

**The Level of Use of Artificial Intelligence Tools in
Personalized Learning by Saudi University Students
from Their Point of View**

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مستوى استخدام أدوات الذكاء الاصطناعي في التعلم الشخصي لدى طلاب الجامعات السعودية من وجهة نظرهم

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ملخص الدراسة:

أدى الذكاء الاصطناعي والتكنولوجيا إلى زيادة الاهتمام بالتعلم والمشاركة؛ ولذلك، فإن الاهتمام بالذكاء الاصطناعي كأداة تعليمية أمر بالغ الأهمية. كلما أصبحت أدوات الذكاء الاصطناعي أكثر تطوراً، زادت أهمية إعادة التفكير في كيفية استخدامها لتعزيز التعلم وتعزيز التعليم ليس فقط من أجل الأهداف الحالية ولكن -أيضاً- من أجل التعليم المستقبلي والأهداف التكنولوجية، وتهدف الدراسة إلى اكتشاف التحديات التي يواجهها طلاب الجامعات السعودية عند استخدام أدوات الذكاء الاصطناعي في التعلم الشخصي، واتبعت الدراسة المنهج المختلط بالتصميم المتقارب للإجابة عن تساؤلات البحث، وتمت معالجة البيانات الكمية

SPSS باستخدام الحزمة الإحصائية ، وتمت الإجابة عن الأسئلة الوصفية باستخدام الوسط الحسابي، وتم حساب الاختلافات باستخدام اختبار مان ويتني اللامعلمي بسبب التوزيع غير الطبيعي للبيانات، وتم استخدام العينة العشوائية الطبقية على عينة مكونة من ٤٥٦ طالباً من التخصصات الإنسانية والتطبيقية في ثلاث جامعات سعودية كبرى وناشئة. وفي النتيجة، يستخدم طلاب الجامعات السعودية أدوات الذكاء الاصطناعي في تعلمهم الشخصي، التي لها تأثير إيجابي للغاية على تجربة التعلم الخاصة بهم، كما أنهم يدركون -أيضاً- التحديات التي تفرضها أدوات الذكاء الاصطناعي وهم على استعداد لمواصلة استخدامها.

الكلمات المفتاحية: التكنولوجيا الحديثة، التعلم الذاتي، التعليم العالي.

The Level of Use of Artificial Intelligence Tools in Personalized Learning by Saudi University Students from Their Point of View

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Abstract:

AI and technology have increased interest and engagement in learning; therefore, paying attention to AI as an educational tool is crucial. The more sophisticated AI tools become, the more important it is to rethink how they can be used to enhance learning and education, not just for current goals but also for future educational and technological goals. The study aims to discover the challenges that Saudi university students face when using AI tools in personalized learning. The study followed a mixed-methods approach using a convergent design to answer the research questions. Quantitative data were processed using the SPSS statistical package, descriptive questions were answered using the arithmetic mean, and differences were calculated using the Mann–Whitney nonparametric test due to the no normal distribution of the data. Stratified random sampling was used to select a sample of 456 students from the humanities and applied disciplines in three major and emerging Saudi universities. The findings indicated that Saudi university students use AI tools in their personalized learning, which have a highly positive effect on their learning experience. They are also aware of the challenges posed by AI tools and are willing to continue using them.

key words: modern Technology, self-learning, higher education.

Introduction:

University students use Artificial intelligence (AI) tools in their studies, making their perceptions of these tools vital. AI is the most important topic in the Fourth Industrial Revolution and brings significant benefits to human life, leading to its widespread use across nearly all aspects of human life. Similarly, in education, learners use AI applications while studying (Chen, 2024). In addition, many teachers and faculty members use AI for lesson planning or brainstorming. AI is a new form of competition in the economy and among countries. Moreover, Stöhr et al. (2024) stated that AI is impacting higher education and the daily tasks of students. Therefore, highlighting its impact on students' personalized learning is important.

