



The Use and Challenges of Artificial Intelligence among University Students: The Case of Saudi Arabia

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ABSTRACT

AI technology is important for increasing efficiency in various fields, including education, healthcare, and industry. In the education sector, AI technology could offer personalized learning, improve student engagement, and provide efficient administrative support which increases the overall learning experience. Seeking this significance, this study examines AI application utilization among Saudi students at Higher Education Institutes and its implementation issues. Cross-sectional data was collected through the electronic questionnaire which was sent to the students through

email and SMS groups. A sample of 223 students from diverse academic fields was studied. The data showed that major subjects can affect university students' AI app use. Science college students use AI more than other students. University students use AI apps to improve their academic performance and complete assignments to gain more. However, students agree on the many issues hindering AI application use. This study emphasizes the importance of AI workshops and training for Saudi university students and staff to properly utilize AI technologies. This research will help students understand AI and establish the groundwork for future academic research and further this research could also benefit administrators, curriculum designers, and educators.

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Introduction

Currently, there is an ongoing global shift towards a digitization wherein artificial intelligence (AI) plays a paramount role. This technology has undergone significant advancements and has permeated numerous aspects of everyday existence as well as multiple organizations and industries (Laupichler et al., 2022). The education sector has undeniably influenced by this significant technological transformation, as it is becoming increasingly evident that AI will play an important role in driving advancement within educational institutions and facilitating the attainment of desired growth (Kamalov et al., 2023). AI helps teachers execute administrative tasks with utmost efficiency, including scrutinizing students' assignments, refining instructional quality, augmenting the overall learning experience, and elevating educational standards (Al-Abdullatif, 2023). AI is considered to be an important tool for the learning of students that could help to understand the unique methods to increase academic success (Chen et al., 2020). In addition, it could also provide recommendations to students to choose the courses that are aligned with their passions. In higher education, universities should equip students with the skills necessary to succeed in an ever-changing labor market and contribute to global development, making AI an increasingly essential component of education (Rayan, 2023). This is reason, the AI impact on the higher education becomes and important which increases the students' academic success in their academic and professional life (Razia et al., 2022).

Researchers' interest on AI in the education sectors has increased which shows the significance of utilizing AI to provide access to high-quality education and learning opportunities for the students (Miao et al., 2021). In another study, further study also enforced that AI provides proper support to students to increase their overall educational experience (Pedro et al., 2019). UNESCO's strategic plan for technological innovation and education from 2022 to 2025 emphasizes the urgent need to develop standard and normative tools, such as guidelines and frameworks, to improve the digital competencies of both teachers and students (Engelbauer, 2023). The aim is to ensure safe, ethical, and meaningful usage of digital technologies, which stems from a human-rights-based approach (Kamalov et al., 2023). In the same vein, Kamyab et al. (2023) also argued that academicians should be trained in the utilization of AI because this could play an integral role in the modern educational technologies which is considered to be important for keeping educational institutions up to date with future developments.

Seeking previous discussion, interest in AI and its applications has also been observed in higher education institutions. Along with this significance, various empirical studies have been conducted in the extant literature but these studies have variance gaps. Extant studies majorly focused on applications of AI (Kamyab et al., 2023; Parekh & Mitchell, 2024; Utami & Winarni, 2023), while paying little attention to identifying the challenges in using AI. This was reinforced by the work of Kengam (2020), which indicated that the integration of AI in education is still an ongoing process. However, there is a lack of a comprehensive understanding among educators regarding how to best utilize this technology on a larger scale, and its impact on teaching and learning within higher-education institutions remains ambiguous (Ahmad et al., 2023; Aithal & Aithal, 2023). Further, extant studies also focused methodologically on descriptive statistics while paying little attention to ANOVA. In other contexts, empirical studies have also focused on other countries while focusing little on Saudi Arabian universities (Kamyab et al., 2023; Parekh & Mitchell, 2024; Utami & Winarni, 2023). It is important to highlight that most of these studies revealed certain limitations and challenges associated with the use of AI and its different

applications in the context of Saudi Arabia.

