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Applications of Artificial Intelligence in Higher Education: An Exploratory Study of a Sample of Professors from the Faculty of Economic Sciences, Commercial Sciences, and Management Sciences at the University of Médéa

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Abstract
This study aims to measure the level of artificial intelligence technology usage in higher education among university professors at the Faculty of Economic Sciences, Commercial Sciences, and Management Sciences at the University of Médéa. Using a descriptive-analytical approach, a survey was conducted with a sample of 71 professors, and the data was analyzed using SPSS statistical software. The findings revealed a moderate level of artificial intelligence usage, with an average score of 79.23. The main challenges identified were insufficient technical support and inadequate training. An independent samples t-test showed no significant differences in AI usage between male and female professors, nor across different levels of experience. The study recommends enhancing training programs, improving technical support, and fostering a culture of technological adoption.
Keywords: Artificial intelligence applications, higher education, university professors, Faculty of Economic Sciences, University of Médéa

ملخص
تهدف هذه الدراسة إلى قياس مستوى استخدام تقنيات الذكاء الاصطناعي في التعليم العالي من قبل الأساتذة الجامعيين بكلية العلوم الاقتصادية والعلوم التجارية وعلوم التسيير بجامعة المدية. باستخدام المنهج الوصفي التحليلي عن طريق إعداد استبيان وزع على عينة من الأساتذة تتكون من 71 أستاذ، بالاعتماد على برنامج SPSS الإحصائي. كشفت النتائج عن مستوى معتدل من استخدام الذكاء الاصطناعي، بمتوسط درجة 79.23. وشملت التحديات الرئيسية نقص الدعم الفني، والتدريب غير الكافي. أظهر اختبار t للعينات المستقلة عدم وجود فروق كبيرة في استخدام الذكاء الاصطناعي بين الأساتذة الذكور والإناث، ومن حيث الخبرة أيضا. تشمل التوصيات تعزيز برامج التدريب، وتحسين الدعم الفني، وتعزيز ثقافة التبني التكنولوجي.
الكلمات المفتاحية: تطبيقات الذكاء الاصطناعي، تعليم عالي، أساتذة الجامعة، كلية العلوم الاقتصادية والعلوم، جامعة المدية.

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Introduction

The rapid advancements in technology, particularly in the twenty-first century, have given rise to several modern sciences that have had a significant impact on various fields and areas of expertise. One of the most notable of these is artificial intelligence, which has been developed through the translation of human experiences, intelligence, and experiments into programs and devices. These advancements aim to benefit individuals, organizations, and society as a whole through scientific research. Artificial intelligence has emerged as a very captivating and engaging field of research, mostly due to its profound connection with technical and cognitive progress, as it imitates human intelligence. Artificial intelligence is regarded as a significant advancement in the realm of information and communication technologies. Organizations have transitioned from conventional operational procedures, irrespective of their nature of activity, to employing cutting-edge programs and tactics to accomplish their objectives. To be effective and accomplish its objectives, a business must adhere to the principles and practices of artificial intelligence within its industry. The organization utilizes processes like as machine learning, natural language processing, and computer vision to establish its place within its environment. Organizations are now required to implement a new system that guarantees stability, longevity, and the capacity to keep pace with significant advancements by managing, transmitting, distributing, and ultimately leveraging information across different parties. Similar to other sectors, the higher education sector has integrated artificial intelligence applications into its activities related to instruction, scientific investigation, and community engagement. This integration is crucial for constructing and propelling societies towards development and aligning with progressive civilizations.

Despite artificial intelligence's increasing importance in various sectors, its application in higher education, specifically by university professors in Algeria, remains underexplored. This study seeks to highlight the current state of artificial intelligence application in university education by professors in Algerian universities, focusing on their adoption, usage patterns, and challenges.

The integration of artificial intelligence into the educational process has garnered widespread attention and is rapidly expanding. With the swift growth of AI in education, leveraging these technologies within university education in Algeria has become imperative. This urgency is further underscored by the Ministry of Higher Education and Scientific Research in Algeria, which plays a crucial role in elevating education and scientific research to keep pace with the global knowledge revolution. Understanding and enhancing artificial intelligence applications in higher education is therefore critical for advancing educational practices and aligning with international academic standards.

This study aims to assess the level of AI technology application in university education by professors at the University of Médéa. It also seeks to direct their attention more toward effectively employing AI to enhance the educational process and overcome the critical challenges associated with its use. By identifying the current levels of AI adoption and the barriers to its effective implementation, the study intends to provide recommendations for improving AI integration in higher education, thereby contributing to the overall development of the academic environment in Algeria.

Based on the above, the main research question can be formulated as follows:

To what extent do university professors at the Faculty of Economic Sciences, Commercial Sciences, and Management Sciences at the University of Médéa utilize artificial

intelligence technologies in the educational process?

Based on the main research question, the following sub-questions are formulated:

- What is the level of university professors' use of artificial intelligence technologies in the educational process?
- What are the main challenges that hinder university professors from using artificial intelligence technologies in the educational process?
- What are the statistically significant differences, if any, among university professors in the use of artificial intelligence technologies, considering factors such as gender and professional experience?

