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Algerian Researchers' Attitudes Towards Employing Artificial Intelligence Applications in Scientific Research: A Survey Study on a Sample of Algerian Researchers

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Abstract

This research paper aims to elucidate the attitudes of Algerian researchers, including university professors holding graduate degrees and their doctoral students, towards the utilization of artificial intelligence applications in their academic pursuits and scientific research. The study concentrated on the principal motivations that prompt these researchers to utilize AI tools throughout their academic careers, in addition to the advantages and disadvantages that arise from this usage, and the most significant technical and ethical challenges encountered by this group when employing AI. The study employed a five-point Likert scale to ascertain attitudes through an electronic questionnaire, to address the study's questions and hypotheses. The sample consisted of 567 individuals. The results demonstrated that there is a favorable attitude towards utilizing AI in scientific research, with recognition of certain concerns that can be addressed through continuous training and appropriate academic guidance. This, in turn, has the potential to enhance the role of AI applications in improving the quality of scientific research and increasing innovation among Algerian researchers.

Keywords: Artificial Intelligence, Algerian researchers, attitudes, scientific research

الملخص

تهدف هذه الورقة البحثية إلى تسليط الضوء على اتجاهات الباحثين الجزائريين من أساتذة جامعين حاملي لشهادتي الماجيستير والدكتوراه وطلبتها نحو توظيف تطبيقات الذكاء الاصطناعي عند انجاز دراساتهم وبحوثهم العلمية، حيث ركزت الدراسة على أهم الدوافع التي تجعل من هؤلاء الباحثين يستخدمون أدوات الذكاء الاصطناعي خلال مسارهم العلمي، وكذا المزايا والسلبيات الناتجة عن هذا الاستخدام، وأهم التحديات التقنية والأخلاقية التي تواجه هذه الفئة عند استخدامهم الذكاء الاصطناعي. وقد اعتمدت الدراسة على مقياس ليكرت الخماسي لتحديد الاتجاهات من خلال استبيان الكتروني لمعالجة تساؤلات وفرضيات الدراسة، على عينة متاحة مكونة من 567 مفردة، وقد أظهرت النتائج أن هناك اتجاهات إيجابية نحو استخدام الذكاء الاصطناعي في البحوث العلمية، مع الاعتراف بوجود بعض المخاوف التي يمكن معالجتها من خلال التدريب المستمر والتوجيه الأكاديمي المناسب، وهو الأمر الذي من شأنه أن يعزز دور تطبيقات الذكاء الاصطناعي في تحسين جودة البحث العلمي وزيادة الابتكار بين الباحثين الجزائريين

الكلمات المفتاحية: الذكاء الاصطناعي، الاتجاهات، الباحثين، البحوث العلمية.

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Introduction

The era we live in today has witnessed a wave of changes resulting from the immense technological advancements that have emerged over the past few decades. These developments have been accompanied by the emergence of numerous new concepts, the most notable of which is the concept of artificial intelligence. AI is considered one of the critical outcomes of digital transformation and one of the most significant products of the Fourth Industrial Revolution, which has developed innovations and generated technologies more advanced than their predecessors. This revolution has enabled new communication technologies based on various algorithms.

Despite being a rapidly evolving emerging field, artificial intelligence has permeated many aspects of our daily lives due to the availability of internet services and the widespread use of smartphones and computers. This has revolutionized various fields and sectors, especially in higher education and scientific research. The latter has increasingly relied on AI as a transformative force reshaping the present and future of education. AI is considered one of the most important modern applications in education, offering various flexible and effective educational tools and techniques. These contribute to improving the quality of education and scientific research, accelerating research processes, and facilitating learning and teaching.

Like other countries worldwide, Algeria has been striving to benefit from AI applications in higher education in recent years. A testament to the national commitment to integrating AI into economic, educational, and research development and recognizing the strategic importance of this technology and its competitive ability to create a new digital knowledge environment different from previous practices is Algeria's focus on establishing specialized institutions such as the Higher School of Artificial Intelligence and the significant increase in AI-dedicated laboratories across universities and research centers. Ethical codes and principles must regulate this usage to ensure achieving the desired goals and objectives.

In this context, AI has emerged to simulate the human mind and intelligence in understanding and perception, especially in making independent decisions. It aims to enhance and advance human achievements in line with contemporary requirements, particularly in scientific research. Based on the above, our research problem is crystallized in the following central question:

What are Algerian researchers' attitudes towards using AI applications in scientific research?

In light of this central question, the researchers formulated a set of sub-questions that allow for addressing the problem of this study, which are framed as follows:

1. Do Algerian researchers' attitudes towards using artificial intelligence applications in scientific research vary according to sociodemographic variables (age, field of study, registered academic degree)?
2. What motivates Algerian researchers to use artificial intelligence programs and applications in scientific research?
3. What challenges do Algerian researchers face when using artificial intelligence programs in scientific research?

Based on the above, the hypotheses of the current study were formulated as follows:

1. Algerian researchers' attitudes towards using artificial intelligence applications in scientific research vary according to sociodemographic factors (age, field of study, and registered academic degree).
2. Researchers' attitudes regarding the fundamental motivations for employing artificial

intelligence tools in scientific research differ.

3. Several challenges hinder Algerian researchers from optimally using artificial intelligence programs in scientific research.

Through this study, we aim to achieve a set of objectives, the most important of which are:

1. To identify the main motivations behind Algerian researchers' inclination towards employing AI programs in scientific research.
2. To observe Algerian researchers' positive and negative attitudes towards employing AI and its applications in overcoming the difficulties of the educational process.
3. To attempt to enumerate the challenges faced by Algerian researchers while using AI programs in scientific research

The significance of this study lies in its attempt to address a current topic characterized by novelty and modernity. Its importance is further increased as it tackles a subject that is one of the outcomes of the technological revolution, namely artificial intelligence. This subject has captured the interest of the most critical group in society—the elite group of Algerian researchers. This interest drove us to explore their opinions and attitudes, both positive and negative, toward employing AI applications in their various scientific research. Since AI has become an icon that has brought about a qualitative leap and a true revolution, it has allowed for new horizons in scientific research regarding quality and standards. Furthermore, AI plays a significant role in honing researchers' skills and improving the
quality of the educational learning process.