AI tools in higher education are being discussed because of concerns regarding their impact on students, faculty, and content, particularly their impact on academic integrity in higher education. Bobula (2024) stated that such challenges vary, from privacy issues, misinformation, equity, and diversity to inclusion. According to Zawacki-Richter et al. (2024), studies have mixed perceptions related to the function of AI in education. A large number of university students in the Kingdom of Saudi Arabia use AI tools during their studies and personal education. But little information is available about the nature of this use by students or its levels. This study examines this gap in particular, given the students' point of view regarding their use of AI tools during their university studies, in light of the factors available from previous studies. They emphasized the need to focus on stakeholders' studies to unravel all issues related to AI in education. The present study focuses on students' usage of AI tools in their

personalized learning at the university level in the Kingdom of Saudi Arabia.

Study problem:

The need to investigate the student's interaction with AI tools in his/her private and informal education has been raised by many studies at the local and international levels. Students in the Kingdom of Saudi Arabia are not isolated from the global factors affecting their personal education from the rest of the world, but studies on this subject are limited, which makes this problem the subject of this research. Alammari (2025) highlighted this problem at the local level in the Kingdom of Saudi Arabia. It has also been referred to at the global level in several studies.

Previous literature highlighted the need for this study. Many previous studies (Hutson, 2024; Bobula, 2024; Sullivan et al., 2023; Swindell et al., 2024) asked researchers to examine students' opinions, perspectives, and attitudes and the impact of using AI tools on students' learning and in higher education. Moreover, additional studies are needed to include the perceptions of students, teachers, and institutional leaders on AI's impact. Sullivan et al. (2023) recommended further studies on the implications of AI tools and teaching and learning practices. Students and educators use AI extensively, but mostly, there is no guidance for its safe and integrated use. According to Swindell et al. (2024), "Educators will need continuous creativity to reframe and rethink teaching, learning, and assessment as AI continues to develop" (p. 17). For teachers and educational institutions, tracking students' learning, achieving education goals, and providing personalized experiences are serious responsibilities. Educators have a heavy workload that can

be eased by using workflow technology. According to Guettala et al. (2024), AI and technology help in solving problems related to flexibility and personalized learning. In addition, AI and technology have increased learning interest and engagement; therefore, paying attention to AI as an education tool is crucial. The more sophisticated AI tools become, the more important it is to rethink how they can be used to power learning and enhance education not just for current goals but also for future education and technological goals. Research on the impact of AI on personalized learning, with highlights on the opportunities and challenges, has grown significantly (Zawacki-Richter et al., 2024), but only a few have explored students' opinions.

Research Questions:

Therefore, this study is important as it aims to answer the following research questions:

- What is the level of Saudi university students' use of AI tools in personalized learning?
- How much educational impact does Saudi university students' use of AI tools have on personalized learning?
- What is the level of acceptance and positive attitude among Saudi university students toward the continued use of AI tools in personalized learning in the future?
- What are the challenges that Saudi university students face when using AI tools in personalized learning?
- Do statistically significant differences exist between the averages of the sample members' responses to the questionnaire on the reality of Saudi university students' use of AI tools in personalized learning due to differences in specialization?

Study Goals:

This study aims to identify the levels of the usage by students in Saudi Arabian universities when using AI tools in their personalized learning. It seeks to understand their perspectives on this use, including the degree of application, as well as the reasons for and challenges they encounter. Furthermore, it explores their future objectives and their preparedness for potential challenges, focusing exclusively on their perspectives and current experiences. These goals were achieved by addressing the specific research topics:

- knowing the level of Saudi university students' use of AI tools in personalized learning.
- Understanding the educational impact does Saudi university students' use of AI tools have on personalized learning.
- knowing the level of acceptance and positive attitude among Saudi university students toward the continued use of AI tools in personalized learning in the future.
- Finding if there is statistically significant differences exist between the averages of the sample members' responses to the questionnaire on the reality of Saudi university students' use of AI tools in personalized learning due to differences in specialization.
- Discovering the challenges that Saudi university students face when using AI tools in personalized learning.

