

Applications of artificial intelligence to improving the quality of higher education

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Abstract:

In this research paper, we tried to find out the most important applications of artificial intelligence that work to improve the quality of higher education, whether it is related to the professor or the student, since these applications have begun to see a terrible development and spread in the world, so we will work to clarify the most important of these applications used in the largest universities in the world, which It made the educational process easy, enjoyable, and non-routine.

Key Words : Artificial intelligence applications, Quality of higher education.

JEL Classification: O31, A120, B410, I230

Résumé:

Dans ce travail de recherche, nous avons essayé de découvrir les applications les plus importantes de l'intelligence artificielle qui contribuent à améliorer la qualité de l'enseignement supérieur, qu'elles soient liées au professeur ou à l'étudiant, car ces applications ont commencé à connaître un développement et une propagation terribles dans le monde, nous allons donc travailler à clarifier les plus importantes de ces applications utilisées dans les plus grandes universités du monde, qui ont rendu le processus éducatif facile, agréable et non routinier.

Mots clés : Applications de l'intelligence artificielle, Qualité de l'enseignement supérieur.

Classification JEL : O31, A120, B410, I230

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1. Introduction

First, we can look at the statement of researcher Yudkowsky in 2008 about artificial intelligence, as he believes that the latter poses a danger to humans, as after its invention, these people will have nothing to do, and they will die of hunger or stay at home watching television.

Artificial Intelligence is a tool that basically helps make tasks easier and faster. It is not a substitute for humans, but rather will help them make changes that contribute to development in various fields. It works to redevelop careers and work effectiveness in a world that is changing radically and permanently. In fact, artificial intelligence is working to bring about change, which makes people confused and afraid of what the situation will become in light of so-called sub-human jobs.

We find that artificial intelligence affects various areas of life, including health, law, investment, marketing, industry, security, and others. Among these fields there is education, especially higher education, where artificial intelligence has helped develop educational curricula in an easy and simple way for the student and make him excel, excel and have the ability to learn.

Artificial intelligence also has a very clear impact on the educational path of students and adapts to each student's level of knowledge and learning speed. It helps students find answers to their questions in seconds.

On the other hand, artificial intelligence also helps the professor by giving him time for research, creativity and innovation. There are many applications of this intelligence that have taken over some of the administrative tasks that the professor himself carries out, such as answering students' inquiries about the school subject, presenting some lectures using these techniques, etc. All of these services gave the professor time to conduct research and develop his personal skills.

In light of the above, the problem of our research paper may revolve around **knowing the most important applications of artificial intelligence that work to improve the quality of higher education.**

Through the fundamental question, **the following sub-questions** can be formulated:

- Is artificial intelligence a new phenomenon or does it have historical roots?
- What are the most important artificial intelligence tools adopted in higher education?
- What do we mean by AI-powered learning systems?

Through these questions, we can put forward **the following hypotheses**:

- Artificial intelligence is a concept that emerged in the fifties of the last century, but in a narrow way, and it began to develop as it has now become the widely used tool, especially after what happened in 2019 (the Corona pandemic), so it has become relied upon in most fields, especially education and higher education ;
- Currently, there are several mechanisms for artificial intelligence that the university is adopting in order to teach better and more effectively, including, but not limited to: chat-GPT, CANVA, AITHOR....;
- It is technology-enhanced education that allows students to develop knowledge and skills with the help of teachers. One such system is Moodle ;

This study aimed to identify the role of artificial intelligence through its available tools in enhancing and developing the educational process at the university.

As for **the method used**, which every researcher must determine accurately, as it works to direct the work in the right direction and reach the desired goal, we relied on the descriptive method in describing all the factors related to artificial intelligence and the various tools for the latter used in higher education.

While this work was divided into six axes as follows:

- **Artificial Intelligence (origin, concept and importance);**
- **Types of artificial intelligence;**
- **Growing interest in artificial intelligence in higher education;**
- **Examples of successful AI technologies for universities;**
- **AI-powered learning systems;**
- **Artificial Intelligence Applications in Higher Education in Algeria;**

2. Artificial Intelligence (origin, concept and importance)

Before starting to list the most important stations of artificial intelligence, the following table can be drawn up, which shows the most important milestones in the history of this concept, which received the Turing Award, which is considered the Nobel Prize in the field of computer science, and is annually awarded by the Association for Computing Machinery (ACM):

