

**Artificial intelligence advantages in technology: problems, ethics, benefits, and challenges in educational technology**

**kawakib Mahmood Hussien <sup>1</sup>, Nadia Mahmood Hussien <sup>2</sup>, and Yasmin Makki Mohialden <sup>3</sup>**

**<sup>1</sup>College of Education Ibn Rushd, Baghdad-Iraq  
University of Baghdad Baghdad, Iraq**

**<sup>2,3</sup>Computer Science Department Mustansiriyah  
University Baghdad, Iraq**

**Abstract**

In the field of education, machine learning is crucial. Artificial intelligence is essential to educational growth. It is a digital tool that provides students with a wide range of educational materials that match their learning requirements and topic choices. The use of artificial intelligence in education (AIEd), ethical issues associated with software-based instruction, and artificially generated neural networks helped professionals and scholars identify appropriate materials and expand on the conclusions of the study. On the other hand, AI causes instructors and students developmental hazards and poses several difficulties, including privacy, security, and safety problems. Thus, it has both positive and negative consequences for education. In this paper, we identify AI in education (AIEd) and its advantages to education and learning in the present and future. We also discuss ethics-related matters. That highlights how crucial ethical principles regarding artificial intelligence are to the realm of education, and the challenges of AI in education are explained.

Keywordartificial intelligence in education (AIEd), Artificial Intelligence (AI), computer-based training, artificial neural networks, AI ethics

**1. Introduction**Computers have been used in teaching for over 20 years. CBT and CAI were the first instructional uses of computers. Early educational institutions did not meet student needs. Instead, students followed a script like "If question 21 is answered correctly, proceed to question 54; otherwise, go to question 32." Student strengths and distinctive traits were ignored [1,2].

Recent advances in artificial neural networks, large data, cloud computing, and machine learning have allowed engineers to develop intelligent devices. Based on these breakthroughs, this study defines AI as a robots' capacity to observe, identify, learn, react, and solve problems. As intelligent technologies emerge, the workforce will change drastically. Thus, although AI can interact with people and improve performance, it is swiftly becoming the next revolutionary invention. Many believe AI is a key part of the fourth industrial revolution and will lead to a fourth education revolution [1, 2, 3]. Artificial intelligence presents two challenges to education: using its benefits to improve classroom and systemic education and equipping students with new skills for increasingly automated economies and societies. Many AI applications are still under development, but they show how AI might change education. This study shows how AI may expedite individualized teaching and serve students with special needs. System-level applications, including assessing developing skill sets and predictive analysis to minimize dropout rates, are encouraging [4] and [5]. The paper's problem statement states that artificial intelligence in education helps students and instructors. However, security and secrecy challenges are rising. This research examines AI's benefits and safety issues in changing environments to address its impact on education.The outline of the paper section 2 What is artificial intelligence in education (AIEd)? section 3Related work section 4 Ethics of AI in Education section 5 AIEd technology applications and educational benefits section 6 Challenges of Artificial intelligence in educational technology 7 Conclusion and future works.

**2. What is artificial intelligence in education (AIEd)?**

psychology, education, and technology. It emphasizes engaging and flexible learning environments for all ages and subjects. The AIED project explores formal classroom and non-classroom learning to promote education and continual learning. AIED scholars explore the intellectual, emotional, and social aspects of learning, including social interaction, motivation, and emotions, as well as scaffolding and intelligent tutoring [6].

AIED builds computer models of human cognitive processes to replicate intelligent behavior. This notion of intelligent conduct covers several forms of growth, including behaving rationally and ethically to enhance learning instantly and over time. AI-based technology-enhanced learning systems allow instructors and students to make educated decisions and adapt swiftly to changing situations, data, and learning objectives [6, 7]. However, an intelligent technology is transforming how students learn, teachers teach, and schools operate. Some notable AI education applications include [8], [9], and [10]:-

A. AI systems can generate personalized educational possibilities by assessing students' learning styles, aptitudes, and weaknesses. Adaptable educational settings adjust topic matter and difficulty based on user experience.

B. Smart teaching: AI-powered coaching offers rapid feedback and guidance. These technologies can assess student responses and adjust the curriculum for a more customized learning environment. Assessment and Grading: Intelligence may automate multiple-choice and more complex task assessment, relieving instructors and speeding up student answers.

C. AI-powered virtual classrooms enable remote and online learning via video conferencing, material exchange, and conversation between students and instructors.

D. Natural language processing (NLP) technology aids language learning, literary comprehension, and automated essay grading. Language interpretation and translation are also available.

E. AI-powered learning analytics can analyze large amounts of data to find patterns, assess educational practices, and identify students at risk of falling behind, allowing early intervention.

F. Gamification: AI-powered educational games enhance learning engagement and interaction. These games adapt to players' abilities.