Literature Review

Attitudes

The American Psychological Association (APA) defined attitudes as: "A term that refers to the general and relatively stable evaluation of an object, person, group, issue, or concept based on a scale ranging from negative to positive. Attitudes provide a summary of evaluations about the target subjects and are often assumed to be derived from previous beliefs, emotions, and behaviors associated with those subjects" (Youssef & Ghunaim, 2023, p. 66).

Attitudes are also defined as "the tendency to feel, behave, or think in a specific way towards other people, organizations, subjects, or symbols" (Abou El-Nil, 1985, p. 450). Newcomb also defined attitude as "the organization of knowledge with positive or negative associations towards objects, people, or situations" (Al-Atoom, 2008, p. 195).

Attitudes can be defined as the cognitive and behavioral perceptions that indicate a generally negative or positive evaluation adopted by Algerian researchers towards a specific subject or issue, which, in our current study, is the use of artificial intelligence in scientific research. These attitudes can reflect how researchers or the Algerian academic community view this topic and may significantly influence how research is conducted and how results are interpreted in the future.

Researchers

Researchers are defined as "individuals who work in the field of seeking knowledge and contribute to the advancement and elevation of knowledge. They are credited with the inception and progress of sciences" (Abdel Tawab & Tantawy, 2020, p. 146).

In this paper, we refer to researchers as academics and scholars with postgraduate studies, who work in universities and research institutions. They conduct studies and

investigations in various scientific journals to discover new knowledge or gain a deeper understanding of a particular phenomenon, ultimately developing knowledge within their academic specialities.

Artificial Intelligence

Artificial intelligence is defined as "the ability of a system to correctly interpret external data, learn from this data, and use those lessons to achieve specific goals and tasks through flexible adaptation" (Haenlein & Kaplan, 2019, p. 17).

It is also known as "the science of making machines do things that require intelligence when done by humans" (Minsky, 2006, p. 315). Additionally, AI is described as "a science concerned with creating machines that perform actions considered intelligent by humans" (Abdel Nour, 2005, p. 7).

AI can be defined as a set of programs and applications that rely on complex algorithms to assist and guide researchers in conducting their scientific research by simulating human cognitive abilities. This enables handling tasks that require thinking, learning, and decision-making, such as drafting scientific papers by generating text based on data and analysis, performing complex calculations, creating graphs, translating, rephrasing, and proofreading texts. These capabilities save researchers significant time and effort, accelerate the pace of discoveries, and improve the quality of results.

Scientific Research

Scientific research is defined as "the use of scientific method steps by academics and practitioners to obtain data and information that contribute to the development and improvement of professional practice methods in dealing with various problems and challenges" (Abu Al-Ma'ati, 2014, p. 7). It is also described as "the activity undertaken by the human researcher through systematic attempts to objectively study observable phenomena with the intent to discover and fully understand them and their causes" (Bourqba & Hasbaya, 2020, p. 114).

It refers to the collection of organized studies that rely on scientific method steps, conducted by researchers in Algerian universities and scientific research laboratories across various fields of humanities and technical sciences. These studies aim to increase human knowledge and understanding of natural, social, and technological phenomena and are published in peer-reviewed scientific journals and specialized electronic media at both national and international levels.

Previous Studies

Youssef and Ghnaim (2023) conducted a study through which they aimed to understand Arab researchers' attitudes towards using the Chat GPT application, an artificial intelligence tool, in psychological and educational research. This was examined in light of certain demographic variables. The researchers used an attitude scale applied to a sample of 725 individuals. The study found several results, the most important of which were the presence of positive attitudes toward using artificial intelligence applications in psychological and educational research and the existence of statistically significant differences related to the research variables (Youssef & Ghunaim, 2023).

Imail (2023) studied the benefits of AI applications in enhancing the educational process in Egypt, using contemporary educational literature and the experiences of the United Arab Emirates and Hong Kong. The researcher employed a descriptive-analytical approach. The study concluded with several findings and a set of recommendations, the most important of

which was establishing colleges to teach artificial intelligence or creating departments in education faculties to prepare teachers skilled in its applications, principles, and ethics, developing a clear plan for integrating artificial intelligence in schools; and upgrading school infrastructure by providing mobile and tablet devices, digital platforms, and technologies that facilitate easy access to electronic content (Ismail, 2023).

A study by Mohamed and Elballat (2024) aims to investigate how faculty staff members and their assistants perceive students' use of AI tools in scientific research. It seeks to identify which AI tools staff members and their assistants believe students can use in research and any other potential areas. The study outlines the challenges staff members and their assistants might face due to students' use of AI tools and their perspectives on these challenges in the coming decade. It also monitors initiatives that official institutions could implement to mitigate possible risks of AI tool misuse in scientific research, as perceived by staff members and their assistants. The study determines the likely scenario (optimistic, neutral, pessimistic) that may unfold if students start using AI tools in the next decade, according to staff members and their assistants. The study adopted a future scenarios method and used a questionnaire to address the study questions. The study population comprised 92 staff members and their assistants from Egypt (46 individuals) and the Arab world (46 individuals). A snowball sample was used. The results showed that reference management tools, such as Semantic Scholar and Connected Papers, were the most recommended AI tools for student use in academic research. The findings highlight a significant challenge faculty and teaching assistants face: the need for specialized training to enhance their understanding and effective use of AI in teaching. This challenge was consistently rated as the foremost concern by both Egyptian and non-Egyptian respondents. The study suggests the importance of training university professors and faculty in using AI tools and familiarizing them with technologies that can evaluate students' reliance on such tools, empowering them to effectively oversee and guide students' AI use. Integrating a curriculum module incorporating secure AI tools into academic programs focusing on scientific inquiry can educate students on the permitted and forbidden uses of AI tools in scientific research (Mohamed & Elballat, 2024).

Methods and Materials

This study belongs to quantitative research as it relies on collecting numerical data through a five-point Likert scale questionnaire, which allows respondents to provide numerical answers ranging across five options, facilitating statistical analysis of the data. Quantitative measures such as arithmetic means and standard deviations were used to interpret the results, providing an objective view of researchers' attitudes towards the use of artificial intelligence in scientific research.