To answer the main research question and the sub-questions, the following research hypotheses will be formulated:

- University professors use artificial intelligence technologies at a high level in the educational process.
- There are significant challenges that hinder university professors from effectively using artificial intelligence technologies in the educational process, such as lack of training and support.
- There are statistically significant differences in the use of artificial intelligence technologies among university professors attributable to gender and professional experience.

To address this problem, our research is divided into the following sections:

Literature Review

Higher Education and Artificial Intelligence

Education is a crucial foundation for developing cultures. When a country's educational rates improve and illiteracy rates decrease, it shows its commitment to progress and align with a more evolved civilization. Higher education is not merely a continuation of the post-secondary phase; it is a continuation of human efforts to uplift and educate individuals, fulfilling their knowledge aspirations. It also meets society's need for specific expertise and skills aimed at development and progress (Ali, 1988, p. 100).

The analysis of studies on Artificial Intelligence (AI) in higher education reveals many commonalities and differences in their approaches, methodologies, and findings. Luo et al. (2024) conducted a bibliometric analysis to map AI research trends in nursing education, using tools like Bibliometrix and CiteSpace to identify key research areas and predict future trends, with a particular focus on ethical considerations and the deeper application of AI technologies. Similarly, Luckin et al. (2024) focused on the ethical dimensions of AI integration in education, advocating for strong partnerships between educators and technology developers to fully harness AI's potential. Both studies emphasize the importance of ethical frameworks in guiding AI's role in education.

Ojeda et al. (2023) and Kiryakova (2023) examined the impact of AI tools like ChatGPT on educational practices using qualitative content analysis and surveys, respectively. Their studies highlight the dual nature of AI its ability to improve educational outcomes and the risks associated with its misuse. Espartinez (2024) and Acosta et al. (2024) expanded this focus to include the perceptions of various stakeholders, including students and teachers, regarding AI in education. Their research, using Q-Methodology and online surveys, underscores the need for responsible use and ethical guidelines to address concerns such as academic integrity, reassuring the audience about the ethical considerations in AI adoption.

Jo (2024) and Johnston et al. (2024) investigated the behavioral factors influencing AI

adoption, examining how personalization, self-learning capabilities, and perceptions of fairness affect students' use of AI technologies. Their studies, conducted through surveys, reveal both the potential and barriers to AI adoption. They underscore the importance of understanding user behavior for the effective implementation of AI tools, as it can help in designing AI systems that are more user-friendly and acceptable.

Yusuf et al. (2024), Bakhtaoui (2022) and Alasmari (2024) provided multicultural perspectives on AI adoption, highlighting the global nature of AI in education. Their surveys, which included participants from multiple countries and regions, underscore the need for context-specific strategies and ethical guidelines. Meanwhile, El Baraka (2024), Baena et al. (2023), and Sakri (2024) focused on AI's potential to revolutionize e-learning and enhance educational quality. They identify implementation challenges and the strategic planning required to overcome these obstacles, instilling a sense of optimism about the future of education. Although distinct in its focus on medical education, Hershberger et al. (2024) aligned with the broader theme of AI's ability to enhance educational practices through targeted interventions. It demonstrates the effectiveness of AI in improving motivational interviewing skills through a software-based training tool.

The study's research gap lies in surveying and exploring the extent to which university professors use various AI technologies in their teaching practices within the Faculty of Economic Sciences, Commercial Sciences, and Management Sciences. This distinguishes our study from previous research, some of which focused solely on ChatGPT.

Artificial Intelligence: An Overview

AI is a multifaceted and captivating discipline. In the past, scholars have investigated many methodologies for artificial intelligence. Intelligence can be defined in different ways. Some define it by how well it imitates human behavior, while others use a more technical definition termed rationality, which focuses on making decisions that are considered correct or appropriate. There is also diversity in the perspectives on rationality: some individuals perceive it as an internal cognitive process, while others emphasize intelligent behavior as an external manifestation (Russell & Norvig, 2022, p. 1). In public discussions, the terms "artificial intelligence" and "machine learning" are often used interchangeably, leading to confusion. It's important to note that machine learning is a subfield of AI, that focuses on improving performance through experience. Some AI systems incorporate machine learning methods, while others do not. By combining these two dimensions—human vs. rational and thought vs. behavior—we can identify four potential approaches to AI. Each approach has its own proponents and research methods. Research into human-like intelligence often involves empirical science related to psychology, including observations and hypotheses about human behavior and thought processes. Rationalist approaches, on the other hand, blend mathematics and engineering and are linked to fields like statistics, control theory, and economics, highlighting the interdisciplinary nature of AI research. Despite their differences, these various groups have both criticized and supported each other. Let's explore these four approaches in more detail to gain a deeper understanding and to stay intellectually stimulated and engaged in this dynamic field (Russell & Norvig, 2022, p. 2). John McCarthy, known as the father of artificial intelligence, defined it as the science of engineering intelligent machines, particularly computer programs, which involve creating programs and computer devices capable of thinking, in the same way, the human brain works and mimicking human behavior (Al-Louzi, 2012, p. 30). Further, artificial intelligence is the ability of a device to simulate the human mind

and its functions, such as the ability to think, discover, and learn from past experiences (Saleh, 2009, p. 33).