Study Importance:

Theoretical importance:

- Contributing to bridging the knowledge gap about the challenges facing students while using AI tools in their personalized learning at the university level.
- Providing an academic basis for future studies on employing the use of AI tools to improve personalized learning skills at the university level.

Practical importance:

- Providing accurate information and data about the reality of using AI tools in personalized learning at the university level in the Kingdom of Saudi Arabia.
- Help universities and faculty members understand the factors influencing the adoption of AI tools as a tool to enhance students' personalized learning.
- Providing recommendations based on the results of the study to facilitate the use of AI tools more effectively in self-education.

Study determinants:

–Objective determinants: determined by the variables addressed in the study, which are: the use of AI tools, personalized learning challenges.

–location: The study was applied in Three Saudi universities.

–Time limits: The study was implemented during the first semester of the academic year 2025/2026-.

–Human Determinants: It was applied to a sample of male and female students at Saudi universities in humanities and applied specializations.

Terminology:

Personalized learning:

The definition of personalized learning is interchanged with many terms and vocabulary. Personalized learning is a fundamental shift from the traditional way of teaching, where one type of education fits all students. In this study, personalized learning is connected to self-regulation. Mejehe et al. (2024) defined self-regulated learning as “independent, self-directed behavior by individuals seeking to improve their knowledge and skills” (p. 17764). In addition, it is useful to consider the definition of adaptive learning technology, which refers to algorithms and data analytics in educational systems or tools that are used to design the learning experience specifically for students’ needs and levels (Mejehe et al., 2024).

Personalized learning is a way of lifelong learning. Most students who seek knowledge through this kind of learning prefer to be active in their learning decisions. Adaptive learning technology has shown the way to personalized learning in the twenty-first century and the lifelong learning trend (Mejehe et al., 2024). AI has a variety of adaptive learning technologies that help achieve a satisfactory personalized learning experience. For example, considering technology in providing instance feedback improves self-regulation in learning, indicating a correlation between instant, precise feedback and personalized learning, according to Mejehe et al. (2024); in this example AI tools could be the solution.

Theoretical Framework:

AI and Education:

With the massive expansion of AI techniques, students' learning has become more individualized than ever before. Students and instructors are constantly striving for better learning techniques. In the AI era, education has undergone tremendous change. According to Chen (2024):

“UNESCO's Rethinking Education: Towards a ‘Global Common Good’ crucial to the sustainable and healthy development of educational AI are creating intelligent learning settings and personalized learning paradigms, improving evaluation systems, and providing scientific education management and services (p. 3266).”

In the past, the use of modern technology successfully improved teaching and learning. However, using AI to improve tailored learning requires additional planning and preparation for all personnel who will engage with these processes. Personalized learning aims to ensure that each student learns according to their individual needs, such as their level of education, time, location, type of background, or even study style. Evolving technology has always been a key to achieving this level of customization. AI can improve student learning when effective conditions are applied to learning and educational situations. According to Guettala et al. (2024), AI advances all aspects of human life, including education and learning.

Many previous studies showed the importance of including AI in students' and educators' work. The level of digital literacy and readiness regarding AI is important; however, no literature review has investigated this issue deeply enough. For example, according to Xia et al.

(2024), knowing the level of AI literacy will help identify the gaps in the current research era. Moreover, many studies showed the gap in creating policies regarding the use of AI in teaching and learning or education. According to Xia et al. (2024), real-world experiences should be included when policymakers discuss AI and students' work in educational environments. AI offers many opportunities to enhance the teaching and learning environment; however, the strategic recommendation is to provide the roles and policies of AI integrations (Bobula, 2024). Including students and educators, along with workforce experts and all other important stakeholders, is necessary in writing and implementing these policies.

