



The Role Of Artificial Intelligence Applications In Enhancing University Teaching Methods And Strategies In Light Of The Components Of The Educational Process

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Abstract:

This study aims to determine the role of artificial intelligence (AI) applications in enhancing teaching methods and strategies through a narrative literature review of scientific articles published between 2019 and 2023.

It found that AI applications help simulate the role of the professor, transforming their role into guidance and providing a comprehensive analysis of student data. and benefit students by personalizing their learning path. It also assists in customizing and suggesting instructional content based on individual student needs.

Keywords: *Artificial Intelligence; Higher Education Teaching; Learning Process; Professor; Student.*

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I. INTRODUCTION

Artificial Intelligence (AI) is a pivotal element that reflects a major shift in various fields, including education. The role of technology is evident in improving aspects of daily life, but its impact is particularly prominent in the field of education, where AI is key to improving educational performance and enhancing interaction between learners and teachers. In this context. The impact of AI in the field of education is increasing in a way that makes it the focus of many researchers and specialists. These effects go beyond the traditional boundaries of education, as AI contributes to improving the quality of education and the integration of technology with the educational process. AI-based technology, such as machine learning and data analytics, is a vital tool in improving the effectiveness of educational communication. AI enhances the personalization of learning and understanding of individual student's needs, which is beneficial for improving academic performance and motivating students to reach their full potential.

1. Research problem

Educational institutions have witnessed advances in the use of information technology tools for educational purposes and in providing personalized and stimulating learning experiences for students, to enhance the interaction between the elements of the educational process. According to Thomas Arnett (2016), AI is not as threatening as some people think, but rather it helps to facilitate and simplify basic teaching tasks (Bakari, 2022).

The use of AI applications in higher education institutions in Algeria is considered a priority today, and there is an urgent need to use them in all disciplines (Kabdani and Baden, 2021). The basic skills and knowledge of AI must be within the basic skills of the individual such as reading, writing, and arithmetic, in addition to not only focusing on the use of AI tools but also paying attention to three things: AI basic knowledge, AI ethics, and AI social impact (Fengchun Mia, 2023), as education and AI are two sides of the same coin: Education helps students to learn and expand the accumulated knowledge of society, and AI provides the techniques and means to understand the mechanisms behind intelligent thought and behavior AI will be a game changer in education (Moussa and Bilal, 2019).

Interdisciplinary learning sciences research has helped us understand a lot about the way students learn, and this provides a better understanding of how best to teach. This same research should now be used to guide the development of AI technologies for use in education and training to better understand how they can help enhance pedagogical communication within the university.

To answer this question, the following sub-questions will be answered:

Q1: What is the role of AI applications for the professor during the educational process?

Q2: What is the role of AI applications for the student during the educational process?

Q3: What is the role of artificial intelligence applications for the prescribed educational content?

2. Objectives of the study:

The current study aims to explore the role of artificial intelligence tools in supporting university teaching methods and strategies within the educational process and to analyze the opportunities associated with them in light of the findings of previous studies.

3. Importance of the study:

It is expected that this study will contribute to providing a comprehensive vision of the role of AI tools in university education, and provide recommendations and guidelines for researchers, professors, designers, developers, and decision-makers in this field to improve the quality of using these tools during the educational process.

4. Limitations of the study:

The study was limited to reviewing and analyzing scientific articles related to the use of artificial intelligence in university education, which were retrieved from databases and selected in an intentional way that serves the objectives of the study, as they were published during the period from 2019 to 2023 because this period witnessed remarkable development and the emergence of many artificial intelligence applications, especially after the launch of ChatGPT.

5. Methodology:

To achieve this goal, the research will follow a methodology based on analyzing the content of several scientific articles published in the field of artificial intelligence in scientific repositories to review the literature on the subject, where the following keywords were written: Artificial Intelligence, Higher Education, University Teaching, and then selecting articles that are relevant to the topic of the study.