The general framework of AI encompasses perceptual intelligence, cognitive intelligence, and decision-making intelligence, as illustrated in Figure One. Perceptual intelligence equips machines with basic human-like abilities such as vision, hearing, and touch. Cognitive intelligence, inspired by cognitive and brain sciences, endows machines with reasoning, knowledge acquisition, and thinking logic akin to humans. Decision-making intelligence uses applied data science, social science, decision theory, and managerial science to enable machines to make optimal decisions. Achieving these intelligences requires a robust AI infrastructure layer supported by data, storage, computing power, machine learning algorithms, and AI frameworks. Through model training, AI learns internal data laws to support and realize applications. AI's application layer is increasingly integrated with fundamental sciences, industrial manufacturing, human life, social governance, and cyberspace. For instance, AI is revolutionizing healthcare with diagnostic tools, enhancing manufacturing with predictive maintenance, improving transportation with autonomous vehicles, and transforming customer service with chatbots, profoundly impacting our work and lifestyle.

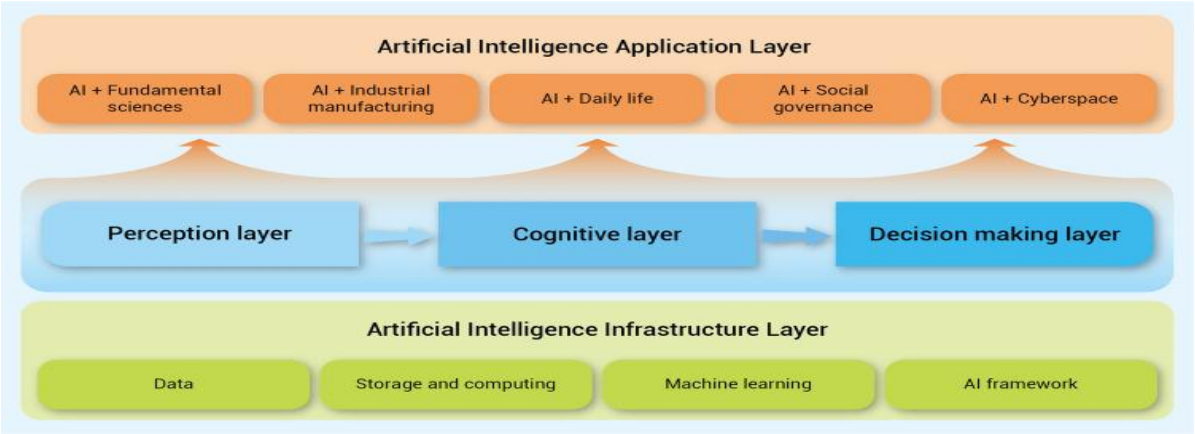

Figure 1. The general framework of artificial intelligence (Adopted from Yongjun Xu., 2021, p. 3)

Artificial Intelligence in Higher Education: Foundations and Challenges

AI in university education improves teaching and learning by utilizing adaptive courseware, evaluation tools, feedback systems, and personalized learning. Adaptive courseware, such as Shadow Health and the University of Michigan's E-Coach, provide lifelike simulations and personalized feedback that is designed to match the performance of each student. Assessment technologies like M-Write enhance the grading and feedback process by identifying areas of weakness and automating the grading process, resulting in improved speed and consistency (Nassoura, 2022). Machine learning algorithms in feedback systems observe and analyze student participation and identify instances of academic dishonesty, facilitating prompt interventions. Artificial intelligence also assesses the efficacy of instruction, as evidenced by data showing that interactive techniques such as clickers yield better results than online homework. Personalized learning is a method that adjusts to the specific needs of each learner, surpassing the constraints of traditional, standardized teaching methods. AI-driven instructional robots promote both creativity and practical abilities, while expert systems offer ongoing, specialized assistance. AI enables seamless communication between students and professors, fostering immediate and enhanced connections that enhance learning networks. AI technologies, such as chatbots, classroom sensors, and language learning aids, improve the quality of education and provide lifetime assistance for students and teachers worldwide (Khan

et al., 2021).

Furthermore, AI provides substantial assistance to higher education by means of several sophisticated instruments. AI-driven educational robots are essential for promoting innovation and practical abilities in students by combining many fields of study and new technology. These robots function as intelligent teaching assistants, autonomous teachers, and aides, augmenting learning efficiency and fostering creativity. Expert systems, the most advanced AI application, replicate human intellect and function continuously to assist and enhance learning processes. They possess profound expertise and adeptness in particular fields, enabling them to effectively analyze and process data, hence offering comprehensive knowledge and problem-solving abilities (Shaaban, 2021). Moreover, AI improves student communication by facilitating immediate connections among students, professors, and AI systems throughout the globe. This link enables students to broaden their learning networks through customized connections. Further advancements in AI have led to the development of several applications that enhance the quality of education. These include AI-powered chatbots that assist in online and blended learning, sensors, and cameras that analyze classroom dynamics, and AI features that aid in foreign language acquisition. These solutions offer customized feedback and immediate analytics and promote continuous learning for students and teachers in diverse settings (Kamalov et al., 2023)