Table 1 : Milestones in the history of artificial intelligence winning the Turing Award

the year	Researcher	Contributions submitted to obtain the award
1966	Alan Perlis	For his influence in the area of advanced computer programming techniques and compiler construction.
1969	Marvin Minsky	For the central role he played to create, shape, promote and develop the field of artificial intelligence.
1971	John McCarthy	Outlining the foundations of the field based on representation and reasoning through his lecture titled "The Current State of Research on Artificial Intelligence."
1994	Edward Feigenbaum Raj Reddy	for his developing expert systems that encode human knowledge to solve real-world problems.
2011	Judea Pearl	For his fundamental contribution of developing a calculus of probabilistic and causal inference that deals with uncertainty in a principled manner.
2018	Yoshua Bengio Geoffrey Hinton Yann LeCun	for making "deep learning" (multilayer neural networks) a critical part of modern computing.

Source: Behave.

Warren McCulloch and Walter Pitts made the first major advances in artificial intelligence in 1943 (inspired by the work of Nicholas Rashevsky between 1936 and 1938). They relied on key sources of information: formal logical analysis; knowledge of the basic physiology and functions of neurons in the brain; and Turing's theory of computability, in which each neuron is classified as "on" or "off," with switching to "on" occurring in response to stimulation of a sufficient number of neighboring neurons.

They also proposed that appropriately defined networks could learn. Donald Hebb proposed a simple updating rule for modifying the strength of connections between neurons in

1949, and his rule remains an influential model to this day, now known as Hebbian learning. (Stewart & Peter, 2020, p. 17).

One of the most notable achievements in the field of artificial intelligence was in 1945, John Mauchly and J. Presper Eckert developed the first universal electronic digital computer by updating and designing the Electronic Numerical Integrator and Calculator (ENIAC). During the 1940s, specifically in 1947, John von Neumann modified and updated the fundamentals of ENIAC and created the modern electronic computer (MANIAC).

Physiologist Warren McCulloch also emerged and created the first neural network model. This scientist's origins date back to America in 1946, and two years later, the concept of information entropy was introduced. Claude E. Shannon, the founder of information theory, defined it as "the average amount of information after redundancy has been removed." This theory has played an important role in fields such as machine learning; ; (Huawei Technologies Co., Ltd., 2023, p. 7)

In the early 1950s, Alan Turing (one of the most prominent pioneers in this field) wrote a paper in which he attempted to answer the question, "Can a machine think?" Based on this proposal, a practical test (commonly known as the Turing test) was developed (Kevin, 2012, p. 2). During the same period, the first neural network computer was built by two Harvard students, Marvin Minsky and Dean Edmonds. Exactly two years later, in 1952, two checkers programs were independently developed by Arthur Samuel at IBM and Christopher Strachey at the University of Manchester (Stewart & Peter, 2020, p. 17).

In 1956, John McCarthy formally introduced AI as a new discipline at the Dartmouth conference that marked its birth. Since then, numerous AI research groups have emerged in the United States, such as the Carnegie-RAND Group, founded by Allen Newell and Herbert Alexander Simon; the MIT Research Group, founded by Marvin Lee Minsky and John McCarthy; and the IBM Engineering Research Group, founded by Arthur Samuel. The MIT Artificial Intelligence Laboratory invented the first chatbot, Eliza, in 1966.

This program works by pattern matching based on specific rules and user questions, selecting from an archive of pre-written answers. It was one of the first programs to attempt the Turing Test (Huawei Technologies Co., Ltd., 2023, pp. 7-8). Simon and Newell continued their AI success with their Global Positioning System (GPS) program. Unlike LT, this program was designed from the outset to mimic human problem-solving protocols.

It turned out that the program's order in considering subgoals and possible actions was similar to that of humans in solving the same problem. The success of GPS and subsequent programs as models of cognition prompted these two scientists in 1976 to formulate the famous physical symbol system hypothesis, which states that the physical symbol system possesses the necessary and sufficient means for general intelligent action (Stewart and Peter, 2020, p. 19).

In the early 1980s, XCON, an intelligent, integrated expert system, was launched and developed by Carnegie Mellon University (CMU) (Huawei Technologies Co., Ltd., 2023, p. 9). Around the same time, the first successful commercial expert system, R1, began operating at Digital Equipment Corporation.

This system helped generate demand for new computer systems; by the middle of this period, it was generating revenues of \$40 million annually for the company (Stewart and Peter, 2020, p. 23). At exactly the same time, in 1986, the German Army University in Munich connected a Mercedes-Benz truck to a computer and an array of sensors, enabling automatic

control of the steering wheel, accelerator pedal, and brakes. This facility, dubbed VaMoRs, was considered the world's first self-driving car.