Additionally, the study focused on testing and discussing quantitatively specific hypotheses related to differences in researchers' attitudes based on variables such as gender, age, specialization, and academic degree. This approach requires statistical analysis to reveal relationships and correlations between the variables.

Participants

The study population consists of all Algerian researchers at Algerian universities who hold master's and doctoral degrees, as well as doctoral students affiliated with scientific research laboratories.

The study relied on a convenience sample to gather responses from Algerian

researchers, comprising 567 participants distributed across three main academic categories, which contributed to a diversity of perspectives and enriched the analysis. The sample included 198 participants representing doctoral students, 36 participants who were researchers with a master's degree, and 333 participants who held a doctoral degree. This distribution enhances the diversity of the sample, allowing for a deeper understanding of the differences and orientations of researchers according to their academic levels, adding an important analytical dimension to the study of their attitudes towards the use of artificial intelligence in scientific research.

The questionnaire was distributed electronically, targeting researchers via social media during the period from 01/09/2024 to 05/30/2024. This method was chosen to facilitate reaching a large number of respondents across various scientific and literary disciplines in different Algerian universities, providing a comprehensive view of Algerian researchers' attitudes and experiences regarding the use of artificial intelligence in scientific research.

Table 01. *Illustrates the sociodemographic data of the respondents*

Variable	Variable Type	Frequency	Percentage (%)
Gender	Male	207	%36.5
	Female	360	%63.5
	Total	**567**	**%100**
Age	24-35	252	%44.4
	36-49	261	%46
	50 and above	54	%9.5
	Total	**567**	**%100**
Academic Degree	PhD Student	198	%34.9
	Magister	36	%6.3
	PhD	333	%58.7
	Total	**567**	**%100**
Specialization	Literary Fields	279	%49.2
	Technical Fields	288	%50.8
	Total	**567**	**%100**

Source: Prepared by the researchers.

Based on the quantitative data presented in the table above, which relates to the analysis of the sociodemographic data of the study sample, the following observations can be made:

Gender

It appears that the percentage of female Algerian researchers, which is 63.5%, is higher than that of male researchers, which is 36.5%. This increase in the percentage of females compared to males is attributed to the phenomenon of women entering the workforce and breaking into all sectors, especially the higher education and scientific research sectors. In recent years, women have excelled academically compared to men, with a strong determination to pursue higher studies and excel academically. In contrast, many males are leaving school and abandoning their academic pursuits at early stages to engage in freelance work.

Age

The ages of Algerian researchers vary, with 46% of them aged between 36 and 50 years, followed by those aged between 24 and 35 years at 44.4%, and the smallest group being those over 50 years old at 9.5%. From these data, it is evident that most of our study sample consists of middle-aged individuals (36 to 50 years), who have recently shown significant interest in using artificial intelligence applications in their various scientific research projects. This age group tends to employ modern technology and benefits from its advantages as a form of innovation and departure from conventional work methods.

Academic Degree

The table shows a diversity in the recorded percentages, with Algerian researchers holding a doctoral degree having the highest percentage at 58.7%, followed by doctoral students at 34.9%, and the smallest percentage being researchers with a master's degree at 6.3%. These responses indicate that most Algerian researchers, regardless of their academic degrees, are inclined towards discovering AI applications and understanding their effectiveness. They rely on AI as a new educational method that contributes to improving education quality, enhancing the learning process, and developing its methods. This helps them to refine their educational skills, facilitate the understanding and assimilation of new knowledge in the simplest ways, and free them from routine educational tasks that often consume a significant portion of their time.

Specialization

The previous table shows that there is a close percentage of the responses of Algerian researchers from all specializations, whether literary or technical. Technical specialists responded more to the distributed questionnaire at 50.8%, followed by literary specialists at 49.2%. These responses indicate that the use of AI and interest in its applications is no longer confined to a specific field. Researchers from all specializations and departments increasingly rely on AI programs and applications. This usage has escalated in recent years due to various factors, the most prominent being the necessity of digital transformation and the shift towards remote electronic education. The goal is to benefit from AI applications and resort to the most useful ones in the scientific research process. This trend has led to the integration of technology in educational practices, serving their scientific specializations and contributing to the development of their research skills, while helping them to learn new techniques and best practices for using technology to enhance the educational process.

Research Instruments

The study relied on a Likert scale questionnaire to measure attitudes, which included a set of predetermined options. Respondents were asked to select the option that best reflected their viewpoint or level of agreement with the given statement. This type of questionnaire allows for quantitative measurement of attitudes and opinions, aiding in the analysis of Algerian researchers' positive or negative stances towards the use of artificial intelligence tools in scientific research. The questionnaire was distributed electronically using Google Drive and consisted of thirty items, designed based on theoretical literature and previous studies such as those by Youssef and Ghoneim (2023), as well as by Almomani and Alnasraween (2024). The

study employed a five-point Likert scale as follows: (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree), with each option representing a specific response level as follows:

Table 02. *Represents the degree of researchers' responses according to the five-point Likert scale*

Response	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Score	5	4	3	2	1

Source: Prepared by the researchers.

Validity of the Questionnaire

The validity of the questionnaire was ensured through face validity, meaning that the questionnaire items effectively measured what they were designed to measure. This involves precise wording, appropriate terms, and suitability for the study sample. The researchers presented the initial version of the questionnaire to a group of university professors (10 professors) who are experts and researchers in the humanities and technical sciences to ensure the suitability of the scale. The professors provided feedback on some items, which were revised and rephrased. Three items were removed, resulting in a final scale version with 30 items.

Reliability of the Questionnaire

The researchers tested the questionnaire on a pilot sample of 146 individuals and calculated the Cronbach's Alpha coefficient for this sample. They then re-administered the test approximately one month later to the same sample and calculated the correlation coefficients between the two sets of results using Cronbach's Alpha, which was 0.816. This high reliability is considered suitable for the current study, as Cronbach suggests that a minimum value of 0.60 is acceptable for Cronbach's Alpha. The following table illustrates this:

Table 03. *Represents the Cronbach's Alpha Coefficient for the pilot sample of the questionnaire*

Number of Items	Number of Individuals	Cronbach's Alpha Coefficient
30	146	0.816

Source: Prepared by the researchers based on the outputs of the SPSS program.