Challenges

To fully exploit AI in higher education, it is crucial to address conflicts between AI solutions and traditional teaching methods and the need for comprehensive validation tests. Despite technological advancements, AI adoption remains limited due to cautious educators requiring compelling evidence. Countries are developing strategies to promote educational technology and enhance teacher training. Additionally, there is a need for research that addresses the practical needs of teaching staff, especially in resource-constrained environments. Effective AI should improve student learning outcomes and provide unique educational opportunities. Furthermore, ethical and transparency issues in data use, including fairness in automated decision-making and privacy concerns, must be addressed. Ensuring transparency in AI applications and preventing monopolistic control by major educational platforms are essential (Pedró, 2020, pp. 68-72). Finally, accountability and the impact of AI on teaching jobs are critical considerations. If AI systems automate many tasks traditionally performed by teachers, this could significantly alter the role of educators and raise questions about who is accountable for automated decisions affecting students' learning. Ensuring data privacy and security is paramount, with regulatory frameworks needed to protect personal information and prevent data theft. While there is growing recognition of the importance of data protection, existing policies often fall short of providing adequate safeguards. Addressing these challenges is crucial for AI to fulfill its potential to transform higher education meaningfully and ethically (Seo, 2021).

Methods and Materials

The study followed the descriptive technique, which involves a series of research procedures that are used to explain a phenomenon through the systematic gathering, classification, and comprehensive examination of facts and data. The objective of this approach is to get definitive findings and overarching principles regarding the subject being studied. (Basheer, 2000, p. 59). The Statistical Package for the Social Sciences (SPSS) software was utilized for the analysis of the data and the obtained results.

Participants

The sample is considered a subset of the study population from which field data is collected. It represents a portion of the whole, thus serving as a specific percentage of the original population. This allows us to generalize the study results to the entire population. (Zerouati, 2002, p. 191). We selected a simple random sample consisting of 71 university professors from the Faculty of Economic Sciences, Commerce, and Management at the University of Médéa. The survey was conducted during the second semester of the 2023-2024 academic year, which Morris indicates as a sample that involves randomly drawing elements from the research population (Angers, 2010, p. 304). The sample was described according to some personal data, as shown in the table below.

Table 1. *The characteristics of the study sample based on gender and the number of years of teaching experience*

	Less than 5 years	From 5 to 10 years	From 10 years to 15 years	More than 15 years	the total
male	6	4	10	9	29
Female	11	13	13	5	42
the total	17	17	23	14	71

The data from the previous table can be represented in the following figure:

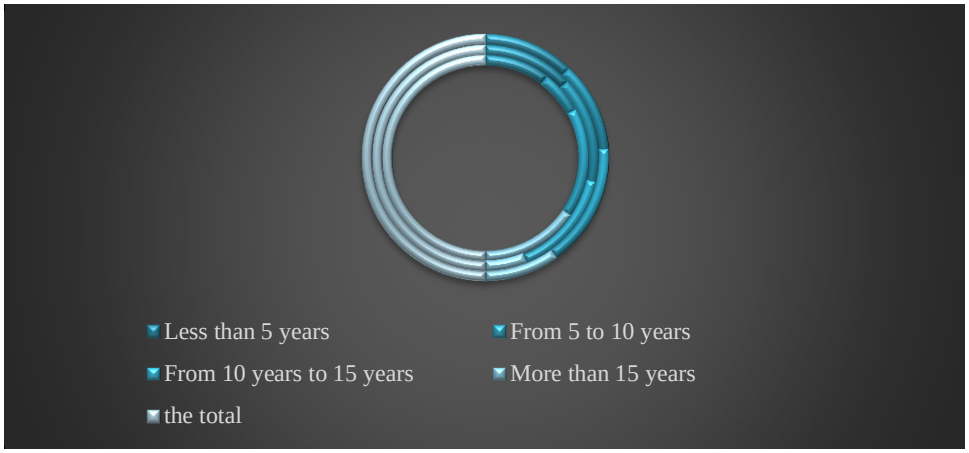

Figure 2. The characteristics of the study sample by gender and years of teaching experience

Both Table One and Figure Two illustrate the description of the study sample, which consists of 71 professors according to the variables of gender and years of teaching experience. The number of female professors was greater than that of male professors, with 42 females compared to 29 males out of the total sample. Professors with 10 to 15 years of experience represented the largest group, totalling 23 individuals. They were followed by those with 5 to 10 years of experience and those with less than five years of experience, with 17 individuals in each category. Lastly, the number of professors with more than 15 years of experience was 14.

