

## AI's Role in Education: A Sophisticated and Transformative Tool

Farida Bouattoura<sup>[a],\*</sup>



<sup>[a]</sup> St. John's University, Jamaica, New York, United States.  
\* Corresponding author.

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### Abstract

Artificial intelligence (AI) has emerged as a powerful force, revolutionizing various aspects of modern life, including education. AI has the potential to aid research, enhance student learning capabilities, and adapt to the ever-evolving educational landscape (Luckin, 2017). However, legitimate concerns exist over the ethical implications, potential abuse through plagiarism or cheating, and educators' perceived loss of control (Biesta, 2020). This essay argues that society must adopt AI by implementing practical solutions to ensure responsible usage in the education system, focusing on developing critical thinking and higher-order skills.

**Key words:** Artificial Intelligence (AI), Education, Technology, and Transformative tools

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### INTRODUCTION

**What is AI? Moreover, why is there such a big hype around it?**

Artificial Intelligence (AI) is a rapidly growing field focused on creating computer systems capable of performing tasks that typically call for human intelligence, such as visual perception, speech recognition, decision-making, and natural language understanding.

AI applications, including voice assistants, machine translation, image recognition, autonomous vehicles, and healthcare diagnostics, can revolutionize various aspects of our lives, automate tasks, save time and resources, and transform industries. Despite the enthusiasm surrounding AI, challenges and concerns, like ethical issues, data privacy, job displacement, and system biases, need to be addressed. The future potential of AI is vast, and as it progresses, it could contribute significantly to global advancements in fields like healthcare, agriculture, and education. The hype surrounding AI is, in essence, fueled by its incredible potential benefits for society, driving the field's rapid advancements and widespread excitement.

### Understanding Artificial Intelligence: Innovative Technologies and Future Applications

Artificial intelligence (AI) has become a hot topic in recent years, transforming industries and shaping the future of our society. This article aims to comprehensively understand AI's history, current applications, ethical implications, and societal impact. Supported by peer-reviewed, scholarly sources, we will explore the cutting edge of AI research and identify where this groundbreaking technology is taking us.

## A BRIEF HISTORY OF ARTIFICIAL INTELLIGENCE

AI has come a long way since its inception. The term "artificial intelligence" was first coined by John McCarthy at the 1956 Dartmouth conference (McCarthy et al., 1955). Since then, considerable progress has been made in developing machines that simulate or mimic human intelligence. Some notable milestones in the history of AI include the development of Eliza, an early natural language processing computer program in 1966 (Weizenbaum, 1966), and Deep Blue. This IBM computer defeated world chess champion Garry Kasparov in 1997 (Hsu, 2002).

AI research experienced a resurgence in the 21st century, driven by three primary factors: the availability of large datasets, increased computational power, and the development of more sophisticated algorithms (Chen & Gomes, 2021). This modern era of AI has brought us game-changing innovations, such as self-driving cars, personalized medicine, and digital personal assistants.

### Core Technologies Behind AI

AI can be broadly categorized into three subdomains: machine learning, deep learning, and neural networks. *Machine learning* entails teaching computers to "learn" from data, enabling them to make predictions or decisions without explicit programming for the task (Samuel, 1959). Machine learning relies on statistical techniques to recognize patterns in data, thus allowing machines to "learn" over time by refining their models based on new observations (Bishop, 2006).

*Deep learning* is a subset of machine learning inspired by the human brain's structure and function. Deep learning models, and artificial neural networks, can automatically learn hierarchical feature representations through multiple processing layers (LeCun et al., 2015). These representations are highly effective for tasks that require high-dimensional input data, such as image recognition, natural language processing, and speech recognition (Goodfellow et al., 2016).

*Neural networks* are the foundation of deep learning algorithms. They consist of interconnected nodes or neurons, which weights the input data and pass it through activation functions to produce an output (Rumelhart et al., 1986). Multiple interconnected layers of neurons allow deep learning models to learn complex, non-linear relationships between input and output data, surpassing traditional machine learning techniques in various tasks (LeCun et al., 2015).

### Current Applications of AI

Today's AI technologies have a wide range of applications in various sectors, including healthcare, finance, and transportation:

- **Healthcare:** AI is pivotal in revolutionizing healthcare, from diagnostics to treatment planning. Deep learning algorithms can accurately analyze medical images to detect diseases such as cancer (Esteva et al., 2017). AI-driven tools can also predict patient outcomes, informing personalized treatment plans and risk stratification (Rajkomar et al., 2018).

- **Finance:** AI has transformed the financial industry by automating trading, risk assessment, and fraud detection (Arner et al., 2017). AI can also provide portfolio optimization, making it easier to achieve financial objectives like maximizing returns or minimizing risk (Krauss et al., 2018).

After thoroughly analyzing the article on artificial intelligence, the following ethical concerns associated with AI has been developed. These concerns emphasize the significance of understanding and addressing the potential implications of AI on privacy, security, and transparency, among other ethical considerations:

1. **Bias and Discrimination:** AI systems can unwittingly perpetuate and amplify existing human biases, leading to unfair and discriminatory outcomes (Chen & Gomes, 2021). It is essential to ensure that AI algorithms are transparent and fair, minimizing potential biases.