Findings

This study employed a quantitative approach to analyze the attitudes of Algerian researchers toward the use of Artificial Intelligence (AI) applications in scientific research. The analysis steps were organized as follows:

Data Collection and Sample of Participants

A structured electronic questionnaire was used, targeting a representative sample of Algerian researchers. The sample aimed to capture variations in demographic and academic characteristics, such as age, field of specialization, and academic qualifications.

Quantitative Analysis Framework

The analysis relied on a Likert scale to measure agreement with statements reflecting motivations, benefits, disadvantages, and challenges associated with AI use in research.

The responses were coded to calculate means and standard deviations, reflecting central tendencies and variations in perspectives among participants.

Statistical Results and Interpretation

The statistical results were organized according to the following main themes:

- **Motivations:** This theme addressed factors such as young researchers' enthusiasm for AI, the impact of academic specialization, and the role of academic qualifications in shaping attitudes.

- **Benefits and Disadvantages:** The analysis explored perceived benefits of AI applications in scientific research, such as efficiency and enhanced learning, versus disadvantages, such as excessive dependency and a decline in scientific integrity.

- **Challenges:** The study examined obstacles, including ethical challenges, financial costs, and issues related to language support.

Each analysis was followed by a qualitative interpretation based on calculated values to highlight general trends and significant differences, clarifying the meaning behind the numerical results. This systematic approach revealed nuanced differences in Algerian researchers' views on using AI tools in scientific research.

The quantitative and qualitative analysis of the study's findings will now be presented in an integrated manner, providing a deeper understanding of Algerian researchers' attitudes toward AI applications in scientific research and highlighting influencing factors, benefits, and challenges in this field as follows:

Motivations for Algerian Researchers to Use AI Programs and Applications in Scientific Research

The statistical evidence in Table Four, which represents the various motivations and reasons behind Algerian researchers' desire to employ AI applications in their scientific research, shows that most statements in this section received many responses in the "Agree" and "Strongly Agree" categories. This indicates that most respondents recognize the multiple benefits of AI in scientific research and hold positive attitudes towards these programs, influenced by age, academic specialization, and academic degree.

The data shows that most participants agree that younger researchers are more inclined to use AI, with this item receiving the highest mean score (4.3) and a tendency towards "Agree," indicating high acceptance and a positive attitude towards this idea despite some variation in opinions. The data also shows a strong consensus on the importance of academic specialization in determining the significance of AI use in research, with a high mean score (4.21) and a low standard deviation (0.78), indicating substantial agreement among respondents and slight variation in opinions.

The results also show that most respondents strongly agree that academic degree level affects researchers' acceptance of AI use, with a mean score of (3.94) indicating a high level of acceptance. At the same time, the standard deviation (1.05) reflects moderate variation in opinions, suggesting some differences among respondents but a general agreement on the positive impact of an academic degree. Most respondents also agree they have the necessary competence to use AI applications, with a mean score of (3.75). At the same time, the standard deviation (1.01) reflects a more significant variation in opinions compared to other statements.

The mean score of (3.75) indicates good acceptance of the knowledge of AI-related concepts and terms, with moderate variation in opinions according to the standard deviation (0.84), suggesting some differences but a general tendency towards agreement. The results also show good acceptance, with a mean score of (3.68) regarding using AI for translating scientific texts, reflected by the standard deviation (0.94), indicating relative agreement among respondents and general acceptance of the idea. The results show moderate acceptance with a mean score of (3.63) regarding the role of AI in increasing researchers' motivation to write scientific texts, despite the variation in opinions reflected by the standard deviation (1.07), indicating some differences in viewpoints among respondents.

The results show strong opposition from respondents to using AI in calculations, with a mean score of (2.44) and a standard deviation of (1.14). The study also shows significant rejection, with a mean score of (2.31), for using AI to rephrase scientific research, with considerable variation in opinions as indicated by the standard deviation (1.16), reflecting wide differences in viewpoints on this topic.

Quantitative analysis results indicate a general acceptance of AI use among researchers, especially younger researchers who are more willing to adopt these technologies. Younger generations tend to be more open to using modern AI technologies, so this willingness should be leveraged by providing continuous support to enhance AI skills among young researchers. The impact of academic degrees and specialization is also evident in the acceptance of AI use, with researchers holding higher degrees, especially in technical fields, being more inclined to use these technologies. Technical fields, which rely heavily on quantitative analyses of large data sets requiring high accuracy, have the highest representation in the study sample and show greater readiness to adopt AI applications than other specializations.

Despite the necessary competence and good knowledge of basic AI concepts, according to respondents' answers, the practical application remains limited, as indicated by the lower mean scores for using AI programs in writing research due to fears of potential plagiarism or the judgment of the research as lacking originality. AI can increase researchers' motivation to complete scientific texts, but achieving this impact requires efforts to improve practical understanding of AI uses in scientific research through continuous training and providing advanced educational materials through practical scientific workshops to enhance researchers' skills. The focus should be on using AI to improve research productivity, overcome reservations, and increase confidence in using these programs and applications within permissible limits.

Algerian Researchers' Attitudes Towards Employing AI Programs in Scientific Research

Advantages of employing artificial intelligence programs in scientific research

The data in Table Five show that one of the most significant advantages of employing AI applications in scientific research for Algerian researchers is their ability to process and analyze vast amounts of data quickly and efficiently. This statement ranked first, with a mean of 4.11 and a standard deviation of 0.69. Following this, the statement regarding the reliance on AI programs and applications to save effort and reduce the costs and duration of scientific research ranked second, with a mean of 4.06 and a standard deviation of 0.64. The statement that AI programs and applications contribute to speeding up scientific research and improving its results ranked third, with a mean of 3.94 and a standard deviation of 0.89.

The statement about AI programs and applications providing many capabilities that enhance learning in higher education and support scientific research ranked fourth, with a mean of 3.92 and a standard deviation of 0.57. The statement regarding AI applications contributing to developing research skills and enhancing creativity in scientific research ranked fifth, with a mean of 3.73 and a standard deviation of 0.86. The statement about AI programs improving the accuracy and reliability of scientific results ranked sixth, with a mean of 3.6 and a standard deviation of 0.9. Finally, the statement about AI programs and applications being simple and easy to use, requiring no special skills, ranked seventh, with a mean of 3.46 and a standard deviation of 0.97.