II. Theoretical framework

1. Artificial intelligence:

Artificial intelligence can be defined as a field of computer science that focuses on building systems capable of performing tasks that normally require human intelligence, such as learning, reasoning, inference, and self-development. It is a computer system that relies on techniques capable of collecting and using data to predict, recommend, or make a decision and choose the best action to achieve specific goals (SDAIA, 2023). It is "a field of science that aims to create intelligent machines capable of simulating the intelligence of other intelligent beings. Interest in AI applications in education began in the 1960s." AI tools are designed based on the study of how humans think, how they learn, and how they work while trying to solve an issue, and then utilize this as a basis for developing software and intelligent systems (Moussa and Bilal, 2019).

The concept of machine learning is a broad branch of AI that is concerned with making predictions based on available data without explicit programming. The field of machine learning includes the concept of deep learning, which is concerned with solving complex issues by identifying the most basic characteristics of input data, and includes generative artificial intelligence that seeks to simulate the role of humans in creating innovative content.

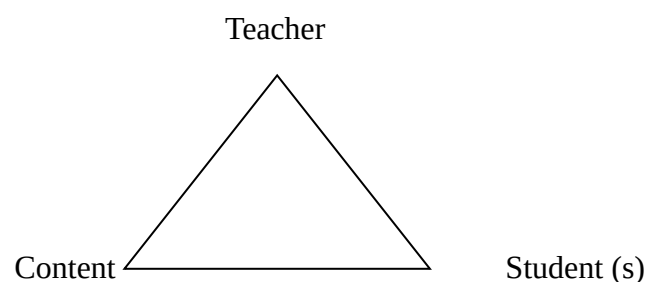
2. University teaching:

The teaching process is a system that has dimensions and components that are mainly represented by the teacher, the learner, educational experiences, tools, modern techniques, and evaluation methods, it is a dynamic process in which the objectives are first formulated, strategies and teaching methods are chosen, followed by implementation, evaluation and assessment (Othman, 2014). To carry out an effective teaching process, appropriate methods and strategies must be followed.

The teaching method is the sequential and interrelated steps that the university professor follows to achieve educational goals (Hamadneh and Obaidat, 2012), while the teaching strategy includes everything related to the method of presenting the educational content to students by the professor to achieve a goal, including the means of controlling and managing the class, the general atmosphere in the classroom and all arrangements that help bring the student closer to the content and arouse his motivation inside and outside the classroom and the selection of appropriate teaching aids (Al-Seleti, 2015).

The pedagogical act revolves around three basic elements that represent the components of the educational process, thus establishing interactive relationships between the parties in what is known as the pedagogical triangle: The teacher, the learner, and the knowledge (Content) (Darwish, 2018). It is also called the educational triangle because the educational process is seen as a pattern that combines three different poles and expresses the relationships between each pole and the other two poles (Tayeb, 2018).

Figure (1): The Pedagogical triangle



Within the triangular framework, the teacher, students, and subject content exist as distinct nodes, engaging in interactions crucial for pedagogical investigation, as asserted by Hopmann (1997) and Imsen (1999). Consequently, delving into the connections among these three nodes becomes fundamental for comprehending and dissecting the teaching scenario. Depending on the chosen learning perspective for analysis, emphasis may be placed on any of the three nodes, as highlighted by Künzli (2000) (Skog, 2022).

III. Results and discussion

1. Findings related to the first question: What is the role of AI applications for the professor during the educational process?

The first role of AI is to select a competent professor who will be hired to teach students. Kshetri's (2020) study showed that AI has a role in human resource management, university institutions can enhance efficiency in recruitment by reducing the influence of subjective criteria in selection such as favoritism, and it can have a positive impact on developing and retaining the professor as an employee (Al-Hindawi and Ahmed, 2021).

In addition, AI tools help in assuming the role of a teacher in some tasks, as AI works to simulate human intelligence and behavior. Although the use of information technology in education has been a reality for some time, the level of AI goes beyond that by modeling the behavior of the professor (Al-Qadi, 2021), thus helping to change the role of the professor from a teacher to a guide, companion, and mentor for the student, managing the educational process and providing appropriate feedback and guidance for the acquisition of the content and correcting errors (Sam, 2022).