Furthermore, recent studies have revealed a significant lack of technical qualifications among faculty members, along with educational and administrative expertise, which poses a major challenge to the successful implementation of AI in higher education institutions in Saudi Arabia (Aithal & Aithal, 2023; Jungwirth & Haluza, 2023; Obidovna, 2024). A study conducted by Rayan (2023) found that the use of AI applications in education by faculty members in Saudi Arabia is limited. Many academic studies have shown that AI is becoming more widely used in higher education in Saudi Arabia (Al-Abdullatif et al., 2023). In other contexts, it is important to identify the patterns, knowledge, and skills of the target demographic, specifically students. AI plays a critical role in shaping their prospects, and research by (Ayyoub et al., 2024) has shown a significant correlation between students' interest in AI and their future career paths. These previous studies highlighted the necessity for experts within the educational system to expedite the development of policies and strategies that can lead to the successful adoption of AI applications in the field of education. To address the previous gaps, the current study explores the potential applications of AI and identifies any possible challenges that may arise during its implementation in the education system in the context of Saudi Arabia's educational institutions. This study achieved from there following research questions.

Q1. What is the level of AI application use in education among students?

Q2. What challenges do students face when using AI applications in the educational process?

Q3. Are there statistically significant differences in the level of AI application use among HEI's students based on gender, major, or academic year?

The study with significant objectives highlighting a critical need of understandings towards the adoption of AI applications in the education sectors which is considered to important substance for transformative learning and operational efficiency. Through the proper exploration of the potential applications of AI, this research contributed to providing insights into how AI can enhance teaching methodologies, streamline administrative functions, and personalize learning experiences for students. Additionally, the study also contributed to identifying the potential challenges that could hinder successful AI integration, enabling educational policymakers and stakeholders to proactively develop strategies to overcome these obstacles. The findings of this study are poised to contribute to policy development, resource allocation, and strategic planning, supporting Saudi Arabia's broader vision of advancing digital transformation within its educational institutions. The study methodology also contributed because previous researches were majorly focused on descriptive studies while there was limited attention to the ANOVA test. The study was further divided into four chapters namely "literature review, research methods, data analysis and results, discussion and future directions".

Literature Review

Artificial intelligence (AI) refers to the development of computer programs that can perform tasks that typically require human intelligence, such as eye recognition, speech recognition, decision-making, and language translation AI uses algorithms and machine learning to execute processes and analyze big data in various sectors (Kamyab et al., 2023). These technologies increase productivity, provide real-time predictability, improve efficiency, and reduce human error

(Ahmad et al., 2023). In the education sector, AI is transforming industries by streamlining data-driven innovations and creating more personalized experiences (Marsella et al., 2024). This is the reason, why integrating AI in educational institutions to streamline business processes enables schools to better collect and analyze student data, identifying students at risk of dropping out (Almogren et al., 2024). This facilitates early intervention and additional support for struggling students. The integration of AI can dramatically increase the efficiency and effectiveness of administrators working in schools. AI technology involves developing a computer program that can simulate human thought and behavior (Ayyoub et al., 2024). This includes abilities such as critical thinking and learning from past experiences (Obidovna, 2024). AI can be a useful tool for addressing educational challenges faced by students, especially in higher education. Using these algorithms, computers can solve problems or make decisions about a situation based on the information provided (Mon et al., 2023).

The future of higher education is closely linked to the advances in emerging technologies and computing capabilities of intelligent devices. Due to advances in AI, the higher education sector is seeing new opportunities and new challenges (Popenici, 2013). AI is being used to improve education and student services, including learning and teaching, decision making, distance learning, and coaching according to González-Calatayud et al. (2021), AI plays an important role in facilitating self-learning in the Spanish education system, especially for private learning. Similarly, Mondal et al. (2023) have studied the impact of AI on the quality of university education. Their research reveals that AI-driven instructional systems empower students by encouraging active participation in the learning process as opposed to passive processing of information. Furthermore, A-based programs stimulate innovation and creativity and facilitate effective learning, benefiting both students and university faculty. Haryanto and Ali (2019) also showed that SIRI, an AI application, supports faster and more efficient foreign language learning in university classrooms, especially for English. Nassabeh et al. (2024) also reported similar results, which found that the use of AI applications in education helps in learning English and solving different tasks and similarly, speech and voice recordings are easily captured and transcribed. Providing students with on-demand information related to educational learning is an important educational task that needs to interact with technological developments for communication and networking.