Two years later, a decisive contribution to the future development of AI technology came from American scientist Judea Pearl's advocacy of the probabilistic approach to AI inference (Huawei Technologies Co., Ltd., 2023, p. 10). The period since the early 1990s has also witnessed the achievement of many milestones and goals.

For example, on May 11, 1997, Deep Blue became the first chess-playing computer system to defeat world chess champion Garry Kasparov at its own game. On March 14, 2002, Kevin Warrick was among the first to successfully connect the human nervous system directly to a computer to achieve a new form of artificial intelligence. On October 8, 2005, a Stanford University robot was announced as the winner of the DARPA Grand Challenge, autonomously driving 131 miles on an unpaved desert track. Meanwhile, in 2009, the Blue Brain Project team announced that they had successfully simulated parts of the rat cortex (Kevin, 2012, p. 8).

Google also launched two Go competitions in 2016 and 2017, between automated and human players. In these competitions, the AlphaGo AI program defeated two world champions, Lee Sedol from South Korea and Ke Jie from China (Huawei Technologies Co., Ltd., 2023, p. 11).

After going through the most important stations of artificial intelligence and how it emerged to become what it is today, we will now try to understand the concept of this term by providing a set of definitions for it.

We can say that "intelligent systems" are: "systems that choose their actions in order to achieve specific goals using limited resources" (Steve, 2024, p. 4). We can say that artificial intelligence (AI) represents the ability of computers and devices to simulate intelligent or human behavior. These systems learn, act, and even think like humans. The capabilities of these systems may exceed some human capabilities. AI systems have a significant ability to analyze vast amounts of data and information, make decisions quickly and effectively, and solve complex problems, innovate, and create.

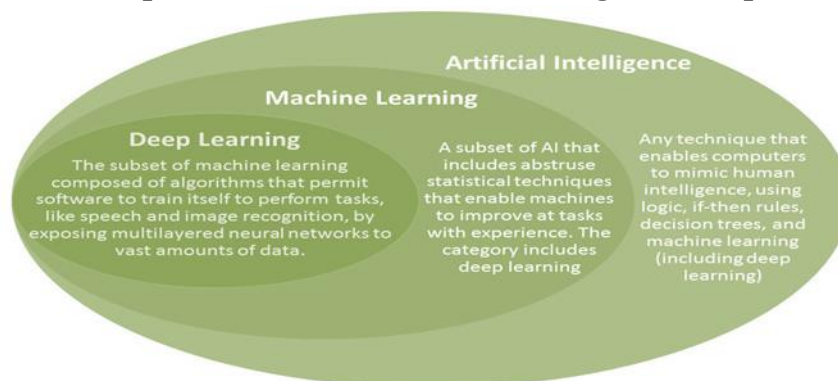
Scientist John McCarthy gave a very simple and clear definition of artificial intelligence, where he saw it as "the science and engineering of making intelligent machines, especially intelligent computer programs" (Ashish & all, 2017, p. 30). AI can also be defined as "automation" and is based on association. Two fundamental shifts in this concept change computing beyond traditional learning technology, by replacing data capture with pattern detection in data, and can provide access to information. (Miguel &all, May 2023, p. 1)

During the late 1950s, the phrase "artificial intelligence" was coined to refer to the ambition to achieve human-level intelligence in software and hardware. The phrase "human-like AI" is used to describe this ambition, emphasizing the idea that an artificially intelligent entity should look like us, if not physically, then at least mentally. AI is supposed to focus on something different: the high-level cognitive ability of humans to think and reason. Yet more than sixty years later, high-level thinking and reasoning are still elusive. In fact, the developments now called AI have arisen mostly in engineering fields related to low-level pattern recognition and motion control, as well as in statistics, a discipline that focuses on finding patterns in data, making robust predictions, testing hypotheses, and making decisions. (Michael , Summer 2019, p. 4)

There are two main approaches to building an AI system that enables it to "learn" to perform a task: machine learning and deep learning. The former can learn from massive amounts of data and can continually improve its performance as it is fed more and better training data. With this "knowledge" gained from training data, machine learning-powered AI systems can make predictions, such as the weather, or recognize patterns in data such as images and speech.

