

**The Role of Artificial Intelligence Applications in Enhancing
Educational Strategies in Higher Education in Algeria**

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Abstract:

The objective of this study is to elucidate the role of artificial intelligence (AI) applications in the improvement of educational strategies in higher education institutions. It discusses the strategic advantages that educational institutions can achieve by incorporating AI, with key findings suggesting that AI plays a substantial role in enhancing the performance of teachers, strengthening their roles, and enhancing the efficiency of the learning process.

The study also establishes that it is imperative to increase the awareness of education stakeholders regarding the significance of integrating AI applications into educational strategies and to prevent obstacles from impeding their implementation.

Keywords: Artificial Intelligence; Educational Strategies; Higher Education.

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1. INTRODUCTION

Higher education in Algeria is among the vital sectors undergoing continuous transformations aimed at development and modernization amidst contemporary demands and trends that necessitate innovative and effective educational models. In this context, technology and artificial intelligence (AI) applications emerge as essential tools to enhance educational strategies and improve the quality of education within Algerian universities.

AI applications represent modern technologies with immense potential to enhance the learning experience and educational quality. In light of rapid digital transformations, these applications play an increasingly significant role in improving educational performance and facilitating the transfer of knowledge and skills.

This article seeks to explore the role of AI applications in enhancing educational strategies within higher education in Algeria. In this context, we will discuss the potential benefits these applications can offer, along with the challenges and opportunities that may arise from their adoption in Algeria's educational environment.

Through the study of this topic, we aim to highlight how AI applications can be integrated into the higher education process in Algeria and how this technology can contribute to improving educational quality and enhancing teaching and learning strategies.

1.1 Study Problem

The primary inquiry of this investigation is as follows:

- **What is the role of AI applications in enhancing educational strategies in higher education in Algeria?**

1.2 Significance of the Study

The significance of this study lies in the following:

- This study contributes to highlighting the role of AI applications that can enhance educational strategies in higher education.
- It sheds light on key AI applications that support educational strategies and their utilization in higher education.
- AI offers its users an opportunity to enhance their learning

experience according to their needs.

1.3 Study Objectives

The study objectives include the following:

- Clarifying the effectiveness of AI application in the higher education and scientific research sectors and its impact on other fields.
- Reviewing the constraints and challenges affecting the effective application of AI in higher education.
- Highlighting the current state of AI in higher education and scientific research through specific laws and regulations that underscore the importance of these sectors and the effectiveness of their integration.

1.4 Study Structure

The study topic is divided into three main sections:

- Section One: Theoretical framework of artificial intelligence.
- Section Two: Applications of artificial intelligence.
- Section Three: The significance of AI application at the higher education level.

2.The Theoretical Framework of Artificial Intelligence

2.1 The Concept of Artificial Intelligence

Artificial intelligence can be defined as “the science concerned with creating machines that perform actions considered intelligent by humans,” or more simply, as defined by Russell Bell, a professional in the field, it is an attempt to make ordinary machines behave like those seen in science fiction movies. Thus, AI is a field with the primary goal of endowing computers and other machines with intelligence, enabling them to perform tasks that, until recently, were exclusive to humans, such as thinking, learning, expressing, and communicating (El-Messaid, 2019, p. 200).

This term has gained popularity recently amid the technological renaissance that the world is witnessing in the development of machines. Although AI was once only a dream depicted by filmmakers in science fiction movies until the mid-20th century, it has now become a tangible reality we rely on often, sometimes without even realizing it. In fact, determining whether a machine exhibits AI is difficult and relative, as there is no precise definition of intelligence. However, we can broadly say that AI

is a branch of science concerned with machines that can solve the kinds of problems for which humans would typically rely on their intelligence. This definition was presented by Marvin Minsky, one of the most renowned scientists in the field of AI, in his book *Towards Building Artificial Intelligence*.

According to this definition, not all machines performing specific tasks fall under the term "artificial intelligence." Among the most notable examples of intelligent machines are those that analyze a problem and make decisions based on that analysis, thus mirroring human thinking **(Al-Farra, Artificial Intelligence, 2012, p. 03)**.

The ability of a digital computer or computer-controlled robot to carry out general tasks associated with intelligent beings is commonly referred to as artificial intelligence (AI). AI is a field of computer science. AI is frequently defined as the study and design of intelligent agents, where an intelligent agent is a system that senses its surroundings and acts to increase the likelihood that it will succeed in accomplishing its own or its team's purpose.