Table 2. *Description of the study sample by academic degree and age*

	Age Variable			
Academic Degree	Under 30 years old	From 30 to 40 years old	From 41 to 50 years old	Over 50 years old
Assistant Professor B	3	5	1	9
Assistant Professor A	0	1	2	3
Lecturer B	0	7	3	11
Lecturer A	0	15	14	31
Professor	2	6	6	17
Total	5	34	26	71

The data from the previous table can be represented in the following figure:

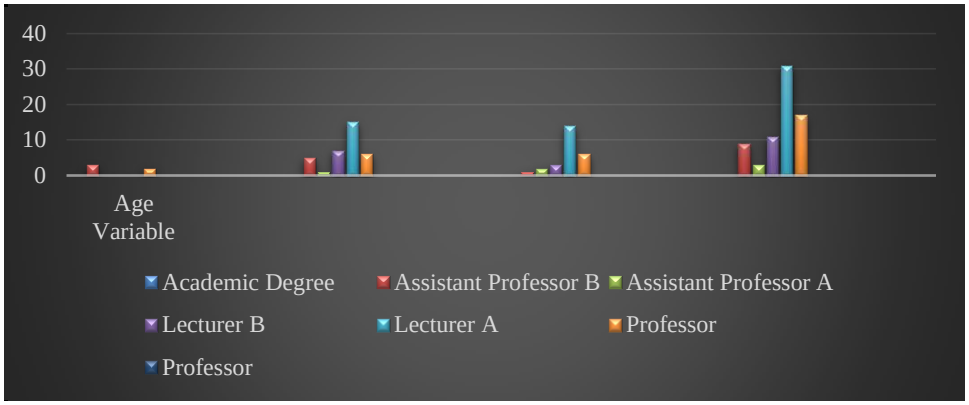

Figure 3. *The study sample by academic degree and age*

Table Two and Figure Three represent the description of the study sample consisting of 71 professors according to the variables of academic degree and age. The number of lecturers, category A, was the highest, with 31 individuals, followed by 17 higher education professors. Lecturers, and finally, assistant professors, category A, were the smallest group, with only three individuals. The latter category is dwindling due to the discontinuation of the Master's degree, resulting in their small number. Regarding the age variable, the most significant proportion of professors are young, aged between 30 and 40 years. This result is attributed to the integration conducted by the ministry last year, which targeted unemployed Master's and Ph.D. holders. They are followed by professors aged 40 to 50 years, with 26 individuals, then those over 50 years old, with six individuals, and finally, professors under 30 years old, with five individuals.

Table 3. *The quantitative assessment of the sample*

Variables	Quantitative Assessment	Significance of the Assessment
Gender	1	Male
	2	Female
Teaching Experience	1	Less than 5 years
	2	From 5 to 10 years
	3	From 10 to 15 years
	4	More than 15 years More than 15 years
Age	1	Under 30 years old
	2	From 30 to 40 years old
	3	From 41 to 50 years old
	4	Over 50 years old
Academic Degree	1	Assistant Professor B
	2	Assistant Professor A
	3	Lecturer B
	4	Lecturer A
	5	Professor

***Source**: SPSS outputs prepared by authors.*

Table Three indicates the quantitative estimates we assigned during coding on the SPSS program, where each variable was given a quantitative estimate as shown in the table.

Research Instruments

After reviewing several studies related to the research topic, we developed a closed-ended questionnaire consisting of 26 statements distributed across three axes: First Section: Justifications for applying artificial intelligence in university education. Second Section: The

use of artificial intelligence applications in university education. Third Section: Challenges of using artificial intelligence in university education.

Questionnaire Correction Method

The sample members respond to the statements in the questionnaire by marking (x) on one of the answers provided for each statement.

Table 4. *The scores of the questionnaire statements*

Questionnaire	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Positive phrases	1	2	3	4	5
Negative phrases	5	4	3	2	1

Table Four represents the scores of the questionnaire statements, where the statements are rated based on a five-point scale ranging from 1 to 5 according to the Likert scale. The ratings can be reversed from 5 to 1 if the statements are negative.

Results

Psychometric Properties of the Questionnaire

Internal Consistency Reliability

To determine this type of validity, the questionnaire was administered to the study sample. Based on the results obtained from the respondents' answers, the correlation coefficient of each statement with the corresponding axis to which it belongs was calculated, as indicated in Appendix B. It indicates the internal consistency validity of the questionnaire dimensions. This type of validity focuses on the internal analysis of the test itself, gathering information about the test content, the processes used in responding to its items, and the correlations between test items (Raja, 2006, p. 459). Pearson correlation coefficients were calculated for each dimension, and the analysis provided strong and good correlation coefficients, ranging from 0.44 to 0.84, all of which are statistically significant at the 0.01 significance level.

Reliability

An instrument's reliability means that the results obtained are consistent. When the instrument is reapplied to the same sample under the same conditions within a suitable time frame, the results should be the same, indicating the instrument's reliability (Hanan & Bouamouch, 2020). In this study, we calculated the reliability of the questionnaire using Cronbach's alpha coefficient.

Table 5. *Cronbach's Alpha reliability coefficients for the questionnaire dimensions*

Dimension	Dimension1	Dimension2	Dimension3	Total Score for the Questionnaire
Cronbach's Alpha Coefficient	0.81	0.92	0.86	0.86
Number of Statements	5	12	9	26

Table Five presents Cronbach's alpha reliability coefficients for the questionnaire dimensions. These coefficients were calculated using the Statistical Package for the Social Sciences (SPSS) to measure reliability. The reliability coefficient for the dimension of justifications for applying artificial intelligence in university education was a substantial 0.81, the dimension of using artificial intelligence applications in university education was a high 0.92, and the dimension of challenges in using artificial intelligence in university education was a significant 0.86. These values, all above the commonly accepted threshold of 0.70, provide strong evidence of the reliability and validity of our questionnaire for application to the sample. The overall reliability coefficient for the scale, a commendable 0.86, further supports our conclusion. As most researchers agree, a Cronbach's alpha value of 0.70 or higher indicates a reliable scale (Mohamed, 2020).