In the same context, AI allows the professor to reduce the time spent on routine tasks such as preparing a lesson plan, summarizing content, formulating questions, and designing tests and can be used to evaluate student work and provide appropriate feedback. It can also optimize the presentation and delivery of lessons to suit the different learning styles of students (SDAIA, 2023). Thus, they can take over many of the tasks performed by the professor such as grading, record keeping, administrative work, etc. This allows the professor to be free from routine tasks and focus on creative work to achieve better learning outcomes (Moussa & Bilal, 2019).

In addition, intelligent educational systems such as Third Space Learning and Carnegie Learning help professors to break free from using a one-size-fits-all teaching method by being able to analyze big data about student performance, strengths, and weaknesses, which helps to identify the exact learning needs and skill gap of each student and provide additional guidance (Moussa & Bilal, 2019). Machine learning and deep learning work to understand the educational process and analyze the characteristics of each learner due to the availability of big data and the development of graphical processors and neural network algorithms, and thus work to help the teacher through role-playing such as instant feedback based on the way the student approaches, the machine through deep learning can analyze whether the student benefits from the feedback or not, it may lead to the student stopping learning, and thus provide it in time to avoid the negative impact (Al-Qadi, 2021).

In contrast, according to Aldosari (2020), students in educational institutions that use AI systems in lecture halls and university laboratories interact and ask questions without wasting time or feeling awkward or embarrassed, so AI enhances learning efficiency without the need for more professors (Al-Maliki, 2023).

On the other hand, AI tools help to analyze the social interactions and attitudes of the student (Bushnafa and Jumaili, 2023), which helps the professor to understand the reactions and extract the nature of the learners to choose appropriate pedagogical methods and strategies for teaching. For example, the student's attention during the lesson can be monitored through a range of technologies such as Eye Tracker to analyze the extent of attention and distraction and suggest appropriate measures that help the student in mindfulness and good eye contact (Al-Qadi, 2021). This is done through new user interfaces, such as natural language processing, speech and gesture recognition, eye tracking, and various physiological sensors (Moussa and Bilal, 2019). There are some applications of AI systems in education such as educational data mining techniques that are used to track student behaviors, collect data on attendance to select specific tasks, and provide appropriate support for students who are likely to drop out of school (Moussa & Bilal, 2019).

In terms of planning, AI researchers offer tools that help teachers create lesson plans in terms of content, activities, videos related to the topic, and quizzes on Kahoot and Quizlet by just typing the

title of the lesson and choosing the target group, such as Schemely, which - in addition to the above - turns the lesson into a ready-made presentation.

As for the evaluation and the assessment process, AI tools help the teacher improve the process of student assessment. The Chief Executive Officer of Evidence stated that "the artificiality is the making of an artifact", as it does not change the role of the pedagogical teacher, but will be supportive of the difficulties faced by the teacher, as AI systems are part of the educational process and part of the solution, not the whole solution (SDAIA, 2023).

AI systems can analyze some data that a professor alone cannot measure. For example, when a professor presents a multiple-choice question, the professor looks at the student's score, but AI systems dig deeper to see where the student is struggling, looking at each student's individual questions to determine if the question is ambiguous or if they are struggling with the general concept. Furthermore, knowing the wrong answers a student chose versus the correct answers can help determine what step they missed and guide them to learn the correct method. It also helps in determining the speed of answering questions, thus determining whether the student has mastered the content or if their answers were just a guess (Moussa & Bilal, 2019). Moreover, various statistics are provided to the professor about the progress of learning skills and mastery of the content and compared with the number of teaching hours in the classroom or remotely, and suggestions and guidance are provided to the professor based on analyzing these results and relying on algorithms and analytical factors to help him take appropriate measures to develop the student's learning speed (Al-Qadi, 2021).

Despite these many benefits of AI, the teacher remains central to the educational process and remains essential to its success, but this role may change as a result of the development of intelligent computing systems. AI applications can take over tasks such as grading tests, helping students optimize learning, providing expertise, and acting as a place for students to ask questions and search for information, thus shifting the role of the professor to that of a facilitator. He is responsible for preparing lessons and submitting them to AI systems, helping struggling students, and providing them with practical experiences and human interaction that cannot be provided by machines (Moussa and Bilal, 2019). In this context, Wang's (2020) study explained that improving the smart learning experience comes from the perspective of building a philosophy of human-computer collaboration to achieve adaptation to the current era dominated by artificial intelligence (Al-Hindawi and Ahmed, 2021), which achieves the highest level of individualized learning through the increasing number of adaptive learning programs, games, and software that take the method of content delivery, university research, and the type of activities offered can be customized based on each student's profile, so that interests can be developed and strengthened by exposing students to different content (Moussa and Bilal, 2019).