AI and personalized learning:

Technology tools have always been used to enhance performance for personalized learning. Some examples show evidence of success in using AI tools and applications. For example, AI offers the flexibility to create learning materials for specific students' needs in real time. Another example is tasks and exams offered automatically based on students' levels, desires, and self-interest at reduced times with lower effort. According to Guettala et al. (2024), AI facilitates rapid adjustment to changes in educational technology. In addition, Bobula (2024) agreed that in higher education, AI offers opportunities to transform assessment, skills development, administrative efficiency, enhanced engagement, and content generation, and provides a chance for transparent learning. AI offers many proficiency levels to improve personalization in the new education era.

Moreover, some educators believe that when the proper factors are considered, AI can potentially impact

student learning positively. For instance, the features and intelligence of AI and its high volume of data analysis and automation can empower students' learning. According to Chen (2024), the rules of teachers, administrators, and peers can be enhanced by AI. Moreover, Chen (2024) emphasized the benefit of proven adaptive personalized support. Younas et al. (2025) revealed that AI empowers learners and enhances self-directed learning. Bobula (2024) agreed that AI in higher education can help investigate and predict possible risky students earlier. AI can help provide the specific support students need by personalizing the most suitable solutions and decrease teachers' load in the whole process without replacing human teachers.

Furthermore, with the expanding AI applications, the potential to enhance personalization strategies increases. New widespread adoption has become a reality in classrooms and lecture halls. Previous studies showed that many models of AI tools are used to enhance students' success using generative AI. Sullivan et al. (2023) stated that generative AI (GenAI) can possibly ensure equity among different student types, people who speak traditional or nontraditional languages, and digital or nondigital natives. Furthermore, the incorporation of GenAI can potentially enhance students' creativity. According to Lively et al. (2023), integrating AI tools enhances creativity and production, particularly in writing skills, information access expansion, artistic skills, design innovation, and time management in project reports. Moreover, Campbell and Cox (2024) noted that, in research, GenAI reduces time spent generating ideas, finding resources, evaluating ethical AI detectors, and

organizing the workflow. Communication and chatbot agents also help enhance students' experiences (Stöhr et al., 2024). GenAI also provides plan learning strategies, course tasks, and reminders (Mejeh et al., 2024). Xia et al. (2024) stated that the application of AI tools enhanced self-regulation of learning with free feedback during students' free time, self-assessment, and independent study. The literature review also covered fundamental methods about the quality of technological feedback. According to Mejeh et al. (2024), technological feedback provided based on AI tools or chatbots enhances students' learning when it is tailored to their needs. Although technological feedback and real-time assistance are the most useful, they are infrequently used in higher education. A quick search on the internet showed that different websites and applications, such as chatbots, Studybay, Grammarly, Chatpdf, Quilbot, Piktchart, and Canva, guide personalized experiences for students. Therefore, AI can enhance personalization.

Students' Experiences and Uses of AI Tools:

Students use AI tools at different levels for many reasons. Previous studies (Alammari, 2025; Mejeh et al., 2024; Xia et al., 2024) reported that students use many AI applications in their daily learning tasks, such as platforms or digital dashboards, and obtain personalized feedback that considers strategy recommendations, task reminders, and notifications. Students use AI because it provides instant feedback and improves learning outcomes. Moreover, students prefer AI tools because these tools enable them to engage in their learning and with their colleagues better. According to Hutson (2024), students like using AI tools because they reduce time spent on

research processes, such as determining location information or gaining access to specific data.

At the higher education level, more studies (Alammari, 2025; Bobula, 2024) recommended that AI tools could be used to enhance update assessment, foster collaboration, increase awareness for academic integrity, and enhance learning. Hutson (2024) advised that excluding AI from students' experiences is not necessarily better for the learning process. According to students, AI engagement can enhance critical thinking skills through changes in teaching strategies and assignment types.

