



## Artificial Intelligence-Based E-Learning: an Overview

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## Abstract

Over the past few decades, artificial intelligence (AI) has been extensively researched around the globe. The use of AI in e-learning to increase the efficiency of teaching and learning in precision education is a particular emerging issue right now. This work presents a review on contemporary research in the field of Ai-induced e-Learning. The goal of this study is to investigate how users perceive the role of artificial intelligence (AI) in enhancing personal learning profiles and personal learning environments and how these enhancements affect a simple, effective, and useful e-learning in overall.

**Keywords:** Artificial Intelligence, E-learning, Problem-based Learning, Intelligent Tutoring System

## 1. Introduction

In recent years, the advancement of technology has changed the way people learn and acquire knowledge. The integration of Artificial Intelligence (AI) in the field of education has given rise to a new form of learning called AI-based e-learning. AI-based e-learning is an innovative approach to education that leverages AI technologies to create a personalized learning experience for students. It has the potential to revolutionize education by providing students with a more engaging and effective learning experience [1]. The use of AI in e-learning is a particularly new area of research, with the majority of studies concentrating on the creation and usage of intelligent tutoring systems, followed by the use of AI to facilitate assessment and evaluation in e-learning situations. AI-based e-learning is a type of e-learning that uses AI technologies to create a personalized and interactive learning experience for students. The goal of AI-based e-learning is to use AI algorithms to analyze student behavior and provide customized feedback to improve their learning experience [3]. AI-based e-learning can be delivered through a variety of platforms, including online learning portals, mobile apps, and virtual classrooms [2]. AI-based e-learning uses a variety of AI technologies, including natural language processing, machine learning, and computer vision, to create a personalized learning experience for students. For example, AI algorithms can analyze student behavior, such as the amount of time spent on a particular topic, and provide customized feedback to help students improve their learning. In addition, AI-based e-learning systems can also use natural language processing to understand the questions and needs of students and provide relevant responses.

## 2. Applications of AI-based e-learning

There has been a growing interest in the use of AI in e-learning, and numerous research works have been conducted in this area. Some of them are listed below:

- **Personalized Learning:** AI-based personalized learning systems have been studied extensively in recent years. These systems use data mining and machine learning techniques to adapt to the individual needs and learning styles of each student, providing them with a tailored learning experience.
- **Intelligent Tutoring Systems (ITS):** ITSs are AI-based systems that provide personalized feedback and guidance to learners. These systems can be used to monitor student progress, identify knowledge gaps, and provide targeted feedback to improve learning outcomes.
- **Natural Language Processing based chatbots:** NLP has been used in e-learning to develop intelligent chatbots, which can be used to provide instant feedback and support to learners. NLP has also been used to analyze student responses to open-ended questions, providing more accurate assessments of student learning.
- **Educational Data Mining (EDM):** EDM involves the use of data mining techniques to analyze large datasets generated by e-learning platforms. This can help identify patterns and correlations between student behavior and performance, which can be used to improve the design of e-learning systems.
- **Gamification:** Gamification involves using game-based elements, such as points, badges, and leaderboards, to motivate learners and increase engagement. AI-based gamification systems have been developed to adapt to the individual needs of each learner, providing a more personalized learning experience.