The latter, a more advanced branch of machine learning, uses complex and sophisticated methods inspired by the human brain called artificial neural networks. Explaining how neural networks work is beyond the scope of this AI primer, but deep learning systems can excel at highly complex tasks, such as creating new works of art and discovering medical drugs. (GUIDE FOR TRAVEL & TOURISM LEADERS, January 2024, p. 10)

Figure 1 : The relationship between AI, machine learning, and deep learning



Source: Dhande Meenal, 2020 ; Available on <https://www.geospatialworld.net/blogs/difference-between-ai%EF%BB%BF-machine-learning-and-deep-learning/>

Through the previous definitions, we can say that artificial intelligence is of great importance to both institutions and individuals alike, as it is clear that this intelligence contributes significantly and clearly to facilitating the performance of tasks and saving time, effort and money. Artificial intelligence works to eliminate routine and spread information and knowledge all over the world and in all languages to facilitate the process of learning, education, creativity and innovation.

It also helps people perform other tasks that develop their skills when it takes over the normal tasks that take time from them. There are many, many more benefits of this intelligence that contribute to providing comfort and effort for some tasks as well as accuracy in performing them, and it can even exceed humans in that, so we cannot limit and mention them all here.

AI systems are already learning. Instead of solving a problem by examining training data, they work to find the best path to achieve a goal based on the data they were trained on. They don't rely on pre-programmed decisions. AI can also learn by experience, constantly, and constantly, so the path to achieving the outcome or goal varies with each run of the AI system. For example, a 2023 Swedish AI study found that AI-powered breast cancer screening was as good as two radiologists working together.

It also reduced the workload of specialists by 50% and led to more cancers being detected earlier for treatment. This illustrates some of the amazing capabilities of AI and its benefits to society. There is also an important concept of AI called "explainable AI." AI systems are sometimes referred to as "black boxes," where the details of how they work are not fully known

or understood. In some cases, it may not be possible to know precisely how a decision or conclusion is reached.

This problem may affect the developers of these systems, as their role is often limited to verifying the outputs without verifying the steps taken by the AI systems. Therefore, "explainable AI" is an active and ongoing field in which researchers work to understand and explain how AI systems reach their conclusions. This is crucial to enhancing trust in AI systems. (GUIDE FOR TRAVEL & TOURISM LEADERS, January 2024, pp. 8,9)

3. Types of artificial intelligence:

Generally, there are two types of artificial intelligence: (Huawei Technologies Co., Ltd., 2023)

Strong AI It is the creation of intelligent machines capable of logically solving problems. These machines possess self-awareness, consciousness, and the ability to find optimal solutions to problems, in addition to the ability to think independently. This species also has its own values and worldview, and instincts, such as the needs for safety and survival, like all living beings.

The second type is **weak AI**, Which expresses the inability of humans to create machines that can truly think and solve problems like humans. Although they appear to be intelligent machines, they lack self-awareness or intelligence.

According to another opinion, artificial intelligence has many different applications, so there are different ways to classify artificial intelligence systems, and they are generally divided into one of three categories, either according to their capabilities, which include artificial narrow intelligence (ANI), artificial general intelligence (AGI), or artificial super intelligence (ASI), or according to their learning method, and here we find machine learning or deep learning, or according to their functions, and here we find predictive artificial intelligence, expert systems, or generative artificial intelligence. (GUIDE FOR TRAVEL & TOURISM LEADERS, January 2024, p. 21).

A brief explanation of each of these types can be provided, skipping both machine learning and deep learning as they were discussed in the previous point, so we can provide an explanation of each of **ANI**, **AGI** and **ASI** as follows: (Cloud, 2024)

- **Narrow Artificial intelligence (ANI):** This is classified as weak AI because it specializes only in a narrow range of parameters or situations, such as speech recognition or self-driving cars ;
- **Artificial General Intelligence (AGI):** It is classified as strong artificial intelligence because it operates at a higher level than human intelligence;
- **Artificial Super intelligence (ASI):** Although this type of AI is not currently being developed, advanced AI means that a machine has become super-intelligent or smarter than a human;