Challenges and Concerns of Students' Usage of AI Tools

Ethical challenges:

AI poses a challenge to educational technology, affecting all types of technology, such as cloud computing, big data, virtual reality, augmented reality, and deep learning. AI also transforms all aspects of human life and society (Chen, 2024). Many countries are updating and upgrading their policies to face ethical challenges posed by AI (Chen, 2024). The United States of America, Europe, China, Saudi Arabia, the United Arab Emirates, and Egypt have developed and enhanced their AI and education policies. For example, in 2020, the US government issued the "Regulation Guidelines for AI Applications." The Ministry of Education of China, the Chinese National Commission for UNESCO, and the Shanghai Municipal People's Government jointly organized the 2024 World Digital Education Conference and issued six forums, one of which focused on the ethics of educational AI (Chen, 2024). In 2019, Saudi Arabia established SADIA, an AI authority. In 2025, the kingdom explained that its AI

strategy includes creating, empowering, and adopting innovations and regulations for a stable AI environment. The National Center for AI focuses on AI in all public and private government issues and education, creating a toolkit and index for AI use in education (National Portal, 2025). In addition, an introduction to AI is being taught at all school and university levels. However, few studies focus on personalized learning in the era of AI.

In education, AI poses issues related to academic integrity/misconduct. It weakens essential skills, security, and privacy; it also changes the traditional roles of teachers and affects students' learning and growth. According to Bobula (2024), ethical issues in AI in higher education include data privacy, misinformation, personal security, digital inequalities, and academic integrity. Hutson (2024) also emphasized that academic writing is changing in the AI era and recommended investigating the definition of plagiarism and academic dishonesty. Likewise, Jie and Kamrozzaman (2024) confirmed that students face different integrity challenges when using AI. According to Alammari (2025), the ethics of adopting AI from students' perspectives in Saudi Arabia need to be investigated, and teaching strategies and policies need to be reframed to adapt to the existence of AI.

Digital Literacy as a Challenge:

Another challenge facing the adoption of AI and personalized learning is digital literacy. Digital literacy poses challenges in the smooth adoption of AI in education. The skills of faculty and teachers have yet to catch up to technology transformation. Therefore, governments and education leaders have become more interested in improving digital literacy to fill the gap in

teaching with AI. For example, China includes digital literacy as a topic for adopting effective ethical AI in education. According to Chen (2024), the government of China includes digitalization to develop ethical AI. The National Portal (2025) states that Saudi Arabia includes specific courses at the higher education level and in K-12 to introduce AI and how to integrate it into daily learning tasks. As can be observed on the websites of Saudi Arabian universities, leaders connect professional training to improve the AI literacy of faculty. AI divides students based on their digital literacy because students may not have the important skills that will allow them to use AI tools effectively. According to Bobula (2024), digital literacy can decrease students' achievement. AI requires a shift in teaching strategy, yet not all students are familiar with new strategies (Hutson, 2024). Campbell and Cox (2024) agreed that GenAI is unreliable because of low digital literacy. Cost is another factor that deepens the gap in digital literacy. Furthermore, students' fields and backgrounds may pose a challenge for incorporating AI into personalized learning. Alammari (2025) discovered that students from different disciplines have varying levels of technology literacy in terms of using AI technologies.

Access:

Access to AI tools and technology is an issue, and their costs cannot be ignored when adopting them in a learning environment. AI tools are pricey and not offered in educational institutions for several reasons, sometimes because of the cost of updating the rules and regulations or because of the membership cost of the apps and tools. Free tools are not sufficient for studying. According to Xia et al. (2024), ineffective AI adoption can lead to poor vital skills

development for students. Bobula (2024) mentioned cost as a challenge in adopting AI tools in learning. Guettala et al. (2024) noted that careful integration of AI in education should consider factors such as cost. Zawacki-Richter et al. (2024) explained the cost in the broader meaning of equity to access to AI tools and how it affects students' learning. Oldemeyer et al. (2025) found that the cost-benefit of adopting AI is not truly investigated in institutions and companies. Thus, the present study is crucial to emphasize students' insights into cost factors.