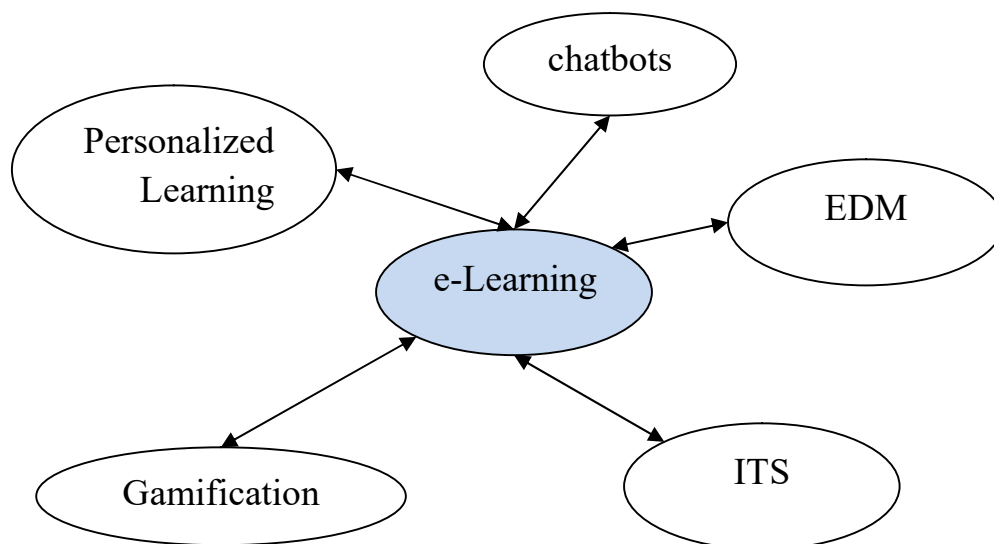


Figure1: Applications of AI in e-Learning

### **3. Advantages of AI-based E-Learning**

**Personalized Learning:** One of the key benefits of AI-based e-learning is that it provides a personalized learning experience for each student. AI algorithms can analyze student behavior and provide customized feedback to help students improve their learning. This can lead to increased student engagement and improved learning outcomes [3][6].

**Improved Accessibility:** AI-based e-learning can provide education to students who may not have access to traditional forms of education, such as those living in remote or underdeveloped regions. It can also provide education to students with disabilities who may not be able to attend traditional schools.

**Problem-based learning:** Students learn about a subject through the experience of completing open-ended problems provided by a teacher in a problem-based learning environment. PBL is a teaching approach where learners are given challenging real-world problems to analyze as a task during their study time. As opposed to the straightforward presentation of facts and notions, it encourages the understanding of principles and concepts. PBL can support the growth of analytical cognitive competencies, communication skills, and problem-solving skills in adult education in addition to the academic program material. Additionally, it may present chances for teamwork or individual work [7].

**Increased Engagement:** AI-based e-learning can provide a more engaging and interactive learning experience for students. By using AI technologies, such as natural language processing and computer vision, students can interact with virtual teachers and receive customized feedback in real-time [5][8].

**Cost-effective:** AI-based e-learning can be a cost-effective alternative to traditional forms of education. By delivering education online, there is no need for physical classrooms, textbooks, or other materials, which can save money for students and schools.

### **4. Challenges and Obstacles**

While AI-based e-learning has great potential, there are several challenges that must be addressed to fully realize its benefits. Here are some of the key challenges:

- **Data Quality:** AI systems require large amounts of high-quality data to train effectively. E-learning platforms generate vast amounts of data, but this data can be noisy or biased, leading to inaccurate or incomplete training.
- **Lack of Human Interaction:** AI-based e-learning systems can be highly personalized and automated, but they can also lack the human interaction and feedback that is important for effective learning.

- **Explainability and Transparency:** Some AI-based e-learning systems use complex algorithms that can be difficult to understand, leading to concerns about their transparency and accountability.
- **Ethical Concerns:** There are ethical concerns related to the use of AI in e-learning, such as the potential for bias and discrimination, the privacy and security of student data, and the impact on human employment in the education sector.
- **Technical Challenges:** AI-based e-learning systems can be complex and require significant technical expertise to develop and maintain, which can be a challenge for smaller institutions or those with limited resources.

Addressing these challenges will require collaboration between educators, technologists, and policymakers to ensure that AI-based e-learning systems are effective, equitable, and accessible to all learners.

## 5. Conclusion

AI-based e-learning has the potential to revolutionize the way people learn and acquire knowledge. By using AI technologies, such as natural language processing and machine learning, AI-based e-learning can provide a personalized and interactive learning experience for students. It has the potential to increase student engagement and improve learning outcomes, as well as provide education to students who may not have access to traditional forms of education. As AI technology continues to advance, it is likely that AI-based e-learning will play an increasingly important role in the future of education.

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