2. Findings related to the second question: What is the role of AI applications for students during the educational process?

Al-Hindawi and Ahmed (2021, p. 481) point out that "the current generation is an authentic digital generation that has not acquired digital as a skill but has become part of its life and being, and the main challenge experienced by education systems today is how faculty members and academic leaders can achieve digital integration in teaching practices, scientific research, and community service."

Benhadj et al, (2019) found that integrating technology in teaching new concepts reduces negative learning behaviors and increases positive learning behaviors in students, increasing their enthusiasm and interest, love of participation, and engagement in educational activities, and Loftus & Madden (2020) found that integrating artificial intelligence in teaching students enhances their knowledge of what they are learning (Al-Maliki, 2023).

This is due to the student's ability to customize his learning path to suit his learning style, by adapting the educational content to the individual needs of each student and adding other educational content for those who need additional support or to accelerate the learning process for advanced students (SDAIA, 2023). AI applications allow the student to learn whenever he wants, as the learning process takes place between him and the AI program (Bakari, 2022), which has capabilities and abilities that humans do not have, in terms of effort and time available throughout the day and the speed of response, and the role of the teacher remains in guidance and accompaniment. This allows for minimizing the effort and time spent commuting to the university. The student can also exploit the extensive use of the phone and computer for learning through AI applications (Bakari, 2022).

AI applications help predict and adapt to student behavior and provide the necessary remediation. By generating personalized learning content for each session, predicting the student's response to them, and adapting them according to their progress and desire, the AI algorithm learns from individual and collective behavior (Al-Qadi, 2021). Through Machine Learning programs, AI helps in obtaining conclusions by analyzing information and making appropriate decisions, as it can identify the individual needs of the student and then provide customized content, instructions, and individualized tests directed to each student to fill the gaps in their learning.

Some researchers also believe that AI can read and scan students' faces and analyze their expressions, making it possible to change the lesson accordingly (Bakari, 2022). The computer analyzes huge amounts of student data and correlates it with other factors such as age, device, geographical location, etc. through complex algorithms and statistical models to understand the differences between students and their approaches to learning (Al-Qadi, 2021). Thus, a student's needs can be studied and appropriate learning resources can be provided based on their level of knowledge, which is determined by complex algorithms (Bakari, 2022). This leads to freedom from one-size-fits-all learning (Muqatil and Hosni, 2021).

In a related context, artificial intelligence helps through the applications it provides to direct questions based on the weaknesses of each student, and this takes into account the multiple intelligences of the learner and the basic principles of differential pedagogy, as studies have found that students prefer to ask questions to electronic devices more than the professor because they fear annoying him or evaluating them negatively in case of repeating questions and requests, as the lack of emotion and prejudice is what distinguishes the machine from the human being. (Bakari, 2022), and chatbots help neutralize the anxiety of failure and error that the student usually has when talking to a real person, which helps to accept mistakes (Al-Qadi, 2021).

In addition, AI applications help to provide immediate responses in the communication process, such as automated responses to students' responses to scheduled lessons (Bushnafa and Jumaili, 2023), via email, e-learning platforms, social media sites such as bots that use artificial intelligence to deal with users, or talking to voice assistants such as Siri, Alexa, and Google Assistant. They also provide virtual guidance to track a student's path through their studies and provide immediate feedback, similar to a real professor (Bakari, 2022).