Since then, the integration of AI in the classroom has been extensively studied and researched in higher education. Rayan (2023) pointed out that this would provide students with better educational and professional skills, thus helping to maintain high standards in Saudi universities. Jafari and Keykha (2024) recognized the importance of training faculty and students on how to use AI applications effectively in higher education. AI apps, such as Chat GPT (Firat, 2023), Duolingo (Herlambang et al., 2023; Ikawati et al., 2022), GitHub, and Kahoot! (Solanki et al., 2020) has been successfully applied in various industries and disciplines in education. It is important to study individual differences among students, especially in terms of their personality traits. Alnasib 2023 highlighted differences in the use of AI services among female students that could be attributed to their core and academic year. Furthermore, Nja et al. (2023) showed that AI has had a significant impact on education. Some students prefer to interact with information systems rather than ask their teachers questions, perhaps to avoid embarrassment or disrupting the class. Such students are concerned that not having direct contact with professors may affect their future research. In another study, it was also found that AI utilization in the education sector increases students' success which helps increase their choices in their academic records (Labrague et al.,

2023).

Despite the potential of AI to improve education, there are many challenges to its implementation. These include rapid development of AI technology, slow pace of AI in education, conflicts with existing teaching methods, financial costs, lack of AI experts in education, insufficient technological support, integration unclear methodologies, inconsistent implementation of AI tools, and inadequate Infrastructure for AI design and implementation (Su et al., 2024). Furthermore, the integration of AI into education poses many challenges for educators. One such challenge is the limited time available to implement AI applications, and the lack of specialized training programs designed specifically for the use of AI in educational settings. Moreover, some teachers may lack their knowledge and skills needed to effectively integrate AI into their teaching strategies (Labrague et al., 2023). While they are open to using AI tools, many teachers are hesitant to do so due to concerns about losing their jobs. In addition, students of Ivanashko et al. (2024) may not have sufficient problem-solving skills when using this framework in the classroom. Overall, the importance of AI in education is unknown, making it difficult for teachers and students to use such tools. Qin and Wang (2022) further emphasized that AI utilization is still in the early stages in the education sector which is important for the storing of sensitive information. This raises concerns about such information potentially getting compromised. Furthermore, the use of unreliable AI applications increases the risk of failing to achieve desired outcomes (Almaiah et al., 2023; Akgun & Greenhow, 2022; Al Malouz, 2023; Chatterjee & Bhattacharjee, 2020; Dimitriadou & Lanitis, 2023; Luan et al., 2020; Pedro et al., 2019; Qin & Wang, 2022; Su et al., 2023). Other authors also recommended that academicians and stakeholders must incorporate AI applications into education because data becomes integral for the long-term sustainability of the academics (Luan et al., 2020).

In other context, AI applications in the education sector highlighted that various demographic factors also influence the students towards the adoption of AI-based technologies. For instance, Rahiman and Kodikal (2024) found that male and females are different in the adoption of AI in their familiarity, engagement, and confidence in using AI applications and they further argued that with male students often exhibit higher comfort levels in some contexts. These gender-based differences may stem from varying levels of access to technological training or societal expectations, which can impact students' willingness to embrace AI-based tools (Banele, 2023). Additionally, majors that are traditionally technology-focused, such as engineering or computer science, show higher AI usage among students, while those in less tech-oriented fields may engage with these applications less frequently, as their curriculum might offer fewer opportunities for AI integration (Rahiman & Kodikal, 2024). In another context, Su et al. (2024) academic year also played an important role in the engagement of AI with the senior students who generally reported greater usage and confidence in AI applications compared to underclassmen. This trend could be due to accumulated exposure and experience as students advance through their programs, gradually gaining familiarity with AI tools used for study, research, or project work (Alqahtani et al., 2023). These differences emphasize the need for equitable access to AI education across all demographics to prevent disparities and foster a more inclusive learning environment. Enhancing AI-related educational policies to account for these demographics increases the benefits of AI innovations in the educational context. Thus, based on previous discussion, it is hypothesized that,

H1: *There is statistically significant differences in the level of AI application use among students based on gender, major, or academic year.*

Research Design

The research aimed to examine AI application utilization among Saudi students at among HEI's and its implementation issue. For this purpose, the research applied the quantitative research approach. Furthermore, researchers used a descriptive survey method to collect information from individuals about their traits, opinions, attitudes, beliefs, or behaviors (Creswell, 2015). This approach is based on objectively describing the phenomenon under investigation, and it relies on scientific research tools to obtain data (Rindfleisch et al., 2008). The data was collected using a cross-sectional research design where data was collected through a self-administered questionnaire.