Based on the responses of the study sample to the statements directed to them through the electronic questionnaire tool, it is clear that these responses reflect many advantages that demonstrate the positive attitudes of Algerian researchers towards employing AI programs and applications in preparing scientific research and completing the tasks required of them in the field of university education. The high uptake of AI applications in scientific research can be attributed to the urgent need to keep pace with educational advancements and adapt to the

fundamental changes driven by AI applications and the preparation for future jobs requiring 21st-century skills.

Moreover, Algerian researchers are adopting AI applications due to their immense capabilities in processing and analyzing large amounts of data in non-traditional ways, with accuracy and efficiency being crucial conditions for the scientific research process. Additionally, their role in saving effort, time, and costs helps researchers discover new knowledge, improving the quality of education and learning. These applications enable optimal use of available information sources, promoting scientific and research collaboration and leading to a continuous and distinguished learning enthusiasm.

Disadvantages of employing artificial intelligence tools according to the respondents' opinions

The data presented in Table Six, related to the disadvantages of employing artificial intelligence programs in scientific research, indicates that the most significant obstacle hindering Algerian researchers from utilizing artificial intelligence applications in their scientific work is its contribution to the emergence of dependency and the dilution of scientific research. This statement ranked first with a mean of (4.13) and a standard deviation of (0.98). Following this, the statement regarding the lack of training courses that contribute to improving researchers' skills and competencies in dealing with artificial intelligence applications ranked second, also with a mean of (4.13) but with a standard deviation of (0.68). Meanwhile, the statement concerning the lack of scientific integrity due to the increased use of applications ranked third with a mean of (4.02) and a standard deviation of (0.93). The statement regarding the excessive use of artificial intelligence applications leading to decreased researchers' scientific level ranked fourth with a mean of (3.94) and a standard deviation of (1.05). Regarding the statement about reducing opportunities for personal interaction and the exchange of ideas among researchers, which ranked fifth with a mean of (3.87) and a standard deviation of (1), it was followed by the statement about distrust in the data and results provided by artificial intelligence applications, which ranked sixth with a mean of (3.63) and a standard deviation of (0.98).

Based on the quantitative data outlined in the table above, it is clear that despite the positive aspects offered by artificial intelligence applications, they still need to be overshadowed by many disadvantages that limit and reduce the extent of engagement with these applications. The reluctance of some Algerian researchers to utilize artificial intelligence applications in their scientific research can be attributed to the fact that these applications tend to replace human reasoning, restricting and hindering their ability to engage in thinking and research skills. Today, researchers, in this era that has come to be known as the technology age, have become obsessed with the skills and capabilities provided by artificial intelligence applications, which has encouraged dependency and diluted scientific research, contributed to the spread of mediocrity at the scientific level, and led to a decline in research outputs. Additionally, the lack of training courses that would make users of these applications aware of how to use them optimally and responsibly has exacerbated the issue.

Illustrates the main challenges Algerian researchers face when using artificial intelligence applications in scientific research

It is evident from Table Seven, which identifies the main challenges faced by most Algerian researchers when using artificial intelligence applications, that the ethical challenges that hinder the use of artificial intelligence applications in scientific research ranked first, with a mean of (4.11) and a standard deviation of (0.74). Following this, the statement indicating that there is resistance from some researchers to using artificial intelligence in their research ranked second, with a mean of (4.05) and a standard deviation of (0.65). Meanwhile, the statement regarding the non-free nature of some artificial intelligence applications ranked third, with a mean of (4) and a standard deviation of (0.78). The statement concerning the non-protection of some intellectual property rights ranked fourth, with a mean of (3.89) and a standard deviation of (0.8). The statement related to privacy violations and weak data security systems ranked fifth, with a mean of (3.76) and a standard deviation of (0.85). This was followed by the statement about using free versions of artificial intelligence applications not meeting my research aspirations, which ranked sixth with a mean of (3.68) and a standard deviation of (0.99). Finally, the statement indicating that most artificial intelligence programs do not support the Arabic language ranked seventh, with a mean of (3.59) and a standard deviation of (0.88).

Based on the quantitative reading of the data presented in the table above, it is clear that despite the enormous potential offered by unlimited artificial intelligence services and applications in improving the educational process, their role in accelerating scientific research and their contribution to increasing the accuracy and reliability of results, there are still many challenges and concerns that weaken their ability to serve education safely and effectively. This is due to many researchers falling into the trap of passion for discovering these applications and their urgent desire to establish a habit of usage and experimentation with them, leading them to detach from their actual circumstances and become immersed in this virtual reality, which lacks dynamism and flexibility and reduces direct human interaction. This digital space suffers from challenges related to violating individual privacy and weakening information protection measures, making researchers susceptible to accusations of academic theft that could expose them to accountability and risk losing their degrees.

Discussion

Based on the above, the results of this research paper indicate a general acceptance of the use of artificial intelligence applications and programs by Algerian researchers, with some minor reservations about how they are used. The study shows positive attitudes towards the use of artificial intelligence in scientific research, acknowledging some concerns that can be addressed through continuous training and appropriate academic guidance. This approach could enhance the role of AI applications in improving the quality of scientific research and increasing innovation among Algerian researchers.

The following section will discuss the hypotheses proposed to analyze Algerian researchers' attitudes towards using AI applications in scientific research and clarify the extent to which these hypotheses are supported by the study's results. Additionally, the quantitative and qualitative analysis results will be reviewed, reflecting the main motivations, benefits, and challenges faced by researchers in this field. To broaden the perspective and solidify the analysis, these findings will also be linked to previous studies to identify similarities and differences, highlighting the scientific contribution of this research to enrich the research field and provide practical guidance for Algerian researchers regarding the use of AI in scientific research.

First Hypothesis: The attitudes of Algerian researchers towards employing AI applications in scientific research vary according to different sociodemographic factors such as age, specialization, and academic degree.

The data indicates strong agreement among researchers that sociodemographic factors such as age, academic specialization, and the level of the registered academic degree play a significant role in the employment of AI applications in scientific research. The high arithmetic means suggest that these factors are highly influential, such that:

Age: Statement (07) showed that there is agreement regarding the responses of the respondents, with an arithmetic mean of (4.3) and a standard deviation of (0.83), indicating that younger researchers demonstrate a greater acceptance of using AI.