The Chaka (2023) study that reviewed, discussed, and synthesized the applications, prospects, and challenges related to artificial intelligence (AI) in higher education institutions between 2013 and 2019 found that the predominant AI technologies in education are chatbots, AI holds the potential for personalized, scalable and affordable learning, is exploratory, has meta-learning and post-learning orientation. In this context, AI helps people with special needs to learn in multiple ways. Such as converting written texts into sound, and sounds into writing (Muqatil and Hassani, 2021). This falls within the framework of adaptive learning, which provides a practical one-size-fits-all solution, where the way the learning is presented changes based on the individual responses of each student and offers learning alternatives based on the information collected during the learning process and not based on pre-existing information such as test scores, age, or gender (Kharshi and Al-Mahdi, 2021).

AI applications also benefit students by improving the quality of academic writing. They help with information retrieval, thematic and semantic text search, and qualitative search in text, images, sounds, and even video. It facilitates text summarization and automated formatting and helps with written fluency, spelling correctness, linguistic complexity, and use of punctuation. It helps analyze handwriting through recognition, correction, and suggestion (Al-Qadi, 2021)

On the other hand, AI applications improve the quality of communication in teaching through the development of simultaneous translation, speech recognition, and automated voice assistants that make it easier to understand commands and queries and improve non-verbal communication. It helps to overcome the language barrier between individuals, promoting international and cultural cooperation (Boushnafa and Jumaili, 2023)

So, artificial intelligence “provides assistance tools for students in the learning process, such as: simplifying concepts, programming, summarizing, brainstorming, learning languages, correcting linguistic errors, evaluating written work and providing feedback on it, and producing training questions and simulating... “Specific educational scenarios to enhance understanding and review lessons in real-time and in an effective manner” (SDAIA, 2023, p. 11).

3. Findings related to the third question: What is the role of AI applications in educational content?

AI-based applications can focus on the educational content that the student needs and exploit the appropriate times, learning style, and content preferences to deliver the educational content in a way that achieves higher quality in less time, instead of the common method of delivering the same content for everyone (One Size Fits All). This solves the issue of individual differences and provides appropriate content for each student according to their needs instead of the widespread method that provides the same content for everyone (One Size Fits All), where content is customized based on previous data (Al-Qadi, 2021). It is used to identify gaps in knowledge and recommend which subject matter a student needs to study next based on their abilities. For example, TrueShelf was created by a faculty member at Princeton based on an artificial intelligence engine that generates a lot of math questions. These are analyzed by their engine and then decide on the student's strengths and weaknesses (Moussa and Bilal, 2019). This is due to the ability to recognize and analyze the learning style of each learner and provide appropriate content, whether auditory, visual, or sensory (Al-Qadi, 2021)

Some smart teaching systems use algorithms to help self-learning by storing and analyzing big data and help in choosing the content that suits the student based on their abilities and needs, such as the Italk2Learn platform that uses a learner model that stores cognitive needs and data related to the student's mathematical knowledge, or the Thinkster Math application Thinkster Math, which helps in teaching mathematics through personalized learning and improving the student's abilities in logical thinking (Ben Ba and Ben Ammar, 2023), as it presents the student with an issue according to his abilities and then analyzes his answer and determines the extent of its correctness and the parts in which he was wrong and the possible reasons and provides feedback to him, which improves logical processing in all students (Bakari, 2022). This can support the preparation of educational curricula by determining the appropriate level of the content based on big data and learning analysis that allows the design of educational content directed to each student, taking into account the target group and their prerequisites (Al-Qadi, 2021)

In addition to this, the use of artificial intelligence leads to changing educational curricula to become aimed at efficiency, for example, many curricula focus mostly on fact-based memorization, which does not benefit students in their future professions, according to Wartman & Cimbs (2018) that the integration of artificial intelligence in teaching will affect the education system and the focus of students as its ability is faster to do most tasks related to facts and this pushes to focus on the skills that the student needs in his future practices and applicable instead of wasting time on what the machine can easily do (Al-Maliki, 2023).

AI applications help analyze the speed of learning and work to balance the three factors: Speed of learning, quantity of learning content, and quality (Al-Qadi, 2021). AI-based chatbots are also programmed to provide educational material based on the question posed by the student (Kharshi and Al-Mahdi, 2021), and provide personalized educational material according to the nature of the student, the topic, and the method of address, and can evaluate and assess the student's performance or provide advice (Al-Qadi, 2021). AI applications also help to understand, analyze, and interpret the content of natural languages. This provides the possibility of converting textual and conversational data into processable information (Bushnafa and Jumaili, 2023). It enables access to information through services such as CRAM 101, which seeks to digitize and summarize textbooks. According to Sourani (2020), this helps professors prepare and deliver lessons and overcome the issue of a large number of students with high-quality educational materials (Al-Maliki, 2023).

