroom, not just as instructors but as learning facilitators. Their job is to help students discover and develop their full potential, which can lead to a more meaningful and engaging learning experience[6].

The independent curriculum also fits perfectly with today's 21st-century education goals. It places students at the center of learning, giving them more control and involvement in the process. Learning isn't just about reaching the end goal; the process of gaining knowledge is just as important. Teachers play a key role here—not just as instructors, but as guides who support students throughout their journey.

Finally, the curriculum encourages the development of four essential 21st-century skills, often referred to as the 4Cs:

- **Critical thinking**

- **Communication**
- **Creativity**
- **Collaboration**

These skills not only help students learn more deeply but also shape them into thoughtful, capable individuals ready for the future.

How Artificial Intelligence Is Shaping Modern Learning

As technology advances, it's opening new doors in education—especially with the rise of Artificial Intelligence (AI). AI is helping teachers create personalized learning materials, track student progress more effectively, and adjust teaching strategies based on real-time data. In response, education systems are shifting to support more independent and student-centered learning, where both teachers and students are expected to adapt to digital tools.

To make the most of this, teachers need proper training. Building digital literacy and understanding how to use AI tools effectively is key to improving how lessons are planned, delivered, and assessed. AI systems, designed to replicate human-like decision-making, can support teaching by automatically creating or organizing content, freeing up more time for educators to focus on student interaction.

When used wisely, AI can help personalize learning experiences, make lessons more engaging, and provide extra support for students who need it. But teachers must still be at the heart of the classroom—guiding, mentoring, and acting as role models. Technology can't replace human interaction.

Balancing AI with Human Connection

While AI brings many benefits—like reducing administrative tasks and making learning materials more accessible—it also comes with risks. If overused, it can reduce personal interaction and affect communication between teachers and students. That's why balance is so important. Teachers need to stay involved, ensuring that the learning experience remains personal, supportive, and focused on developing both academic and life skills.

In Uzbekistan, for example, the curriculum has evolved to embrace global changes and now prioritizes student-centered learning. This approach not only supports the development of skills and interests but also instills strong moral values. AI can help by offering smart tools that support planning, teaching, and evaluating student progress—but it should be used to enhance learning, not replace it.

Moving Forward with Purpose

AI has a powerful role to play in education—but it needs to be handled with care. Training and thoughtful implementation are essential to avoid dependency or misuse. When used properly, AI helps teachers analyze learning patterns, identify challenges, and personalize instruction to fit individual student needs. It can even help students become more critical and creative thinkers, preparing them for a tech-driven world [9].

CONCLUSION

The use of Artificial Intelligence (AI) in independent, or autonomous, curriculum-based learning is making a big impact. AI has the potential to improve the quality and effectiveness of personalized learning by helping students engage more actively and meaningfully in the process. It also supports the development of important 21st-century skills like critical thinking, creativity, communication, and collaboration. Even with these technological advancements, the role of educators remains essential. Teachers are key to making sure AI doesn't take away from the human aspect of education—especially when it comes to building character and emotional growth in students. When used the right way, AI can make learning more accessible, helping students better prepare for the challenges of a globalized world. AI also helps teachers adapt lesson plans and learning materials to suit each student's individual needs. It offers tools to personalize learning while allowing educators to stay focused on guiding students through both academic content and social-emotional development.

However, it's important to use AI thoughtfully. Educators must strike a balance between embracing new technologies and maintaining meaningful, person-to-person connections in the classroom. AI should be a support tool, not a replacement for real interaction.

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