Participants Profile

After conducting our survey, we received 223 complete replies from the participants. In the field of social sciences, this number of responses meets the criterion for a suitable sample size as determined by Weisberg and Bowen (Hill, 1998). The collected responses showed that most of the responses were 83.9%, which belonged to females, and there were 16.1% males. Participants were distributed across different academic majors, with the largest group being Science (52.5%), followed by Human Sciences (35.4%), and Medical/Healthcare (12.1%). Regarding academic year distribution, participants were fairly spread across the first through seventh years. The third year had the highest representation (24.6%), followed by the second (21.5%) and fourth years (19.2%). Fewer participants were in the fifth (4.9%), sixth (4.0%), and seventh years (8.5%), indicating a stronger representation of students in the earlier stages of their academic programs. The above results are predicted in table 1 below.

Table 1

Demographics of the participants

Demographics		N	%
Gender	Female	187	83.9
	Males	36	16.1
Major	Medical/ Healthcare	27	12.1
	Human Sciences	79	35.4
Academic year	Science	117	52.5
	First	38	17.0
	Second	48	21.5
	Third	56	24.6
	Fourth	43	19.2
	Fifth	11	4.9
	Sixth	9	4.0
Seventh	18	8.5	

Study Instrument

The researchers created a questionnaire based on the relevant literature and the previous studies by (Al Malouz, 2023; Suh & Ahn, 2022; Chile, 2022). The questionnaire was carefully constructed to be completed within a time frame of 8-10 minutes. A five-point Likert scale

consisting of the following responses was employed: "I strongly agree" (5), "I agree" (4), "I am neutral" (3), "I disagree" (2), and "I strongly disagree" (1). The final version of the questionnaire had two sections. The first extracted the participants' demographic information, including gender, major, and academic year, while the second consisted of two primary components related to AI. The first component (items 1-12) investigated the level of AI application use in the educational context among university students in KSA. For question 13, students had to choose from a list of AI applications that are used in education. The purpose of this question was to determine which AI applications are preferred by university students in the educational process. The second component (items 14-26) investigated the perceived constraints related to the utilization of AI technologies in the educational process.

Questionnaire validity

A panel of seven experts with extensive knowledge of educational technologies thoroughly analyzed the content validity of the questionnaire. Based on their feedback and suggestions, the questionnaire was modified. After that, a pilot sample of 109 students were selected to complete the questionnaire and calculate Pearson's correlation to evaluate construct validity. Pearson's correlation is commonly used to assess internal consistency by computing the correlation coefficient between the item's score and the total score of the questionnaire. The results of the analysis are presented in Table 2.

Table 2

Pearson correlation coefficients measuring the questionnaire's construct validity.

Item No.	R	Item No.	R	Item No.	r
1	.613**	11	.562**	22	.666**
2	.500**	12	.664**	23	.452**
3	.667**	14	.486**	24	.637**
4	.727**	15	.530**	25	.422**
5	.670**	16	.507**	26	.471**
6	.691**	17	.456**		
7	.416**	18	.406**		
8	.654**	19	.703**		
9	.651**	20	.651**		
10	.576**	21	.527**		

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 2 shows that Pearson's r values have a range extending from high to moderate ($r = .727 - r = .406$). Since all the questionnaire items have positive correlations, the internal consistency of the questionnaire can be deemed satisfactory.

Questionnaire Reliability

To assess the reliability of the questionnaire, Cronbach's alpha was calculated for the two components of the questionnaire, which comprised 25 items, as shown in Table 3. Item 13 was excluded since it required long answers.

Table 3

Cronbach's alpha for questionnaire reliability

Component	No. of Items	Cronbach Alpha value
AI application use in Education	12	.927
Perceived challenges	13	.834

The results showed a high-reliability coefficient of (0.927) and (0.834) for the first and second components, respectively.

Data Analysis

To answer the research questions and test the research hypotheses, SPSS version 23 was utilized for data analysis. Descriptive statistics, including mean and standard deviations, were employed to illustrate the extent of students' AI application use and the associated challenges in educational settings. Before the data analysis, the normality assumptions were validated through the Kolmogorov-Smirnov and Shapiro-Wilk tests. Levene's test confirmed the equal variance assumption for only the gender and major variables. However, the academic-year variable exhibited statistically significant results in Levene's test, indicating unequal variance. As a result, factorial ANOVA was utilized to demonstrate the differences between the gender and major variables, while the Kruskal-Wallis test, a nonparametric test, was employed to compare differences across the groups of the academic-year variable.