Academic Specialization: Statement (06) indicated a significant agreement among the respondents regarding their answers, with an arithmetic mean of (4.21) and a standard deviation of (0.78), reflecting the importance of academic specialization in employing AI tools.

Academic Degree: Statement (05) confirmed a strong agreement among the respondents regarding their answers, with an arithmetic mean of (3.94) and a standard deviation of (1.05), which indicates the influence of the level of the academic degree on the acceptance of using AI.

The results suggest that sociodemographic factors significantly affect researchers' attitudes toward using AI applications, as evidenced by the high level of consensus among participants in their responses. This supports the hypothesis that there is variation in attitudes based on age, specialization, and academic degree, as follows:

- The results of this study regarding the analysis of sociodemographic data showed that the percentage of females (63.5%) was higher than that of males (36.5%). Regarding the age variable, the dominant age group was those between (36 to 50 years). Concerning the academic degree variable, we concluded that all researchers, regardless of their academic degrees, use AI applications in scientific research, with 58.7% having a PhD, 34.9% currently completing their doctoral theses, and 6.3% holding a master's degree. Regarding the specialization variable, we found that all Algerian researchers, regardless of their scientific specialities, have tendencies toward employing AI applications in their pedagogical tasks, especially those in technical specialities.
- Most study participants agree that younger researchers are more accepting of employing AI applications in their scientific research, reflecting how younger generations are influenced by modern technologies that have been an important part of their upbringing. This necessitates investing resources to support and enhance AI usage skills among young researchers to increase productivity and innovation.
- There is a strong consensus among the respondents that academic specialization plays a significant role in using AI, particularly in technical and scientific disciplines that rely on quantitative analysis and data, where there is a higher acceptance of this technology. Therefore, it is essential to train and guide researchers in other disciplines to promote the use of AI in various academic fields.
- The results indicate that the majority of the sample believes that the level of the academic degree affects the acceptance of using AI. The higher the researcher’s academic degree, the greater the likelihood of acceptance of AI applications. The results showed a general agreement on this point, indicating that researchers with higher academic degrees may be more knowledgeable and confident in using AI.

Based on the above results, the hypothesis that the attitudes of Algerian researchers toward employing AI applications in scientific research differ based on sociodemographic factors is **accepted**.

Second Hypothesis: The attitudes of researchers regarding the fundamental motivations for employing AI tools in scientific research vary.

The data indicate a significant variation in researchers' attitudes toward the fundamental motivations for employing AI tools in scientific research. Some statements, such as the impact of AI on motivation and the translation of scientific texts, show high levels of agreement. For instance, statement (10) revealed that there is agreement among respondents, with an arithmetic mean of (3.63) and a standard deviation of (1.07), indicating that the use of AI enhances researchers' motivation to write papers. Conversely, there is less agreement regarding the use of AI for paraphrasing texts and performing calculations. For example, statement (11) indicated strong opposition, with an arithmetic mean of (2.31) and a standard deviation of (1.16), suggesting that respondents prefer not to rely heavily on AI when writing their scientific papers. The results showed the following:

- The findings indicate that most respondents feel they possess good competence in using AI applications; however, there is variability in the level of confidence and competence. Therefore, ongoing practical training and workshops should be provided to improve researchers' skills and increase their confidence in using these technologies.
- The results showed that most study participants have a good understanding of AI-related concepts and terminology, indicating a strong knowledge base among researchers, which can be enhanced by providing advanced educational materials and training programs to improve understanding and practical use of AI.
- There is agreement that using AI increases researchers' motivation to write papers, but there is variation in opinions suggesting that the impact depends on understanding and confidence in these applications. This aligns with the study by (Yaroshenko & Iaroshenko, 2023, p. 197), which confirmed that AI has become a driving force, creating both opportunities and challenges. AI-supported transformative tools, such as advanced models like ChatGPT, Llama-2, Google Bard, Microsoft Bing, Jasper Chat, and others, are versatile tools with a significant impact across various contexts, including research, publishing, and library science.
- The results indicate that the use of AI applications in writing scientific papers is still limited among participants, with reservations about this use. Therefore, intensive training and ongoing support should be provided to researchers to overcome these reservations and increase confidence in AI applications.
- The results suggest a good acceptance of using AI in translating scientific texts, reflecting the effectiveness of these applications and researchers' needs for them, as well as their satisfaction with this type of service.
- The findings showed that the use of AI for paraphrasing scientific texts is not widely accepted among respondents, reflecting significant reservations about the accuracy and effectiveness of these applications. There are also concerns regarding the originality of research and the ethics of scientific research that encourage researchers to write their papers themselves. To benefit from this aspect, paraphrasing tools can be developed, and awareness of their benefits and accuracy can be increased without compromising the quality and originality of scientific research.
- The results indicate that the use of AI in scientific calculations is not common among respondents, with reservations about the effectiveness and accuracy of these applications. To enhance the use of AI in calculations and graphical plotting, advanced courses on specialized and reliable software can be programmed, and researchers can be trained to use them effectively.

Based on the above results, the hypothesis that the attitudes of researchers vary regarding the fundamental motivations for employing AI tools in scientific research is **accepted**. The results suggest that there are multiple and varied motivations influencing researchers' decisions to employ AI, indicating a clear divergence in these attitudes.

Hypothesis Three: Algerian Researchers Have Positive Attitudes Towards the Use of Artificial Intelligence Programs and Applications in Scientific Research

The overall mean agreement on the benefits of artificial intelligence reached (3.83) with a standard deviation of (0.83), indicating general consensus among respondents on the advantages of artificial intelligence and its significance in writing scientific research.

The data confirms that artificial intelligence can accelerate the scientific research process, enabling researchers to deliver results faster and more accurately. This is a crucial element in a rapidly evolving world, where there is an increasing need for quick and effective responses to new variables. Furthermore, the role of artificial intelligence in processing and analyzing large amounts of data allows researchers to extract deeper and more comprehensive insights, which can be particularly useful in fields requiring big data analysis, such as social and medical sciences. Additionally, the use of artificial intelligence programs helps reduce the costs and duration of research projects, encouraging researchers to leverage this technology to enhance their efficiency. The data reflects the respondents' agreement on the potential of artificial intelligence concerning learning and fostering innovation in higher education and scientific research.