Another definition of it is the theory and creation of computer systems that can carry out operations that call for human intelligence, such voice recognition, visual perception, decision-making, and learning in the face of uncertainty**(Hisham & Hanan, p. 709)**.

From this definition, AI can be inferred as the simulation of human intelligence processes by specific systems resembling computer systems. It is characterized by the ability to think and learn and can be used to identify patterns that humans might not detect.

2.2 The Importance of Artificial Intelligence

The importance of AI lies in the following:

- Productivity and Efficiency: AI can automate a number of processes, which boosts productivity and efficiency.
- Personalization: AI can personalize experiences for clients, employees, and users. For example, AI-powered recommendation systems can suggest products or services based on user preferences and behavior.

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- Accuracy: AI can process vast amounts of data and identify patterns that humans might miss, leading to more accurate predictions and better decision-making.
- Innovation: AI makes it feasible to create previously unthinkable new goods and services. AI is utilized, for instance, to provide customized healthcare treatments.
- Cost-effectiveness: By automating processes and lowering the need for human intervention, AI can help save costs for businesses and organizations in a variety of industries.

Intelligent systems will significantly contribute to decision-making areas, as these systems are autonomous, accurate, and objective, making their decisions free from biases, racism, prejudgments, or even external or personal interference. Additionally, these machines will play a critical role in fields that involve intricate details requiring deep focus, continuous mental presence, and sensitive and swift decision-making that cannot tolerate delays or errors (**Omar & Nizar, 2019, p. 84**).

AI's significance is also evident in the business sector, where it enhances business capabilities across various fields, enabling companies to showcase their full potential and elevate themselves to the highest standards. It boosts business efficiency and speed, adds value, supports continuous growth, and increases the number of engaged users.

In daily life, AI applications have revolutionized industries like automotive manufacturing; for instance, Google's self-driving program utilizes AI, as do logistics companies like Uber to reduce accidents and alleviate traffic congestion. In e-commerce platforms such as Amazon, AI applications help obtain a clear picture of customer behavior in purchasing activities and offer personalized recommendations. Social media networks also employ AI applications to detect unauthorized access to users' photos.

2.3 AI Gains and Benefits

The fact that AI can analyze enormous volumes of data with ease and far faster and more efficiently than humans is one of its many noteworthy benefits. Based on the data, AI software can make basic decisions and, through a process called machine learning, can teach itself to gain new

insights.

This process will allow us to achieve insights we previously thought impossible, and the collaboration between humans and machines can significantly enhance systems in traffic management, healthcare, marketing, and more, including sales.

- AI and Sales: Data is important to sales teams, and AI is a perfect tool to help them manage it. Actually, AI is now immediately included into automated marketing and customer relationship management systems, so users may not even be aware that they are employing AI while reaping its benefits.
- Rethinking Shopping: AI can also influence real-world shopping experiences by increasing in-store purchases through displaying advertisements relevant to buyers at the moment of purchase. Meanwhile, online shopping can similarly evolve, with conversational interfaces and virtual assistants making online shopping feel more natural and potentially leading to higher conversions.
- Unstructured Data Analysis: A significant challenge for marketers is understanding unstructured data, such as social media feedback or reviews on Amazon. It takes time to standardize this data and add it to a customer's profile, and human mistake is a possibility. AI, however, provides a means to analyze and process this data with minimal human supervision.
- Tomorrow's Technology Today.
- Real-time Analytics: One of AI's greatest advantages for businesses is the ability to process vast amounts of data and interpret it in real-time. This enables companies to make critical decisions and act more quickly, ensuring they maintain a competitive edge. For example, in the transportation industry, AI allows drivers to receive data about traffic congestion spots and adjust their routes immediately.
- Cost Reduction and Profit Improvement: AI is not merely a solution for routine tasks but an opportunity to cut costs, ultimately improving profits. It saves significant time and effort, allowing

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humans to focus on honing skills by performing tasks that require innovation, while AI handles routine daily tasks. AI not only reduces costs and boosts profits, but it also provides companies with highly valuable opportunities, allowing them to:

- **Monitoring Operations 24/7:** AI allows for continuous monitoring of operations every day of the week, around the clock.
- **Reducing Human-Related Risks:** AI minimizes risks associated with human errors in various processes.
- **Predictive Maintenance for Machines:** AI can predict when machines need repairs or specific maintenance.
- **Data Processing and Task Execution Without Breaks:** AI processes data and performs necessary tasks without requiring rest periods.
- **Reducing Downtime and Operating Costs:** AI decreases production line downtime and reduces operational costs.