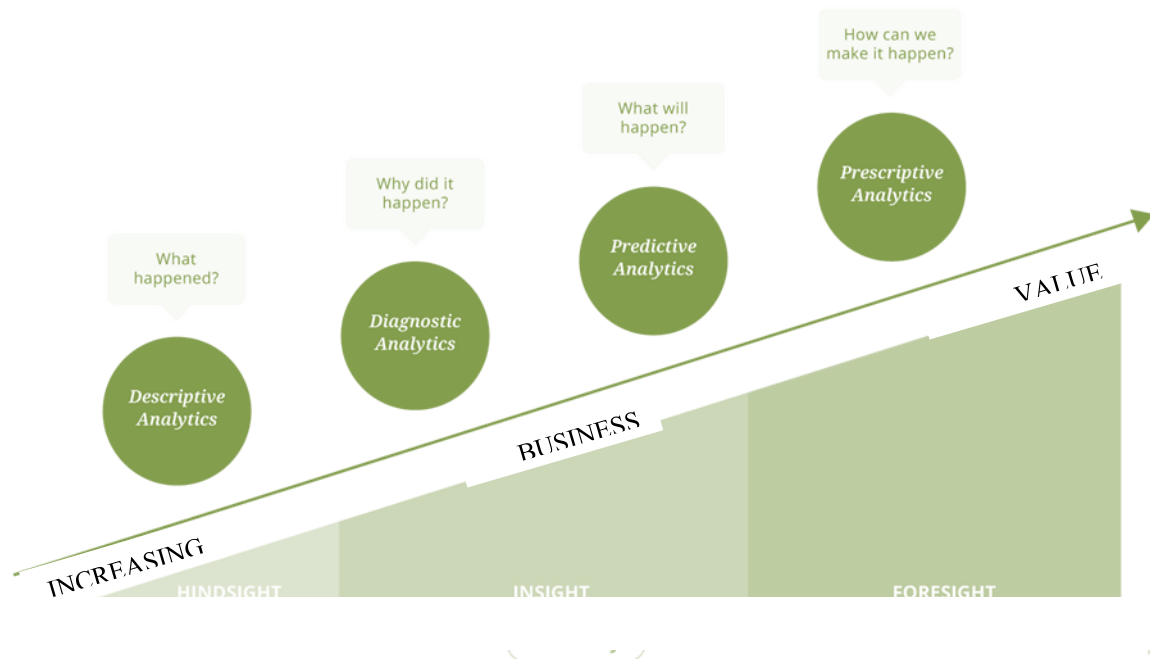
The remaining types can be defined as follows: (GUIDE FOR TRAVEL & TOURISM LEADERS, January 2024, pp. 22-24)

- **AI expert system** It is an intelligent program that uses artificial intelligence to simulate human expertise in a specific field, such as medical diagnosis, travel planning, or financial advice. These systems also contain a knowledge base of rules and facts about a specific field, which are combined with artificial intelligence to solve problems and provide recommendations or advice. The artificial intelligence expert system includes a number

of benefits, including cost and time savings, extensive knowledge of experts, and personalized customer service;

- **Predictive AI:** Another way to classify it is to refer to AI that uses historical and current data to predict future events, outcomes, or behaviors. This is done by analyzing a large amount of data to identify trends, patterns, and relationships that can help predict the future. Examples include flight delay forecasts, weather forecasting, etc. Other data analysis techniques that can be combined with predictive AI include diagnostic analytics and descriptive analytics;

Figure 2 : Types Of Data Analytics



SOURCE: Behave.

- **GENERATIVE AI:** Sometimes called “Gen AI” for short, it is a relatively new form of artificial intelligence that emerged globally in late 2022 with the launch of a sophisticated chatbot called ChatGPT.

ChatGPT, along with other advanced chatbots launched in 2023, such as Google Bard and Microsoft Copilot, is credited with unleashing the power and potential of AI for consumers and businesses;

4. Growing interest in artificial intelligence in higher education:

Many teachers today are looking for effective and scalable technological methods to meet their educational needs. Naturally, they will wonder whether the rapid advancements in technology at a daily pace can help. These teachers are also using AI services as a modern tool in their daily lives, such as tools for grammar correction, essay writing, sentence completion, and even automated trip planning on their phones and educational event notifications.

Teachers have seen opportunities to use AI capabilities, such as multilingual learners and speech recognition, to support students with disabilities and others who may benefit from greater flexibility and customization in digital learning tools. They are also exploring how AI can enable and improve lesson writing, as well as the process of finding, selecting, and adapting materials for use in their lessons. (Miguel &all, May 2023, p. 1)

First, we need to differentiate between AI in education and learning analytics. The most common definition of learning analytics is the measurement, collection, analysis, and reporting of data about students and their contexts, in order to understand and improve learning and the environments in which it occurs. In this way, learning analytics is also "the process of developing actionable knowledge through problem identification, statistical analysis, and applying modifications to current or future simulated data".