The discussion indicates an increasing awareness of the benefits of artificial intelligence among researchers, enhancing opportunities for innovation and advancement in their fields. However, these positives should be balanced with awareness of the negatives to ensure the optimal use of artificial intelligence applications.

The overall mean agreement on the negatives reached (3.95) with a standard deviation of (0.96), suggesting a general tendency among the sample to acknowledge the existence of downsides affecting the use of artificial intelligence in scientific research.

From the above, the results showed a growing concern among researchers regarding the negatives associated with artificial intelligence, as reflected by the high averages in the statements related to fears of declining academic standards (statement 22), reducing personal interaction (statement 23), and over-reliance on technology (statement 24). The general trend indicates that researchers feel the need to maintain a balance between using artificial intelligence and relying on traditional research skills, reflecting their awareness of the importance of critical thinking and human interaction in achieving research quality.

The findings of this study regarding Algerian researchers' attitudes toward employing artificial intelligence programs in scientific research confirm that their attitudes were predominantly positive, attributed to their interest in the digital applications of artificial intelligence and their role in improving the quality of higher education. They recognize its ability to refine their skills and help them discover new and innovative ways to conduct their various scientific research. However, they also acknowledge the existence of some negative attitudes toward employing artificial intelligence applications, mostly related to a decline in researchers' academic standards due to their heavy reliance on these applications, the spread of mediocrity and lack of originality in scientific research, as well as the weak interest of Algerian universities in organizing training courses that would allow researchers to effectively utilize these applications. All studies, including the one by (Mohamed & Elballat, 2024, p. 59), emphasize the importance of training university professors on using artificial intelligence tools and familiarizing them with techniques that can evaluate students' reliance on these tools, enabling them to effectively supervise students' use of them. They also proposed integrating a study unit that includes safe artificial intelligence tools in academic programs focusing on scientific research to educate students about the permissible and impermissible uses of artificial intelligence tools in scientific research.

Despite the positive attitudes toward employing artificial intelligence, there is agreement among the researcher participants in the study sample on the existence of some negatives associated with the excessive use of artificial intelligence, such as dependency, reduced

personal interaction, and a lack of training courses that improve researchers' skills in dealing with these applications. However, the high mean averages indicate that the negative impacts do not negate the benefits that researchers gain from using artificial intelligence.

Based on the available data, the hypothesis that Algerian researchers have positive attitudes toward employing artificial intelligence programs and applications in scientific research was accepted. Despite some negatives associated with its use, the benefits gained lead Algerian researchers to generally lean toward adopting this technology in their research. These results align with the study by (Youssef & Ghunaim 2023, p. 9), which showed positive attitudes among Arab researchers toward modern technologies in communication and information technology, particularly artificial intelligence, exemplified by the ChatGPT application, where researchers have developed familiarity with this application and how to effectively use it.

Hypothesis Four: Several Challenges Are Hindering the Optimal Use of Artificial Intelligence Programs in Scientific Research by Algerian Researchers

The data indicates that Algerian researchers agree on the existence of several challenges they face in the optimal use of artificial intelligence applications in scientific research. Among the most prominent challenges are:

Ethical Concerns: The rise in ethical concerns ranked first, with a mean of (4.11), indicating that this challenge is the most significant in the researchers' view.

Resistance from Some Researchers: This challenge ranked second with a mean of (4.05), suggesting that some researchers resist the use of artificial intelligence.

Financial Challenges: The cost of some applications ranked third with a mean of (4.00), highlighting cost as a significant barrier.

Privacy Violations and Weak Data Security: This challenge had a mean of (3.76), indicating concerns about security and privacy.

Language Support: The lack of support for the Arabic language ranked with a mean of (3.59), representing a technical challenge affecting the effective use of these applications.

The results show that Algerian researchers face several challenges in using artificial intelligence applications in their research, with the most prominent challenges related to the costs of paid applications. Accessing some of these applications is considered costly, while free versions show limitations in achieving the desired research objectives. The lack of Arabic language support in many of these applications serves as an obstacle to their effective use. There are also concerns about data security and privacy, in addition to worries related to intellectual property rights, which complicate the integration of artificial intelligence in scientific research. A study by (Yaroshenko & Iaroshenko, 2023, p. 198) confirmed that the enthusiastic adoption of artificial intelligence in scientific research is met with growing concern about the potential for data manipulation, which can harm ethical standards and academic integrity. This underscores the importance of establishing clear ethical standards and regulations.

Lastly, it appears that some researchers still resist relying on artificial intelligence in their research, necessitating intensified awareness and training efforts to enhance understanding and optimal use of this technology in the scientific field. This was reinforced by a study by (Ismail, 2023, p. 72), which emphasized the importance of not overlooking some of the downsides of using certain artificial intelligence applications and ensuring appropriate legal frameworks are in place to prevent misuse of artificial intelligence by programmers or users.

Based on the statistical data and results above, the hypothesis that numerous challenges are hindering the optimal use of AI programs in scientific research by Algerian researchers can be accepted. These challenges range from ethical, material, and technical, to security issues, highlighting the need to address these obstacles to increase the effectiveness of AI usage in academic environments, scientific research, publishing, and university libraries. This can be achieved by providing the necessary mechanisms to protect AI technologies from

vulnerabilities that could lead to data hacking or affect their quality and integrity, along with continuously maintaining and correcting the data.

Conclusion

In light of the results of this study, it is evident that Algerian researchers widely accept the use of artificial intelligence applications and programs despite some reservations regarding how to use them. Researchers, regardless of their academic degrees—whether they hold a doctorate or are doctoral students, or even those with a master's degree—show tendencies to employ these technologies in their research. The results also demonstrated that academic specialization plays a pivotal role in the extent of artificial intelligence use, with technical and scientific disciplines showing higher acceptance of these technologies. Furthermore, younger researchers are more willing to adopt artificial intelligence techniques, necessitating investing resources to enhance their skills and utilize these tools. However, some reservations regarding using artificial intelligence in writing and paraphrasing scientific texts remain, as researchers hesitate to rely entirely on these applications. Therefore, there is an urgent need to provide continuous training and practical workshops to improve competence and increase confidence in using artificial intelligence applications at Algerian universities. Additionally, there is a pressing need to enhance information security and protect personal data to safeguard researchers from ethical challenges, such as academic theft and the lack of originality in research. Consequently, efforts should be directed towards promoting the use of artificial intelligence in scientific research by providing the necessary resources for training and support, as well as developing policies and programs that ensure these technologies' safe and ethical use.