### **3. Related work**

Some of related reseaches are :- In 2020, this article discusses AI in education's future potential and commercial prospects, the tools and programs utilized in diverse applications, research trends, and existing disadvantages and hazards. The research covers AI in education for student assessment and grading, retention and dropout prediction, sentiment analysis, intelligent tutoring, classroom observation, and recommendation systems. The study reviews research publications in various important subdomains, including learning analytics, educational data mining (EDM), and big data [11]. In 2021, this research will assess AI's educational benefits and drawbacks. A systematic examination of relevant material was used to identify the study's topic, provide students with a complete understanding of AI technology in education, and recommend future research options. In developed countries, AI in education has improved, and most research has acquired prominence during Industry 4.0. The study addresses these topics and others [12]. This study examines AI in academia and government in 2022. In every school, instructors teach. Other tasks are also required of instructors. Teachers often spend time and resources on administrative tasks in addition to teaching. AIA improves school efficiency by aiding with academic and administrative duties. Learning analytics, VR, grading and exams, and admissions help AIA instructors with many tasks. The administrative burden is reduced, allowing teachers to concentrate on teaching [13]. In 2023, this article will examine the legal and moral usage of ChatGPT for teaching and encourage greater study and debate on this important subject. The research found that ChatGPT should be used in education with secrecy, fairness, nondiscrimination transparency, and other considerations. This research recommends following all of these recommendations to ensure ethics and accountability in global education [14].

### **4. Ethics of AI in Education**

As with any new technology, AI may raise ethical and legal difficulties, including culpability and biased judgment. General AI ethics have been a priority for scientists. All of these initiatives focus on data, which raises issues like informed consent, data privacy, biased data sets and biased assumptions, transparency, and statistical apophenia, the practice of identifying patterns when there aren't any. [15]. AIED's massive data gathering (including student skills, presumed states of mind, methods, and blunders) has issues, as does AI in general. What's the privacy concern? Who owns and has access to this data and is responsible for errors? Computational methods are another major AIED ethical issue, as with AI. How do

you analyze, evaluate, share, and utilize data? How can conscious or unconscious prejudices that might harm a student's civil rights be minimized or eliminated, particularly when AIED's breadth is likely to increase design biases? [16] [17]. Finally, the artificial intelligence community in education must discuss the importance and utility of creating an ethical framework and usable rules to guide our research and ensure that our AIED tools and methods are ethical by design. We also know that without a more focused approach to AIED ethics, the public's work may remain essentially opaque to the rest of the AI subfields and associated legislation, limiting the research's influence on the wider

### **5. AIEd technology applications and educational benefits**

Education has nearly endless potential with AI. It contains these learning technologies [18] and [19]:

#### **A. Chabot:**

- Research examined how chatbots impacted students' interest in foreign language classes.
- The research found that students' interest declined after a week of chatbot talks, although this was due to novelty.
- Increasing empirical study on chatbots' impact on schooling is crucial.

#### **B. Intelligent tutors and agents:**

- Intelligent tutors or agents provide personalized resources, guidance, and feedback.
- Teachable Agents (TA) research has shown enhanced learning results for primary students.
- Metacognitive help from a teaching assistant improved students' problem-solving abilities.
- Effective metacognitive signals in an intelligent tutoring system need prior student knowledge.

#### **C. Machin learning (ML):**

- Machine learning predicts educational application attitudes and evaluates ESL/EFL learning style improvements.
- Research found that information management activities may predict undergraduate students' feelings 74% accurately.

#### **D. PLS/E: Personalized learning systems or environment:**

- PLS/E systems have been shown to improve e-learning interactions and experiences.

Research indicates that integrating AI and AR into mobile learning improves learning outcomes.

- AI-enhanced e-learning systems produced customized learning materials that satisfied students and staff.

#### **E. Visualizations and virtual learning environments (VLE):**

- AI, VLE, and visualizations enhance learning.
- Students showed increased interest in and learning in virtual environments.
- Integration of AI with VR has been shown to enhance learning results.
- AI technology with visuals may aid social communication for autistic learners.

### **6. Challenges of Artificial intelligence in educational technology**

The use of artificial intelligence in schools has advantages, but it also has drawbacks. Data safety and confidentiality are among them, particularly when it comes to gathering and maintaining private information. Additionally, because users of well-known AI platforms like Chat GPT must be 18 or older, institutions with younger-aged students are now unable to use them. As AI results are only as good as the data it has been educated on, bias in algorithms or inaccurate data is also a risk[10][15]. Another element is accountability: who is responsible if something goes wrong? The replacement of human teachers by AI and the unavailability or probable restriction of networked and interactive educational environments are further potential issues. For any educational institution can successfully integrate AI in the classroom, all of these difficulties must be taken into account and resolved[10][15].

### **7. Conclusion and future works**

Advancements rooted in computational intelligence bring about both positive and adverse outcomes for the education sector. Hence, it is of paramount importance to prioritize the integration of machine learning for educational purposes and implement appropriate methodologies to meet the requirements and aspirations of teachers and students through AI technology. Consequently, this will result in outstanding educational achievements. Possible future AI-in-educational-technology projects:

A. Building and deploying AI-powered adaptive learning systems that tailor lessons to students' requirements and learning patterns .

B. 2. Trained instructors in AI to use it in their teaching.

- C. 3. Better data collection and systematization to help instructors and administrators analyze and comprehend data .
- D. 4. Creatively managing human and AI resources in educational institutions.
- E. 5. Ensure that AI in education enhances human talents and protects human dignity.
- F. 6. Follow AI's progress in education and its function in the world to guarantee it helps instructors and students .
- G. Studying AI's potential in education and its problems .
- H. Working with tech professionals and educators to test AI and VR technologies and resources on student learning .

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