Testing Study Hypotheses

Testing Hypothesis One

Hypothesis: The level of university professors' use of artificial intelligence technologies is high

To determine this level, we relied on the respondents' arithmetic means. The scale used in the study tool is the five-point Likert scale (1, 2, 3, 4, 5). The data were coded and entered into the computer. The range for the five-point Likert scale (upper and lower bounds) was calculated. The range (4 = 5 - 1) was then divided by the number of scale points to obtain the correct cell length, which is (0.80 = 4 / 5). This value was then added to the lowest value on the scale (which is 1) to determine the upper limit of each cell (Hatem, 2011, p. 87)The cell lengths are as shown in the table below.

Table 6. *Criterion adopted in the study*

Cell Length	Cell Length * Number of Statements	Mean	Level
1.00 - 1.79	46.54---26	79,23	Very Low
1.80 - 2.59	67.34---46.8		Low
2.60 - 3.39	88.14---67.6		Moderate
3.40 - 4.19	108.94---88.4		High
4.20 - 5.00	130---109.2		Very High

Note 1. Adopted from Jonald (2010, p. 11)

Table Five shows the criterion we used to determine the level of university professors' use of artificial intelligence technologies. According to this criterion, if the respondents' average score ranges from 26 to 46.54, we judge this level as very low. When the average exceeds 88.4, we consider this level high. Upon calculating the average response of the sample for the entire questionnaire, we obtained a value of 79.23. This value falls within the moderate level.

Testing Hypothesis Two

Hypothesis: University professors face significant challenges that hinder their use of artificial intelligence technologies in the educational process, primarily due to inadequate training and lack of incentives.

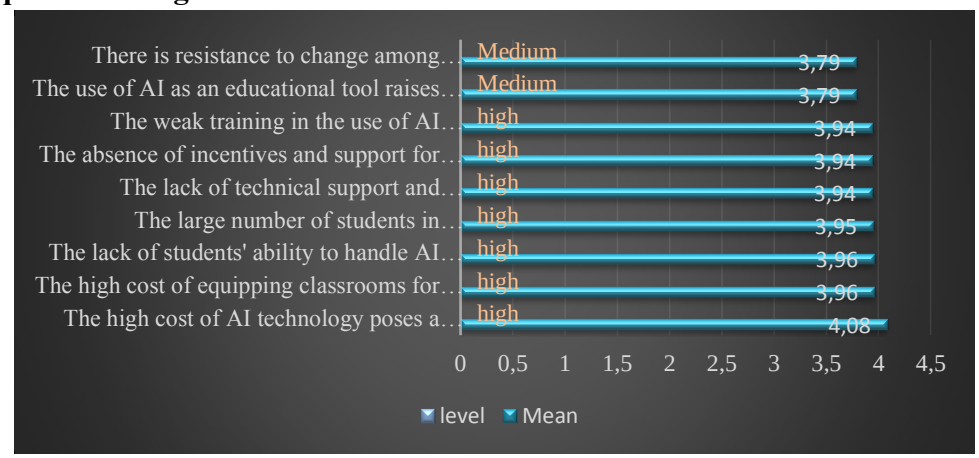

Figure 4. Graphical representation of challenges of using AI in University education

The provided bar plot illustrates the difficulties associated with implementing AI in university education. It displays the average scores for each statement, with error bars indicating the standard deviation. The levels of agreement, specifically High and Medium, are indicated adjacent to each bar through annotation.

Testing Hypothesis Three

Hypothesis: There are differences among university professors in the use of artificial intelligence technologies attributable to gender and professional experience.

Table 7. Independent samples t-test to identify differences between two independent samples

Statistical Variables	Sample Size (N)	Mean (M)	Standard Deviation (SD)	Degrees of Freedom (df)	t-value	Significance (p-value)
Male Professors	29	78.31	13.77	69	-0,53	0,59
Female Professors	42	79.88	11			

Table Seven indicates the results of the independent samples t-test to identify differences between the two means. The total number of professors and the means between males and females are presented. The mean score for male professors is 78.31, while for female professors, it is 79.88. The standard deviation of responses for female professors is 11, and for male professors, it is 13.77. Additionally, the t-value for two independent samples is -0.53, which is not statistically significant at the 0.05 significance level.

Table 8. *One-Way ANOVA test for significant differences in the use of artificial intelligence technologies based on professional experience*

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-value	Significance (p-value)
Between Groups	367.149	3	122.383	0.824	0.485
Within Groups	9955.781	67	148.594		
Total	10322.930	70			

The table above represents the One-Way ANOVA test to identify differences between means. When examining the F-ratio table for degrees of freedom for the more minor variance (3) and the more considerable variance (67), the F-value is found to be 0.82. This value is not statistically significant at the 0.05 significance level, as the p-value is 0.48, which is greater than the significance level. This indicates that there are no significant differences.