Results

Research Question One Results

The primary objective of this study was to examine the level of AI applications used in the educational context as perceived by students. The first research question was associated with students' use of AI applications concerning their performance in the classroom, while the second main result was associated with students' use of such applications concerning their proficiency in academic research. Table 4 shows that students scored higher ($M = 4.35$, $SD = 0.831$) in their use of AI applications for academic purposes, such as addressing academic obstacles and accessing research papers via Google Scholar. Performing educational exercises using OneNote ($M = 4.077$, $SD = 1.084$) and learning new languages using Duolingo ($M = 4.018$, $SD = 1.063$) had the second and third-highest mean scores, respectively. Further results shown that the students who utilized the Turnitin tool to prevent plagiarism in scientific research content had a mean score of 3.64 with a standard deviation of 1.209. The management and organization of scientific research resources through the GitHub program were discussed as a supplementary issue, with an average value of ($M = 3.6$, $SD = 1.252$). The development of digital research skills using the Mendeley application also received a low average score of ($M = 3.69$, $SD = 1.227$), ranking third lowest. Based on the above results researchers believe that the obtained results can be attributed to the composition of the sample, which comprised undergraduate students. Results are presented in Table 4 below.

The first research question is further supported by the Figure 1. The data in Figure 1 was obtained from a survey of 223 students. This figure shows that Google Scholar was the most preferred application, with 23% ($n=136$) of students reporting it as their first choice. The category

of 'others' mentioned by 14% (n=82) of students includes other educational platforms and applications. One Note: Chat GPT and Coursera were selected by 13% (n=76), 12% (n=70), and 8% (n=46) of students, respectively. However, the applications with the lowest selection rate were GitHub, Zotero, and Brainli, which were mentioned by only 4% (n=24), 3% (n=20), and 2% (n=13) of students, respectively. It is worth noting that Brainli and Zotero support academic research skills, whereas GitHub is related to programming.

Table 4

Descriptive statistics of students' level of AI application use in Education

Item #	Statement	Mean	Std. Dev.
1	I use AI to access academic articles and research papers (Google Scholar)	4.351	0.831
2	I use AI for my educational tasks (OneNote)	4.077	1.084
3	I use AI to learn new languages (Duolingo)	4.018	1.063
4	I use AI to access specialized training courses (Coursera)	3.928	1.123
5	I use AI to communicate with specialized experts from all around the world	3.833	1.205
6	I use AI to access Chat GPT	3.806	1.159
7	I use AI to find answers to complex academic questions (Chegg)	3.779	1.215
8	I use AI as an assistant teacher	3.775	1.155
9	I use AI to improve the academic writing experience (Notion AI)	3.725	1.215
10	I use AI to manage and organize scientific research resources (Mendeley)	3.698	1.227
11	I use AI to develop digital programming skills (GitHub)	3.653	1.252
12	I use AI to help avoid plagiarism (Turnitin)	3.644	1.209

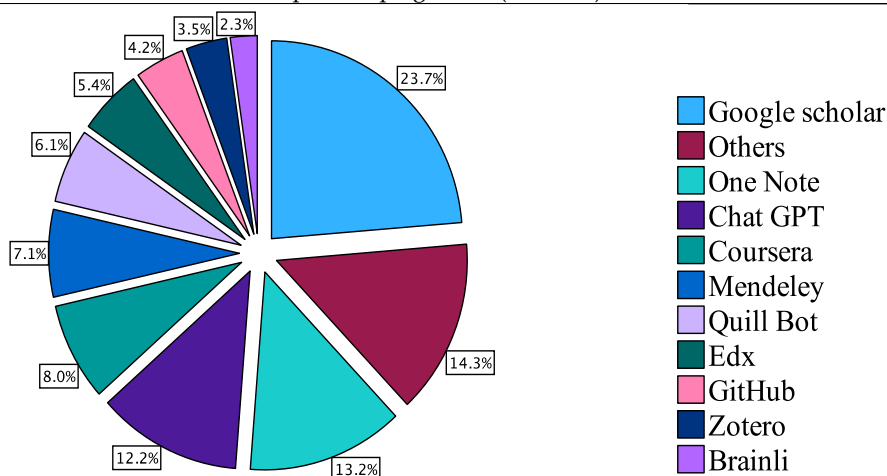


Figure 1: Students' preferred AI applications in the educational process.