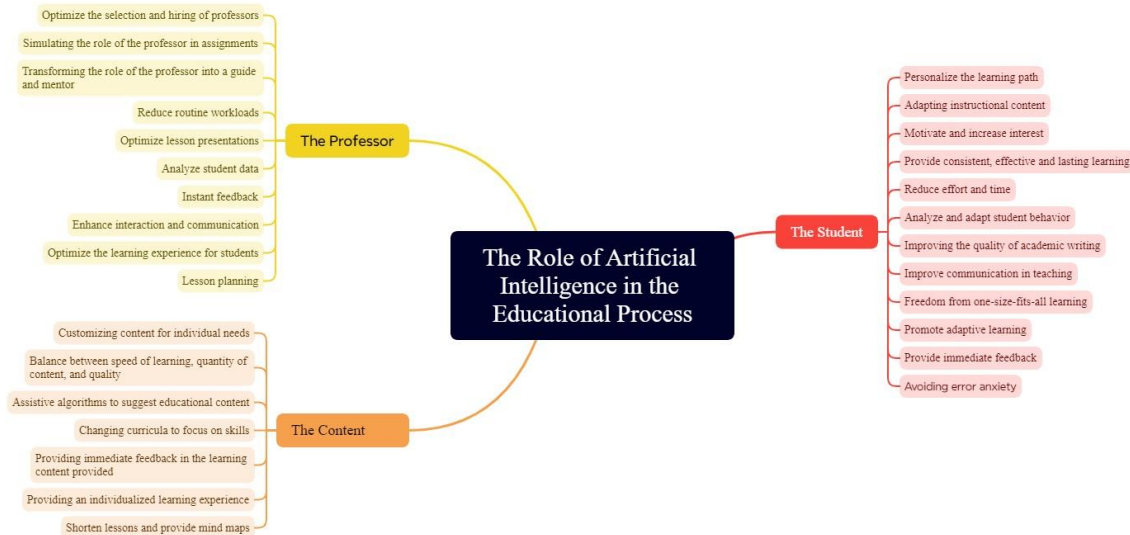
IV. Conclusion

This study highlighted the importance and role of the role of artificial intelligence (AI) applications in improving university teaching strategies, in the context of the growing need to improve learning processes and the student experience in educational institutions. It shows that AI applications can play a vital role in enhancing the interaction between professors and students and improving the effectiveness of the delivery of educational content from the professor to the student. Understanding this role in enhancing university teaching contributes to improving the quality of education and meeting the aspirations of educational institutions.

The results show the role of AI applications in improving the performance of the professor and the student during the teaching process and presenting the educational material, the following figure

summarizes the most important of these results:

Figure (2): The role of artificial intelligence in the educational process



The source: by researchers

In light of these findings, we offer the following suggestions:

- a) Developing applications to enhance student interaction with content.
- b) Integrate AI applications in the delivery of educational content.
- c) Provide personalized learning experiences for each student.
- d) Develop AI-based applications that can accurately analyze student performance and provide comprehensive reports to professors to improve teaching.
- e) Integrate effective means of communication between professors and students within AI applications to enhance interaction and improve content comprehension.
- f) Encourage the development of smart AI-based educational resources that contribute to improving the quality of university education.
- g) Provide self-assessment tools using AI to support students in understanding their strengths and weaknesses and identifying areas for improvement.
- h) Supporting AI applications to include various disciplines and academic fields in universities.
- i) Supporting research and workshops related to the integration of AI applications in university education to promote knowledge exchange and improve techniques and practices.

The following topics offer avenues for this research:

- a) The impact of AI-based content personalization on student performance.
- b) Evaluating the impact of AI applications on student interaction.
- c) Security and privacy in AI applications for university teaching - an analytical study.
- d) The impact of artificial intelligence on improving the quality of university education.
- e) Gaps and challenges in the use of AI applications in university education.