Discussion

The first hypothesis test suggests that university academics' utilization of AI technology is at a moderate level. The researcher ascribes this result to the novelty of these technologies and the high level of competency with which university teachers may interact with them. This discovery is consistent with the research carried out by Luo et al., (2024) and Luckin et al., (2024), which highlight the increasing incorporation of artificial intelligence (AI) in higher education. These studies identify essential patterns, such as the improvement of learning environments through AI and the critical necessity of interdisciplinary collaboration. This finding answers the first sub-question and confirms that the first hypothesis is incorrect.

Similarly, the findings from testing the second hypothesis indicate its inaccuracy. The investigation indicates that the main obstacles to implementing AI in higher education are exorbitant expenses, inadequate technical assistance, and a need for more training. The challenges mentioned here are similar to the ones identified in the comprehensive research conducted by Baena et al. (2023) and Elbaraka (2024) on the practical obstacles of incorporating AI into higher education. This further supports the idea that logistical and financial barriers are widespread in different educational institutions. These factors are considered substantial impediments that must be resolved to facilitate the efficient utilization of AI in education. In addition, moderate yet significant hurdles arise from concerns regarding

data privacy and faculty members' resistance to change, aligning with the conclusions given by Al-Zahrani and Alasmari (2024) and Yusuf et al. (2024). To address these issues, it is necessary to make joint efforts to reduce expenses, enhance technical infrastructure, offer thorough training, and promote a culture that welcomes technological advancements.

The results of testing the third hypothesis led us to reject our initial hypothesis and accept the alternative hypothesis, indicating that there are no significant differences between male and female university professors in their use of AI technologies. Additionally, there are no differences in the use of AI technologies among university professors based on professional experience. These findings are consistent with the study conducted by Acosta Enriquez et al. (2024), although the key difference lies in the sample studied, as their research focused on students and their use of AI technologies. This equality in the use of technology should provide a sense of fairness and balance in the academic community.

Conclusion

Artificial intelligence has rapidly progressed. It is now being used in different sectors, including higher education, where its integration has shown great potential in improving teaching, research, and community participation. The primary aim of this study is to explore the extent to which artificial intelligence technologies are utilized in the educational processes by university teachers at the Faculty of Economic Sciences, Commercial Sciences, and Management Sciences at the University of Médéa. Furthermore, the study seeks to identify the obstacles hindering the effective implementation of artificial intelligence and to examine variations in artificial intelligence usage based on gender and professional experience. The following results were acquired:

Moderate Level of AI Usage

The average score for AI technology usage among university professors was 79.23, reflecting a moderate level of adoption. This suggests that while AI is valued, its full potential in higher education has not yet been realized, indicating room for greater integration in the future.

Challenges in AI Adoption

The primary challenges in adopting AI in higher education include high costs, insufficient support, and moderate faculty resistance. Despite these, AI's potential is promising, and its adoption appears to be inclusive, unaffected by gender or experience.

Recommendations

1. Develop and implement extensive training programs to provide instructors with the requisite expertise to utilize AI technologies proficiently. Possible options include workshops, online courses, and practical training sessions.
2. Create resilient technical support systems to aid instructors in implementing and assimilating artificial intelligence tools. These technologies will offer a safeguard, facilitate the adoption process, and instill confidence in faculty members.
3. Establishing explicit norms and protocols is crucial for ensuring the privacy and security of data. Implementing this proactive strategy would not only address issues but also foster trust among faculty members, ensuring the safety and security of their data. In addition, the university administration should establish comprehensive security programs for professors to increase data protection further and facilitate the integration of AI technology. And Encourage a culture of innovation and openness to technological change within the university. This could be

achieved through regular seminars, success stories, and showcasing the benefits of AI in education.

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Declaration of AI Refined

This research paper has undergone language correction using the AI-powered tool Grammarly to address grammatical, spelling, and stylistic errors. It is acknowledged that the use of such tools may introduce standardised patterns typical of AI-generated content. Consequently, a certain percentage of content may reflect AI-generated language structures. Yet, the intellectual content and the analysis remain entirely the work of the authors.

Statement of Absence of Conflict of Interest

The authors mentioned above hereby solemnly declare that they are not and shall not be in any situation that could give rise to a conflict of interest in what concerns the findings and recommendations contained in this academic article.

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Appendices

Appendix A

Teachers' Questionnaire

Dear Professor,

We are in the process of conducting a study on the applications of artificial intelligence in university education. We would like to learn about your opinions and experiences in this field. We appreciate your time in answering this questionnaire and assure you that all responses will be treated with the utmost confidentiality and used solely for scientific research purposes. Thank you in advance for your kind cooperation.