This allows companies to experiment with data to capture and improve student learning experiences and outcomes and identify improvements in the effectiveness and efficiency of delivery. So, we can say that learning analytics is just one of the promising elements of AI in education.

Learning analytics is a powerful resource for making effective decisions and achieving better educational outcomes. It relies on the availability of vast amounts of data that can be sifted through to extract knowledge or develop intelligent tools useful for educational or administrative tasks. However, analyzing and making the most of data is not an easy task. To achieve this, advanced data mining techniques are used, which in turn draw on other areas such as:

- Self-learning algorithms that learn from data;
- Big data technologies to manage massive amounts of data;
- Visualization tools to communicate effectively with decision-makers;

All these software layers enable intelligent data processing to gain insights, predict future situations and discover learning patterns, or provide recommendations to improve available resources. Analytics is also a crucial step in the development of future AI solutions that will allow, using powerful libraries including natural language recognition, language translation, and game theory.

The bright future prospects allow us to anticipate an AI ecosystem that can help overcome the various challenges associated with the quality and equal opportunities of higher education, especially when it is delivered in a hybrid or fully remote mode. Although the future of AI solutions looks promising in the medium term, current solutions aim to make the most of data mining and analysis techniques. (Pedró, 2020, p. 62)

The applications of artificial intelligence in higher education are wide and varied, impacting different aspects of the educational landscape. From personalized learning and adaptive assessments to smart administrative processes and campus security, artificial intelligence is revolutionizing the way higher education institutions operate and deliver their services. We will try to present the most important of these applications in the following points: (d'événements, 2024)

4.1 Personalized learning : To analyze student data, we can rely on AI-powered algorithms, including learning styles, performance, and preferences, to create personalized learning paths and content recommendations. Additionally, these personalizations enhance the overall learning experience and improve student engagement and academic outcomes. AI-powered virtual professors and intelligent tutoring systems provide real-time feedback, adaptive exercises, and personalized guidance. They also ensure that every learner gets the support they need to succeed;

4.2 Streamlined administrative tasks: AI-powered chatbots and virtual assistants are streamlining campus admissions processes. They help manage more student applications and automate many administrative functions, such as event scheduling, course registration, and campus security. By automating these repetitive and time-consuming tasks, AI also allows administrators to focus on more strategic initiatives, improving the overall efficiency of the institution;

4.3 Increased campus security: Artificial intelligence in higher education is changing the way institutions approach campus security. Intelligent surveillance systems powered by AI-based computer vision and anomaly detection algorithms monitor activities on campus. They can identify potential threats and alert security personnel in a timely manner. This proactive approach to campus security improves the safety of students, faculty, and staff. This contributes to a safer and more inclusive learning environment;

4.4 Accessibility and Inclusivity with AI in Higher Education: AI algorithms analyze big data to uncover trends, patterns, and insights that inform resource allocation, policy development, and strategic planning. This data-driven approach enables organizations to make more informed decisions. It also helps them better meet the needs of their students and communities and improve their offerings.

Additionally, AI-powered assistive technologies, such as virtual tutors and transcription, support students with disabilities or diverse learning needs. Finally, ensuring that all learners have equal access to educational opportunities and resources;

4.5 Integration of virtual assistants and chatbots: AI tools are increasingly being used in higher education to improve student support services and streamline administrative tasks. These AI-powered tools handle a wide range of requests, from admissions, course registration, campus safety, to academic advising. Freeing up valuable resources to focus on delivering high-quality educational experiences;

A company like Admit Hub has developed a **chatbot**, a computer program that automates online communications by sending text or converting text to speech. These bots also allow advisors to focus on more important tasks, allowing prospective college students to ask thousands of questions.

These applications use artificial intelligence and machine learning and can learn from each professor's experience to automate a variety of tasks, allowing them to devote more time to more important aspects of teaching. There's also **Shadow Health**, an AI-powered training program that simulates patient cases for undergraduate nursing students, who typically practice their skills on real-life actors.

The University of Michigan's **E-Coach** program, a program with a broad focus on STEM subjects, tracks undergraduate students' progress, identifies errors, and identifies areas of interest in larger classes. Based on their performance in previous modules, it can also offer and suggest practice activities relevant to their course. There's also **M-Write**, a program also developed by the University of Michigan that helps professors handle note-taking in large-scale introductory courses.