Challenges Related to university students' use of AI Applications in Education.

Research Question 2 Results

The statistical analysis conducted in this study identified the key issues that have the potential to impede the utilization of AI applications in the educational process, as perceived by students among HEI's. Table 5 presents the challenges associated with the implementation of AI applications in the field of education. Among the students, the highest mean score was observed for the statement "AI is an emerging technology in education," with an average of (M=4.387, SD=0.825). Next, the "Insufficient internet connectivity in educational institutions" statement was found to be the second greatest challenge, with an average score of (M=4.252, SD= 0.979). The statement "lack of appropriate devices to use AI applications in universities" ranks third, with an average of (M= 4.104, SD= 0.972). This is likely the case due to the high cost of equipping classrooms with AI-ready programs, devices, and networks. Regarding the challenges that students encounter when using AI applications, the statement "students' reluctance to engage with AI applications" obtained the lowest average of (M= 2.946, SD= 1.261). The statement "There are issues with prohibiting the utilization of AI applications in education" garnered an average score of (M= 3.613, SD= 1.127). The authors suggest that this challenge may diminish with time, as there is a significant inclination toward the adoption of AI applications in education by both students and faculty members. The statement "There are no appropriate technical skills among faculty members in the use of artificial intelligence" obtained an average score of (M= 3.869, SD= 1.070), indicating an improvement in faculty members' technological skills and their acceptance of technology following the COVID-19 pandemic. Further, the statement "It is difficult to use AI in the Arabic language" has an average score of (M=3.833, SD= 1.178), which suggests that many AI applications lack support for the Arabic language and that the existing applications that do support Arabic do not meet the required standards. Next, the statement "traditional education that dominates the educational process" obtained an average of (M=3.756, SD=1.033). Above results are predicted in Table 5 below.

Table 5

Mean and standard deviations of the perceived challenges to AI application use in education.

Item #	Statements	Mean	Std. Dev.
14	AI is an emerging technology in education	4.387	0.826
26	Insufficient internet connectivity in educational institutions	4.252	0.979
17	lack of appropriate devices to use AI applications in universities.	4.104	0.972
18	There is concern about the potential technical security issues caused by using AI applications	4.027	0.997
16	Training programs for educational AI applications are scarce.	4.009	0.946
20	There are no appropriate technical skills among faculty members in the use of AI.	3.869	1.070
21	It is difficult to use AI in the Arabic language	3.833	1.178
15	Traditional education that dominates the educational process process.	3.756	1.033
19	Students do not have adequate technical skills to use AI.	3.703	1.146
22	Faculty members' reluctance to engage with or embrace uses of AI.	3.635	1.108

Table 5

Mean and standard deviations of the perceived challenges to AI application use in education.

Item #	Statements	Mean	Std. Dev.
24	There are issues with prohibiting the utilization of AI applications in education.	3.613	1.127
25	The large class sizes prevent the use of AI applications in the classroom	3.523	1.221
23	Students' reluctance to engage with AI applications	2.946	1.261

Differences in AI use among students due to Gender, Major, or Academic Year

Research Question Three Results

This section discusses students' AI application use concerning their demographics (gender, major, and academic year). Table 6 illustrates the differences in the AI applications used. To determine the statistical significance of these differences, two statistical analyses were employed: factorial ANOVA and the Kruskal-Wallis test. Factorial ANOVA was performed to compare the main effects of gender and major as well as their interaction effects on the level of students' AI applications use in education. Table 6 shows that the main effect of gender was not statistically significant ($F(1, 217) = 0.031, p = .861, n^2 = .000$). Therefore, the gender of the students did not influence the level of their AI application use. In addition, there was a non-significant interaction effect between gender and major, which means there is no combined effect of these variables on the level of students' AI applications use in education ($F(2, 217) = .944, p = .391, n^2 = .009$). However, the main effect of major yielded statistically significant results ($F(2, 217) = 5.017, p = .007, n^2 = 0.44$). Regardless of the student's gender, a 4.4% variance in the level of AI application use is explained by the student's major. According to the Tukey post hoc test, only medical and science majors showed significant differences in their use of AI apps ($p = 0.03$). As for the academic year variable, the Kruskal-Wallis test was conducted due to the unequal variance detected by Levene's test. The results indicated that the level of students' AI application use was not significantly affected by their academic year ($H(6) = 8.449, p = .207$). These results align with Selwyn (2008) research, which revealed no significant variations in technology and internet usage among British university students based on their academic year.