In sectors like finance and banking, where data protection is critical, AI can detect intrusion attempts and unauthorized access to personal data. The intricate fusion of automated data processing, machine learning, voice recognition, and natural language processing enables this capacity.

3. Challenges and Applications of Artificial Intelligence

3.1 Characteristics of AI Applications

AI applications possess a range of characteristics that make them effective investments in various fields, including:

- AI applications enable devices and machines to analyze problems.
- AI applications allow devices and machines to recognize voices and speech and to move objects.
- Certain AI-enabled devices can understand inputs and analyze them to efficiently provide outputs that meet user needs.
- AI applications support continuous learning, with learning processes being autonomous and unsupervised.
- They can process vast amounts of information.
- They can detect and analyze similar patterns in data more effectively

than the human brain.

- They are capable of finding solutions to unfamiliar problems using cognitive abilities.
- AI can be used to solve presented problems even in the absence of complete information.
- They possess the ability to think and perceive.
- They have the capacity to acquire and apply knowledge.
- They can learn and understand from previous experiences.
- They provide information to support managerial decision-making (Asmaa & Mohamed, 2020, p. 23).

3.2 Applications of Artificial Intelligence

Numerous AI applications have emerged that serve the educational sector, including:

- Artificial Neural Networks: Defined as a system that processes data in the same way as the human neural network, comprising a set of cells for information processing. Neural networks are characterized by mathematical foundations and are considered a part of intelligent information processing technology that mimics the human mind. They handle various types of data (quantitative and qualitative), store implicit knowledge based on past cases, and can be applied in diverse scientific fields.
- Intelligent Agent: This is an AI application used in data mining from the internet and information databases. It operates through software packages that carry out repetitive or predictable tasks, such as performing complex tasks in administrative fields. E-administration can program this agent to make decisions based on previous user choices. Tasks that the intelligent agent can handle include responding to customer inquiries, replying to messages, and gathering feedback on services and products.
- Ability for Learning and Self-Development: The concept of machine learning and skill acquisition originates from human learning, where individuals learn through observation, experimentation, study, and listening. Based on this, AI research has aimed to develop machines

that emulate the human mind, programming them with the capacity to learn, build knowledge, understand concepts, make decisions, and solve problems **(Al-Malki, 2023, pp. 96-97).**

3.3 Challenges and Risks of AI Applications

3.3.1 Challenges of AI Applications

Some of the challenges facing AI applications include:

- Lack of Problem Clarity: AI requires clear objectives to deliver useful results, which depends on clearly defining and specifying tasks.
- Data Scarcity: Many current AI applications rely heavily on large amounts of data for quality output. Therefore, any shortage in data quantity or quality will negatively impact AI results.
- Simplicity of the Problem: Certain problems may not require AI due to their simplicity and reliance on straightforward rules and formulas, which can be solved with traditional methods and statistical calculations.
- Unstructured Data: Many AI applications require data to be collected, organized, and stored systematically, with accessible pathways to achieve the desired results.

3.3.2 Risks of AI Applications

Some of the risks associated with AI applications include:

- Reliability: Ensuring AI is safe for use and free from intentional or unintentional biases, which largely depends on transparency and accountability.
- Security: Preventing unauthorized or harmful interference with AI, especially with the increasing use of open-source code.
- Responsibility: Ensuring AI is free from errors or legal violations and establishing legal accountability, which requires monitoring changes in legislative and regulatory requirements.
- Control: Balancing control between humans and AI in task execution as needed, depending on the situation and the human ability to manage critical scenarios **(Saudi Data and Artificial Intelligence Authority (SDAIA), 2022, pp. 98-99).**

4. The Importance of AI Applications in Higher Education

4.1 The Importance of AI in Enhancing the Educational Process

AI embodies the expertise of instructors by simplifying essential teaching tasks and addressing them within the educational field:

- Addressing Faculty Shortages: In cases where universities lack expert instructors, AI that encapsulates faculty expertise can enhance their effectiveness. Research indicates that providing high-quality curricula and online educational materials to less experienced faculty can improve students' academic performance.
- Meeting Diverse Student Needs: Even highly skilled instructors sometimes struggle to meet the diverse educational needs of their students. Universities may train instructors in differentiated instruction, and AI can support this by delivering core content, essential teaching skills, and better assessment data to instructors.
- Teaching Beyond Academic Content: In addition to academic content, deep learning and non-cognitive skills play a crucial role in academic outcomes and students' lives. AI that embodies the expertise of instructors enhances their ability to help students develop essential skills.
- Maximizing Instructor Value: Expert instructors are invaluable resources in the education system, and ensuring every student receives excellent instruction requires simplifying innovations and unique teaching aspects through AI.
- Reducing Administrative Burdens: AI applications can alleviate instructors' workloads by handling administrative tasks like grading exams and assessing assignments, allowing instructors to dedicate more time to research and curriculum development (**Abdulrahman, 2018, pp. 23-24**).

4.2 Quality in Higher Education

Defining the concept of quality is itself a considerable task. Despite its widespread use, researchers have not reached a consensus on a common definition. However, it can be understood as a multidimensional concept in

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higher education that should encompass all functions and activities, such as curricula, educational programs, student research, facilities, and tools, while also providing services to the local community and fostering internal self-education. It requires setting internationally recognized quality standards.

Quality is also defined as a strategy rooted in values that derive effectiveness from conditions that enable the most successful utilization of capabilities and talents in a creative manner that fosters the institution's continuous development. Graham Geis defined it as anything that enhances students' intellectual and imaginative capacities, improves their understanding and comprehension, and develops skills for solving issues effectively, viewing matters through the lens of both past learning and current studies.

There are several fundamental principles of quality in higher education, outlined as follows:

- Encouraging and embracing creative ideas and motivating innovators.
- Ensuring quality is comprehensive, covering all areas of service.
- Integrating policies to achieve excellence across the entire quality process.
- Using efficient management mechanisms for time and positively addressing conflicts.

The significance of applying quality management in higher education lies in developing future administrative leadership, which leads to improved educational system outcomes, advances in assessment and evaluation methods, and enhances the use of educational technologies. This approach supports the quality and improvement of education by optimizing both material and human resources (**Younis, pp. 299-300**).

5. CONCLUSION

AI applications may represent the future of modern education due to their benefits in academic achievement. AI has evolved beyond being a mere science or a set of algorithms; it has become an industrial revolution. Thus, the increasing integration of AI in the education sector relies on stronger partnerships between governments and heightened investment, driven by the demands of the modern era.

To fully harness AI technologies in education, educational institutions need expertise in creating and managing AI systems on a broad scale, along with providing the necessary infrastructure for implementation, operations, and management strategies to ensure the success of AI technology. Additionally, clear guidelines should be established regarding the duration and methods for monitoring online lessons.

The widespread adoption of AI applications will inevitably lead to significant disruptions in labor markets. Due to rapid technological advancements and the proliferation of robotics and smart production technologies, there will be a substantial decline in demand for unskilled labor.

To activate AI applications on a national level, the following outcomes are necessary:

- The use of AI in higher education and scientific research requires adequate, accessible data sources and proper training for educators and researchers in AI-related technologies.
- The constitution asserts that education is a right for every Algerian citizen and should be free at all levels, with the state working to provide high-quality education at reasonable costs.
- Shortage of Qualified Human Resources: The AI field requires a strong team of experts in computing, mathematics, data science, and AI. However, Algeria faces a shortage of qualified human resources, making it challenging to develop the necessary expertise and skills to implement AI projects.

5.1 Recommendations

In studying the legal framework for applying AI in higher education and scientific research in Algeria, we propose the following recommendations:

- Strengthening International Cooperation: Enhance AI collaboration between Algeria and other countries and work together to develop an international legal framework for AI.
- Collaboration with Specialized Companies: Work with companies specializing in AI to gain experiences that help improve the legal

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framework for AI in higher education and scientific research in Algeria.

- Adoption of Educational Programs Aligned with AI: Implement educational programs that adapt to AI advancements.
- Facilitation of Specialized AI Research Centers: Support the establishment of specialized AI research centers.

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