Referrals and references:

- 1) Abdelkader Sam. (2022). The effectiveness of artificial intelligence applications in teaching the Arabic language online. *Linguistics and Translation*, 2(3), pp. 298-306.
- 2) Abdullah Moussa and Ahmed Habib Bilal. (2019). *Artificial Intelligence is a revolution in the technologies of the age* (First Edition). Cairo: Horror Group for Training and Publishing.
- 3) Ahmed Abdel Fattah Hamdy Al-Hindawi and Mahmoud Mustafa Ahmed. (2021). Artificial intelligence and its applications in developing university administration. *Education (Al-Azhar)*, 40(192), pp. 477-513.
- 4) Chaka, C. (2023). Fourth industrial revolution review of applications, prospects, and challenges for artificial intelligence, robotics, and blockchain in higher education. *Chaka Research and Practice in Technology Enhanced Learning*, 18(2), pp. 1-39.
- 5) Firas Sleti. (2015). *Contemporary teaching strategies*. Irbid, Jordan: Modern Book World.
- 6) Hisham bin Saleh Al-Qadi. (2021). Utilizing Artificial Intelligence in Learning and Teaching Arabic as a Second Language: Prospects and Potentials. *Al-Hikma Journal of Literary and Linguistic Studies*, 8(3), pages 82-116.
- 7) Hisham Tayeb. (2018). The role of the educational triangle in education. *Journal of the Researcher in Humanities and Social Sciences*, 10(2), pp. 49-56.
- 8) Karima Bushnafa and Zainab Jumaili. (2023). The impact of the development of artificial intelligence on the communication process from an epistemological perspective. *Madar*, 3(2), pp. 58-82.
- 9) Laila Muqatel, and Haniya Hosni. (2021). Artificial intelligence and its educational applications to develop the educational process. *Journal of Human and Social Sciences*, 10(4), pp. 109-127.
- 10) Mohammed Mahmoud Sari Hamadna, and Khaled Hussein Mohammed Obeidat. (2012). *Teaching Concepts in the Modern Era: Methods and Strategies*. Irbid, Jordan: Modern World of Books.
- 11) Mukhtar Bakari. (2022). Challenges of artificial intelligence and its applications in education. *Journal of the Forum for Economic Studies and Research*, 6(1), pages 286-305.
- 12) Razia Darwish. (2018). The components of the pedagogical triangle and its role in the educational process. *Wisdom Journal of Philosophical Studies*, 7(1), pp. 65-76.
- 13) Safia Ben Ba, and Ahmed Ben Ammar. (2023). The role of artificial intelligence in the process of teaching Arabic for special purposes. *Linguistic Issues*, 4(3), pp. 43-53.
- 14) Sara, Kharchi, and Zawawi, Ahmed Al-Mahdi. (2021). Communication technology in the service of education: Applications of Artificial Intelligence and Special Needs Education. *Al-Risala Journal of Humanitarian Studies and Research*, 6(4), pp. 156-170.
- 15) SDAIA. (2023). *Generative Artificial Intelligence in Education*. Riyadh: Saudi Data and Artificial Intelligence Authority (SDAIA).
- 16) SDAIA. (2023). *Global Artificial Intelligence Report*. Riyadh: World Artificial Intelligence Summit.
- 17) SDAIA. (2023). *Modern Data-Driven Technologies and Artificial Intelligence*. Riyadh: Saudi Data and Artificial Intelligence Authority (SDAIA).
- 18) Sidi Ahmed Kabdani and Abdelkader Baden (2021). The importance of using artificial intelligence applications in Algerian higher education institutions in ensuring the quality of education - a field study. *Revue Les Cahiers du POIDEX*, 10(1), pp. 153-176.
- 19) Simon Skog. (2022). A theoretical framework for synchronous remote teaching? Reshaping the pedagogical triangle, 4(2), pp. 86-97.
- 20) Wafa Fawaz Al-Maliki. (2023). The role of artificial intelligence applications in enhancing educational strategies in higher education (literature review). *Journal of Educational and Psychological Sciences*, 7(5), pp. 93-107.