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Declaration of AI Refined

This document has undergone translation with the assistance of AI-driven tools, including ChatGPT. However, the final corrections and linguistic proofreading were conducted in collaboration with a professional English translator, who is also an educator. While AI tools contributed to the initial refinement of linguistic aspects, the accuracy and quality of the translation were ensured through professional expertise. The intellectual content, data interpretation, and conclusions remain the sole work of the authors.

Statement of Absence of Conflict of Interest

The authors declare that there are no conflicts of interest related to the research, findings, or recommendations presented in this paper. All conclusions drawn are independent and unbiased.

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Appendices

Appendix A

Table 04. *Illustrates the motivations for Algerian researchers to use AI applications*

N°	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Arithmetic mean	Standard Deviation	Sample Direction	Statement Rank
05	I believe that the level of academic degree affects the extent to which researchers accept the use of AI in their research.	189	243	63	54	18	3.94	1.05	Strongly Agree	3
06	I see that academic specialization plays a significant role in determining the extent of using AI in scientific research.	207	306	18	36	00	4.21	0.78	Strongly Agree	2
07	I believe that younger researchers are more receptive to employing AI in their research.	279	207	54	27	00	4.3	0.83	Agree	1
08	I am proficient in using AI applications.	117	297	54	90	9	3.75	1.01	Agre e	4
09	I have knowledge of AI concepts and terminology.	72	351	72	72	00	3.75	0.84	Agree	5
10	Using AI applications increases my motivation to write scientific research.	117	252	90	90	18	3.63	1.07	Agree	7
11	I often use AI applications to write my scientific research.	36	80	44	271	136	2.31	1.16	Disagree	10
12	I use AI to translate scientific texts.	90	297	99	72	9	3.68	0.94	Agree	6
13	I use AI to rephrase scientific texts.	54	71	35	271	136	2.31	1.16	Strongly Disagree	9
14	I use AI to perform various calculations.	36	62	144	198	127	2.44	1.14	Strongly Disagree	8

Overall axis average	Arithmetic mean	Standard Deviation	Sample trend
	3.44	1.25	agree

Source: The researchers prepared based on the SPSS program outputs

Appendix B

Table 05. *Advantages of employing AI programs in scientific research*

N°	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Arithmetic Mean	Standard Deviation	Sample Direction	Statement Rank
15	Relying on AI programs and applications contributes to speeding up the research process and improving its results.	117	369	27	36	0.89	3.94	0.89	Agree	3
16	AI programs and applications enable the processing and analysis of vast amounts of data quickly and efficiently.	135	387	27	9	0.69	4.11	0.69	Agree	1
17	Relying on AI programs helps improve the accuracy and reliability of scientific results.	54	324	117	54	0.9	3.6	0.9	Agree	6
18	Relying on AI programs and applications reduces effort and cuts down the cost and time of completing research.	117	387	45	18	0	4.06	0.64	Agree	2
19	AI programs and applications are simple and easy to use; they do not require special skills.	45	315	72	126	9	3.46	0.97	Agree	7
20	AI programs and applications provide many capabilities that enhance learning in higher education and support scientific research.	54	432	63	18	0	3.92	0.57	Agree	4
21	AI applications contribute to developing my research skills and enhancing my creativity in conducting my scientific research.	90	297	117	63	0	3.73	0.86	Agree	5
Over all axis	Arithmetic mean		Standard Deviation				Sample trend			
	3.83		0.83				Agree			

Source: The researchers prepared based on the SPSS program outputs.

Appendix C

Table 06. *It illustrates the disadvantages of employing artificial intelligence programs in scientific research*

N°	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Arithmetic mean	Standard Deviation	Sample Direction	Statement Rank
22	Excessive use of AI applications has led to a decline in researchers' academic level.	207	198	90	63	9	3.94	1.05	Agree	4
23	Reduces opportunities for personal interaction and exchange of ideas among researchers.	153	270	81	45	18	3.87	1	Agree	5
24	Increased reliance on AI applications has led to dependency and diluted scientific research.	243	216	54	45	9	4.13	0.98	Agree	1
25	Lack of trust in the data and results provided by AI applications	99	252	144	54	18	3.63	0.98	Agree	6
26	Lack of training courses that contribute to improving researchers' skills and efficiency in dealing with AI applications.	162	324	72	9	0	4.13	0.68	Agree	2
27	Lack of scientific integrity due to the increased use of AI applications.	198	216	135	0	18	4.02	0.93	Agree	3
Overall axis average	Arithmetic mean		Standard Deviation				Sample trend			
	3.95		0.96				Agree			

Source: The researchers prepared based on the SPSS program outputs.

Appendix D

Table 07. *It illustrates the challenges most Algerian researchers face when using artificial intelligence applications*

N°	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Arithmetic mean	Standard Deviation	Sample Direction	Statement Rank
28	Some AI applications are not free.	135	333	63	36	0	4	0.78	Agree	3
29	The use of free versions of AI applications does not meet my research expectations.	126	225	126	90	0	3.68	0.99	Agree	6
30	Most AI programs do not support Arabic.	63	297	117	90	0	3.59	0.88	Agree	7

31	Privacy violations and weak data security systems.	108	261	153	45	0	3.76	0.85	Agree	5
32	Some intellectual property rights are not protected.	117	297	135	9	9	3.89	0.8	Agree	4
33	Rising ethical concerns that hinder the use of AI in scientific research.	171	3.6	72	18	0	4.11	0.74	Agree	1
34	I believe there is resistance from some researchers to using AI in their research.	117	378	54	18	0	4.05	0.65	Agree	2
Overall axis average	Arithmetic mean		Standard Deviation			Sample trend				
	3.87		0.84			Agree				

Source: The researchers prepared based on the SPSS program outputs

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