Table 6

Results of factorial ANOVA for the variables gender and major on the level of students' AI applications use in education.

	<i>F</i> (1-2, 217)	<i>P</i>	<i>n</i> ²
Gender	.031	.861	.000
Major	5.017	.007*	.044
Gender*Major	.944	.391	.009

*. The f test is significant at an alpha level of .05

Discussion

Today, the world is moving toward a new digital era based largely on the use of AI

technologies and applications, which have developed and spread in many areas of life and different work sectors. This study aimed to identify the level of AI application use and its challenges among students in Saudi Arabia. For this purpose, cross-sectional study used an electronic questionnaire sent to students' email and group SMS. A sample of 223 students from diverse academic fields was studied. The first question results show that students are primarily using AI for accessing academic articles, performing educational tasks, and language learning which is showing a preference for tools that directly support their studies. In other words, utilization of AI tools for the management of research resources, plagiarism removal, and developing programming skills are less used which suggests that these areas may hold less immediate relevance for students. The result is consistent with the research of [Martínez-García et al. \(2023\)](#), where they found that sectoral intelligence applications improve students' learning and interaction with scientific material and their classmates. It is also supported by the work of [Al Shamsi et al. \(2022\)](#), who emphasized that language learning programs and applications are particularly necessary for students. This is due to their connection with the specific subjects taught in English as well as their significance in enhancing students' learning and development. Thus, the findings argued that students should properly use AI in their academic careers because proper utilization of AI-related programs is considered to be beneficial for students in both their academic pursuits and future professional endeavors that could increase the utilization of AI by the students.

The second question results show that students are facing several challenges in the utilization of AI in the education sector which consist of insufficient internet connectivity, and a lack of appropriate devices which shows the infrastructure issues. These findings indicate that undergraduate students among HEI's are not properly utilizing AI applications as much as anticipated for academic research purposes. This trend could be attributed to the effect of the prevailing educational system in the Saudi Arabia and the overall educational environment in the educational institutions. There appears to be a lack of enthusiasm toward scientific research and its contemporary methods and applications within the educational system of the Saudi Arabia, especially at the pre-university education level. This aligns with the assertions made by [\(Rahiman & Kodikal, 2024; Su et al., 2024\)](#), who posited that the deficiency in scientific research abilities and limited utilization of contemporary technological tools among university students can be attributed to their previous educational preparation. Therefore, based on these findings, it is argued that Universities should focus on AI utilization to increase the attention of the student to increase their academic success.

Further research question two showed that most of the faculty members are facing a deficiency in providing essential resources and contemporary technology tools, such as AI, to augment their academic research proficiencies. The results are similar to the research of [\(Ivanashko et al., 2024\)](#), where they showed that where they emphasized that AI utilization significantly influences their academic success. In addition, it aligns with the findings of a recent study conducted by [\(Banele, 2023\)](#), which substantiated the presence of deficiencies in the research aptitude of undergraduate students. The study further advocated for an exploration of the significance of e-learning concerning enhancing these research skills. This finding can be connected to the research conducted by [Zawacki-Richter et al. \(2019\)](#), who demonstrated that despite the significance of AI, teachers continue to face challenges related to effectively utilizing it on a broader scale. Consequently, they are unable to fully harness its potential for enhancing both teaching practices and scientific research within the domain of higher education. Furehr findings show that AI, as a novel technology in education, has not received substantial support and attention concerning

enhancing the educational attainment of students, which is reflected by the practical challenges encountered in university education. This finding is supported by the research conducted by (Ali et al., 2024; Weidener & Fischer, 2024), which highlights the lack of involvement of universities in promoting the practical applications of AI and fostering awareness of its significant role.