*Example:* Controversial facial recognition tools have faced critiques for disproportionately misidentifying people from specific ethnic backgrounds (Krauss et al., 2018). Regulatory policies or third-party audits may prevent biased AI systems from unfairly targeting specific populations.

2. **Privacy:** AI technologies, such as machine learning and neural networks, can potentially compromise users' privacy by leveraging personal data to build algorithms

and improve performance (Bishop, 2006).

*Example:* Personal assistants like Amazon's Alexa or Google Home gather vast user data, raising privacy concerns. Regulatory frameworks overseeing data collection and usage could protect users' privacy and control how their data is utilized.

**3. Security:** AI systems could be exploited by malicious actors, resulting in adverse consequences such as data theft, manipulation, or automated cyberattacks (Arner et al., 2017).

*Example:* Autonomous vehicles could be hijacked or manipulated by hackers, risking passengers' safety. Regular security assessments and strict industry guidelines can help mitigate these risks.

**4. Transparency and Accountability:** The decision-making processes of some AI algorithms (such as deep learning) can be opaque, making it difficult to understand the reasoning behind their outcomes (LeCun et al., 2015).

*Example:* AI algorithms used in lending practices may only accept credit with explaining due to the opaque nature of decision-making. Tools that allow for increased interpretability, such as explainable AI, can address these concerns and enable users to understand and trust AI-driven decisions.

**5. Impact on Employment:** The potential for AI technologies to replace human labor, particularly in low-skilled jobs, raises concerns about job displacement and social inequality (Hsu, 2002).

*Example:* Automation in manufacturing could lead to significant job losses, exacerbating inequality. Policies encouraging training and reskilling affected workers can help mitigate this impact.

**6. Control and Autonomy:** Overreliance on AI may lead to decay in human decision-making abilities and decreased human agency (Weizenbaum, 1966).

*Example:* AI recommendations in medicine could lead clinicians to rely increasingly on AI systems' suggestions, ultimately limiting their autonomy. Establishing guidelines outlining the complementary roles of humans and AI can ensure that human expertise remains central in decision-making processes.

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## AI IN EDUCATION: REVOLUTIONARY TOOL OR POTENTIAL DANGER

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AI's impact on education has been likened to revolutionary tools such as social media and the Google Internet (Kolb, 2017), facilitating instantaneous access to information and expanding the learning landscape. Schools have increasingly integrated social media into their curriculum to promote collaboration, creativity, and critical thinking (Lepi, 2012). Similarly, advanced calculators and math programs have provided efficiencies for students and teachers (Grawemeyer & Cox, 2015). Ignoring or denying the roles of these tools in education neglects

their potential for enhancing learning experiences and developing essential skills (Kolb, 2017). Furthermore, the resistance to social media use in classrooms has resulted in a vulnerable population to manipulation and political polarization. From those lessons, one can anticipate the extensive damage caused by the ill-informed and ill-equipped public with AI tools on social media platforms.

The persistent challenge has been incorporating AI and other digital tools into the curriculum while mitigating potential ethical issues and concerns about maintaining educator control (Clark-Wilson, 2013). For example, incorporating social media in schools should involve training educators to master and teach students how to use these applications responsibly, addressing any fears about privacy or ethical concerns (Lepi, 2012). Educators must foster critical thinking and higher-order skills by emphasizing the importance of proper AI usage through adjusted curricula (Biesta, 2020).

Students should learn to rely on trustworthy, peer-reviewed academic sources to ensure the responsible use of AI tools for research. For instance, AI-enhanced software, such as that found on the Google Scholar platform, aids in locating peer-reviewed articles and specific sections within these sources by tailoring search queries and results (Halevi, Moed, & Bar-Ilan, 2017). Such technology improves students' research efficiency, expands their comprehension of topics, and facilitates critical thinking (Luckin, 2017).

It is crucial to recognize that regardless of AI's transformative power, it is still vulnerable to human errors, such as biases or flaws in programming, which can result in misinformation or manipulation (Huang & Kesidis, 2016). Thus, schools and educators must follow these tools. Focusing on developing skills to discern and evaluate information sources effectively will help encourage responsible AI use and foster an educational environment tailored toward future-ready students (Luckin, 2017). For example, an educator can have students use multiple commands to produce different articles for a different audience, then have them complete a critical analysis and reflection in class with those same articles they produced using AI. This is also an opportunity for them to take ownership of their work and choose topics. They are creating more investment and interest in their learning.

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## CONCLUSION

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The impact of Artificial Intelligence (AI) in the education system is a transformational phenomenon that has parallels with the integration of social media platforms and advanced technology in schools. The undeniable influence of AI calls for its responsible and ethical usage, which requires society to adapt by devising effective solutions to cope with the challenges posed by the proliferation of

AI technologies in the education domain, such as adjusted curricula and emphasizing critical thinking and higher-order skills. Educators must continue to strive to strike the appropriate balance of AI's potential with the need for student autonomy, adaptability, and future readiness.

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