Section One: Personal Information

Gender: male ( ) Female ( )

Age: Under 30 years old ( ) 30 to 40 years old ( ) 41 to 50 years old ( ) Over 50 years old; Academic Rank: Assistant Professor B ( ) Assistant Professor A ( ) Lecturer B ( ) Professor ( )

Number of Years of Experience in University Teaching: Less than 5 years ( ) Between 5 and 10 years ( ) More than 10 years ( )

Section: Study Topics

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Topic One: Justifications for Applying Artificial Intelligence in University Education					
Artificial intelligence helps save time and effort for university professors, research, and community service.					
Artificial intelligence improves the accuracy of assessments and tests in lectures, directed works, and practical applications.					
Artificial intelligence provides personalized support for students to enhance their academic achievement, catering to their levels and specializations.					
The use of artificial intelligence enhances student interaction with educational content.					
Artificial intelligence contributes to improving the quality of higher education.					
Topic Two: The Use of Artificial Intelligence Applications in University Education					
Smart adaptive learning is used to tailor curricula according to the individual needs of students.					
Adaptive learning systems enhance students' understanding of the course materials.					
I convert scientific texts (or scientific materials) into videos using applications like Canva or Prezi.					
Using expert system software allows me to provide guidance and solutions for students' complex academic problems.					
Expert system software assists me in the academic decision-making process.					
Using virtual reality techniques allows students to interact with study content.					
Utilizing smart assessment applications facilitates the evaluation process and enhances the educational performance of university students.					
Using smart assessment applications reduces human bias in evaluations.					

Employing voice generation applications transforms written study material texts into audio files.					
Utilizing artificial intelligence to summarize lessons and lengthy texts makes them easier to read.					
Using intelligent chatbots to respond to students' questions and concerns.					
Integrating smart games into the educational process enhances the academic achievement of university students.					
Topic Three: Challenges of Using Artificial Intelligence in University Education					
The high cost of artificial intelligence technology poses an obstacle to its adoption as an educational tool.					
The high cost of equipping classrooms for artificial intelligence use hinders the educational process.					
Students' limited ability to handle artificial intelligence technologies and applications impedes the educational process.					
The large number of students in classrooms prevents effective control of artificial intelligence applications in education.					
Insufficient technical support and resources at the university hinder the implementation of artificial intelligence technologies.					
The lack of incentives and support for faculty members using innovative teaching techniques impedes the educational process.					

Appendix B

Correlation Coefficient of the Statements of the First, Second and Third Dimension with the Total Score of the Dimension

No.	Statements	Correlation Coefficient	Significance Value
1	Artificial intelligence helps save time and effort for university professors, research, and community service.	0,63	0,00**
2	Artificial intelligence improves the accuracy of assessments and tests in lectures, directed works, and practical applications.	0,78	0,00**
3	Artificial intelligence provides personalized support for students to enhance their academic achievement, catering to their levels and specializations.	0,75	0,00**
4	The use of artificial intelligence enhances student interaction with educational content.	0,84	0,00**
5	Artificial intelligence contributes to improving the quality of higher education.	0,75	0,00**

No.	Statements	Correlation Coefficient	Significance Value
1	Smart adaptive learning is used to tailor curricula according to the individual needs of students.	0,72	0,00**
2	Adaptive learning systems enhance students' understanding of the course materials.	0.64	0,00**

3	I convert scientific texts (or scientific materials) into videos using applications like Canva or Prezi.	0.83	0,00**
4	Using expert system software allows me to provide guidance and solutions for students' complex academic problems.	0.78	0,00**
5	Expert system software assists me in the academic decision-making process.	0.78	0,00**
6	Using virtual reality techniques allows students to interact with study content.	0.78	0,00**
7	Utilizing smart assessment applications facilitates the evaluation process and enhances the educational performance of university students.	0.78	0,00**
8	Using smart assessment applications reduces human bias in evaluations.	0.67	0,00**
9	Employing voice generation applications transforms written study material texts into audio files.	0.76	0,00**
10	Utilizing artificial intelligence to summarize lessons and lengthy texts makes them easier to read.	0.77	0,00**
11	Using intelligent chatbots to respond to students' questions and concerns.	0.70	0,00**
12	Integrating smart games into the educational process enhances the academic achievement of university students.	0.71	0,00**
No.	Statements	Correlation Coefficient	Significance Value
1	Smart adaptive learning is used to tailor curricula according to the individual needs of students.	0,72	0,00**
2	Adaptive learning systems enhance students' understanding of the course materials.	0.64	0,00**
3	I convert scientific texts (or scientific materials) into videos using applications like Canva or Prezi.	0.83	0,00**
4	Using expert system software allows me to provide guidance and solutions for students' complex academic problems.	0.78	0,00**
5	Expert system software assists me in the academic decision-making process.	0.78	0,00**
6	Using virtual reality techniques allows students to interact with study content.	0.78	0,00**
7	Utilizing smart assessment applications facilitates the evaluation process and enhances the educational performance of university students.	0.78	0,00**
8	Using smart assessment applications reduces human bias in evaluations.	0.67	0,00**
9	Employing voice generation applications transforms written study material texts into audio files.	0.76	0,00**
10	Utilizing artificial intelligence to summarize lessons and lengthy texts makes them easier to read.	0.77	0,00**
11	Using intelligent chatbots to respond to students' questions and concerns.	0.70	0,00**
12	Integrating smart games into the educational process enhances the academic achievement of university students.	0.71	0,00**

*Significance level of 0.01.

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