The program uses an algorithm to detect weaknesses and errors in written texts, as well as identify significant issues that contribute to poor writing. As another automated assessment and analysis platform, **Perceptiv** provides double-blind review structures that evaluate long-

term projects and experiments using algorithms developed at the University of Pittsburgh. (Nassoura, 2022, pp. 1174, 1175)

According to the UK's Open University, machine learning algorithms have been able to analyze undergraduate student behavior data from a virtual learning environment to predict undergraduate student engagement, which is particularly notable in large distance learning institutions where it is difficult to attract undergraduates to classes. The authors hope to extend the intelligent prediction system that allows professors to automatically identify and intervene with inactive students during workshops with undergraduates. (Nassoura, 2022, p. 1175)

5. Examples of successful AI technologies for universities

As the adoption of artificial intelligence in higher education grows, many institutions have successfully implemented AI-based solutions to improve their educational offerings and administrative processes. Among these institutions we find: **Timely** It is a program that works to lead and simplify event planning on campus, and **Coursera for Campus** They are tools that automate assessments and create personalized learning experiences for students.

There is also **math thinker** A mathematics education platform to provide personalized learning experiences, and **Querium** These are systems that help students in the fields of science, technology, engineering, and mathematics, customized based on individual performance. We also find **Brainly** and **Lierre.ai**, The first represents a social media platform for questions related to the specific semester, The second is chatbots that handle student inquiries, assist with administrative tasks, and provide support 24/7, reducing staff workload and improving students' learning experience.

There is also **Gradescope by Turnitin** It is a tool that helps teachers grade tests and quizzes efficiently and provide appropriate and timely feedback to students, and **Backpack** It is a discussion platform to facilitate and manage online discussions in educational environments among students; (d'événements, 2024)

Note that all of the above elements are tools supported by artificial intelligence.

6. AI-powered learning systems :

In recent years, technology has played a pivotal role in various areas of life. Among these areas is higher education, where so-called "technological" learning and teaching systems exist, enabling students to develop their knowledge, methods, and skills with the help of professors. These systems have received increased attention, particularly after the COVID-19 pandemic, due to their ability to help professors provide more enriching educational experiences for their students.

These tools also support students in the learning process. Among the most popular and widely used learning systems are Blackboard, Moodle, Web CT, and Canvas. These systems provide easy and convenient access to courses at a low cost, continuous availability, the ability to collaborate between professors and students, effective communication, improved performance, and faster response times. Despite all these advantages, these systems focus on achieving their technical goals, leading both students and professors to view them as inadequate and unsuitable for their needs.

This has necessarily led to the recent emergence of more advanced learning systems that rely heavily and clearly on artificial intelligence technologies. The latter has clearly contributed to the development of these systems (learning systems), making them adaptable

and flexible to a constantly changing environment by providing learners with accurate, high-quality educational materials tailored to their individual needs. Intelligent education systems also use artificial intelligence to simulate a human teacher to enhance learning and provide better support to learners. Artificial intelligence has already contributed to the education sector by providing personalized feedback and support to students. (Kabudi & ALL, 2021)

Adaptive learning systems are a type of AI-based learning system. They are an educational approach and method that uses technology to deliver personalized learning experiences tailored to students' needs. These systems leverage AI-powered algorithms to dynamically adjust instruction, content, and pace based on learner performance and engagement. By adapting to each student's unique needs, adaptive learning promotes effective and successful learning and improves academic outcomes. (Gligorea & All, 2023, p. 1)

There are also intelligent tutoring systems (ITS), computer-based learning systems that integrate independent databases or knowledge bases on teaching strategies and pedagogical content. They seek to exploit inferences about the learner's ability to understand topics and identify their strengths and weaknesses, thus allowing them to dynamically adapt to the learning process. ITS have four fundamental elements: an expert model, which provides a model of expert performance against which the learner is evaluated; a student model, pedagogical knowledge, and an interface. ITS dynamically models the learner in different scenarios. (ALRAKHAWI & All, 2023, p. 1206)

7. Artificial Intelligence Applications in Higher Education in Algeria

Algeria, like other countries in the world, has tried to keep up with the latest developments and technological techniques in the field of higher education, especially after the Corona pandemic, which forced the world to close itself and carry out tasks remotely. This forced the Algerian Ministry of Higher Education to adopt some educational and administrative systems that rely on technology in order to manage the work of the ministry and not stop it and waste years of the lives of its students and professors.