The third question result showed that the main effect of gender was not statistically significant which showed that the gender of the students did not influence the level of their AI application use. In addition, there was a non-significant interaction effect between gender and major, which means there is no combined effect of these variables on the level of students' AI applications use in education. However, the main effect of the major yielded statistically significant. The findings are consistent with the research conducted by Selwyn (2008), where they highlighted differences in the use of AI apps among students of various academic disciplines. According to the Tukey post hoc test, only medical and science majors showed significant differences in their use of AI apps. A possible reason for this relationship is that it could be attributed to the limited number of responses received from healthcare students compared to the number of responses received from students in the colleges of humanities and sciences (Ahmad et al., 2023). Nevertheless, students who are medical majors extensively use AI applications to obtain information and prepare assignments. Their lower average in the current study, compared to their counterparts in other disciplines, may be due to the low percentage of responses. As mentioned earlier, only 27 students out of 223 who participated were earning medical majors. The academic curricula, assignments, and activities of students from these three disciplines may also affect their level of use of AI apps (Lai & Hong, 2015). Further for academic variables results showed that the level of students' AI application use was not significantly affected by their academic year. These results align with Selwyn (2008) research, which revealed no significant variations in technology and internet usage among British university students based on their academic year.

Implications

The study has some theoretical and practical implications. Theoretically, this study with significant objectives highlighting a critical need to understand the adoption of AI applications in the education sector which is considered to important substance for transformative learning and operational efficiency. Through the proper exploration of the potential applications of AI, this research contributed to providing insights into how AI can enhance teaching methodologies, streamline administrative functions, and personalize learning experiences for students. Additionally, the study also contributed to identifying the potential challenges that could hinder successful AI integration, enabling educational policymakers and stakeholders to proactively develop strategies to overcome these obstacles. Along with theoretical implications, the study also identified several challenges that university students encounter when using AI applications for learning. Some challenges include technical difficulties with the applications, inadequate support and guidance from instructors, and a lack of understanding about how to effectively incorporate AI applications into the learning process. To overcome these challenges, this study contributed to emphasize the importance of providing sufficient support and training to university students on how to efficiently use AI applications for learning.

The study could also help academicians increase their students' interest in AI applications which could help to overcome challenges that impact the successful implementation of AI applications with a thorough evaluation of existing programs and practices to identify strengths

and weaknesses. Then, a clear plan of action to address identified weaknesses could be developed, including timelines and responsibilities which could help to ensure successful integration. The study could also help others to contribute some suggestions to enhance students' knowledge of AI and inform them about the latest advancements in this field. The first is organizing regular training programs in AI. By doing so, we can ensure that students are well-equipped to engage with AI and its applications throughout their academic journey. The second is integrating AI applications into undergraduate courses, such as the "Scientific Research" course. This will allow for a more effective teaching and evaluation method in the learning management system and graduation projects. Furthermore, these programs will contribute to improving the quality of the internet infrastructure among HEI's and facilitating the utilization of AI applications in the educational process. Third is ensuring that students and faculty members can efficiently utilize AI in their academic pursuits. The university should establish a well-equipped educational setting that can seamlessly integrate AI applications into the learning process. Additionally, each college should have a specialized technical team that can provide students and faculty members with comprehensive technical support, enabling them to overcome any issues that may arise.

Limitations and Future Directions

The current study has certain limitations that must be considered. First, the study was conducted with students in Saudi Arabia, which limits the generalizability of the results. Hence, the researchers call for a subsequent investigation that emulates the present study and targets students enrolled in both public and private Saudi colleges. This could reinforce the significance obtained from the current study. Second, for a deeper understanding of students' use of AI applications in education, the authors propose conducting qualitative studies, using interviews, to gain valuable insights into the implementation and recommendations for students' use of AI in education. There have been no evaluations of this use to date, and such a study could help address the gap in the related knowledge and inform future decisions. Third, the researchers suggest testing the effects of AI applications on university students' academic performance and perceptions with an experimental investigation involving one or more educational AI models.

Conclusion

The study examines AI application utilization among Saudi students and its implementation issues. Cross-sectional data was collected through the electronic questionnaire which was sent to the students through email and SMS groups. A sample of 223 students from diverse academic fields was studied. The data showed that major subjects can affect university students' AI app use. Science college students use AI more than other students. University students use AI apps to improve their academic performance and complete assignments to gain more. However, students agree on the many issues hindering AI application use. This study emphasizes the importance of AI workshops and training for Saudi university students and staff to properly utilize AI technologies. This research will help students understand AI and establish the groundwork for future academic research and further this research could also benefit administrators, curriculum designers, and educators.

Authors contributions

All Authors contributed equally to the current study.

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Ethics approval

The study was approved by the Institutional Review (or Ethics Committee) of the Research Ethics Committee (REC) of King Faisal University (protocol code KFU-REC-2023-MAY-ETHICS817).

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