The digital platforms that were created are part of the implementation of the main digital plan (SDN) adopted by the Algerian Ministry of Higher Education. The SDN network consists of 7 strategic axes, 16 strategic programs and 102 executive programs that will be implemented by December 2024. The goal is to facilitate the student's journey through the various stages of university curricula, starting from the Tawjihi and up to obtaining a professional diploma, integrating with ensuring the improvement of educational innovation and modernizing governance in its various aspects.

Among the digital platforms adopted by the ministry are the Innovation Platform :

- **the Infrastructure Platform;**
- **the Research Platform;**
- **the Electronic Guide for Research Laboratories;**

In the past few months alone, the Algerian Minister of Higher Education, Kamal Baddari, has put into service two digital platforms, the first platform represented by "**My Concerns**" directed at students residing in various university residences across the country, and the second platform represented by the "**Digital Incubator**" for university graduates.

As for the artificial intelligence applications approved by the ministry, we find **E-services Mesrs DZ**, which can simplify the academic journey and stay at the forefront, whether the

person is a student, researcher or faculty member. This application offers a comprehensive set of features designed according to their needs.

Coinciding with the announcement of the results of the secondary education certificate and the start of registrations for new students in higher education, Mr. Kamal Baddari launched several applications based on artificial intelligence to help these students choose their specializations and facilitate registration processes and obtain various university services. We find the application "**Discover your opportunity for guidance**", which helps in choosing fields and departments of training at the university. As for the education process supported by artificial intelligence, digital platforms have been developed for the benefit of teachers and students for distance learning only, such as **the Moodle and Google Meet platforms**, but they do not reach the efficiency of education platforms supported by artificial intelligence. Therefore, Algeria is still in the process of progressing to reach these modern technologies, and this is due to the fact that they are expensive technologies and there is no sufficient infrastructure for these applications.

8. CONCLUSION

In this research paper, we tried to give a brief overview of the applications of artificial intelligence adopted in higher education processes with the aim of improving the quality of this sector through a literature review of some books and articles as well as websites interested in this topic.

The concept of artificial intelligence was identified, which appears to be a system that tries to think, learn and act like humans and sometimes tries to outperform human capabilities. The most important types of this system were also identified, the most important of which are machine learning and deep learning. We also touched on the most important applications of this intelligence in education, the most important of which were chatbot, ChatGPT and M-Write. In addition to knowing the most important learning systems supported by artificial intelligence, represented by adaptive learning systems and smart teaching systems.

At the end of this paper, we tried to identify the most important Algerian initiatives to adopt artificial intelligence applications in higher education, and they were very significant compared to the rapid development witnessed by the world, but we can say that they are trying to keep up and catch up.

Despite the advantages that artificial intelligence applications offer to improve the quality of education, there are negatives or rather misuse of these applications, such as researchers relying on them to conduct their research without making a personal effort, thus eliminating the spirit of creativity and passion for research, and students relying on them to perform the tasks assigned to them, and other things that work to control artificial intelligence applications and eliminate human intelligence. Among the things that generally scare people is replacing some tasks with artificial intelligence and the spread of unemployment for this reason, we find that there are applications, for example, that perform administrative tasks at the university without stopping and with fewer errors and costs, and do not get sick or absent and are present at all times, day and night, which exposes some administrative jobs to risk. Also, smart teaching systems that may exceed the professor's ability and take his place, as these applications have become able to adapt to the external environment and provide the latest information in a simplified manner. Despite this, human intelligence remains a feature that

artificial intelligence cannot overcome, as there is no room for comparison between the creation of the Creator and the creation of humans.

After collecting and analyzing the information in this paper, we reached many results, the most important of which are :

- Artificial intelligence helps individuals perform their tasks in a short time, at a low cost and with high quality;
- Artificial intelligence helps professors save time for innovation and creativity, by performing routine tasks for them;
- Artificial intelligence has a quick and timely response to answer students' inquiries and meet their educational and administrative needs;
- The most common applications of artificial intelligence adopted in education are chatbot, as it answers all students' inquiries, and the ChatGPT program, which conducts research and articles in a short period of time;
- Most of the applications of artificial intelligence in higher education in Algeria serve the student without paying attention to developing applications that help the professor;

Some recommendations can be made, especially for the Algerian university, as it must focus more on artificial intelligence applications to help professors in order to reduce, even a little, the routine pedagogical work to gain some time for research and development, since the latter takes up all the time of the Algerian professor, so that he is prevented from pursuing his passion for research, innovation and creativity. In general, caution must be taken against relying completely on these applications, which leads to the human mind stopping working and thus these applications dominating real life.

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