The Diffusion of Innovations Theory:

Theory is used to understand the implementation of new technology tools. This study used the Diffusion of innovations theory (DOI) to gain more understanding. According to Rogers (2003) the diffusion of innovations theory was developed by Rogers, a communication theorist, in 1962. The theory explains the passage of a new idea through stages of adoption by different people who participate in or begin using the new idea. The main people in the diffusion of innovations theory are: innovators, early adopters, early majority, late majority, and laggards. Therefore, innovators and early adopters are willing to take a chance while experimenting with new ideas, technology, or inventions. Conversely, laggards are risk-averse and rigid in their methods. An innovation eventually becomes indispensable to mainstream society, making it hard for them to go about their everyday lives without it. They are consequently compelled to start using it. In terms of this study, the new tech is AI tools that students will use or adopt in personalized learning. The degree of the embracing is their level of usage.

Technology acceptance model (TAM):

The second theory used in this study is Technology acceptance model (TAM). It provides a starting point for monitoring the impact of external factors on belief, attitude, and intention to use. TAM suggests two cognitive beliefs, perceived value and perceived ease of use. TAM states that a user's behavioral intention, attitude, perceived utility, and perceived ease of use all have a direct or indirect effect on the actual use of a technology system. In addition, TAM suggests that external factors influence intention and actual use through indirect effects on perceived usefulness and perceived ease of use. According to Straub (2009), TAM is used to study the adoption of new technology in educational settings. In this case the new technology is the AI tools, and the elements of the model explain how students accept these new tools.

Past Studies:

The purpose of Alammari's (2025) study was to recognize Saudi Arabian university students' views and considerations about using AI in the classroom. The study showed how students' use of AI tools impacts social, cultural, and educational contexts. It also employed a combined learning strategy and detected how students experienced new technology and its applications. This study is distinctive because it investigates how much students use personalized learning instead of involving it to their formal learning in a university environment. It agreed with the study's mixed approach and the same sample and population of college students.

In Mariano et al. (2025) investigate the impact of feedback supported by contemporary technologies, including AI tools, on the nursing field. The results of the

study indicated that students accepted this different type of feedback in their self-regulated learning experience. The study concluded that the qualitative results revealed that learners have different perceptions about the feedback they receive, its impact on their adaptive learning, and its individual benefits. The principals of this study agreed on the research methodology in terms of the mixed approach but failed to expand the study sample for all specializations. Furthermore, the current study's objective is different from the previous studies in that it concentrates on identifying the degree of use as well as changes in acceptability and usage-related challenges. It also acknowledges conclusion, including the possibility of raising personal usage rates when advantages and approval have been achieved.

Sullivan et al. (2023) assessed the impact of ChatGPT's application in academic settings. The study showed that to deal with contemporary AI technologies, must be developed. The study inspected at current procedures in several nations, including the United States, Australia, New Zealand, and the United Kingdom. From several databases, 100 articles about using ChatGPT were examined. According to the study's findings, there were conflicting opinions regarding the challenges, the most significant of which centered on issues with academic integrity and the precision of creative assessment.

Sullivan et al. (2023) revealed a shortage of discussions about how to encourage student involvement in AI usage. While the current study examines many AI, tools are utilized and well-liked by students. The previous study concentrated on comprehending a single application, "ChatGPT." The current study highlights the need to

understand students' proficiency levels while utilizing and deploying AI tools, as well as the necessity to learn more about university students' practices across diverse majors.

In Summary, despite the growing body of literature, studies on personalized learning in Saudi Arabia remain limited. Important gaps still need to be understood regarding the students' level of use, impact on their learning, and attitudes toward expanding AI in the future from the point of view of personalized learning, particularly for Saudi Arabian university students.

Methodology:

Study Method:

The study followed the mixed approach) Creswell & Plano-Clark, 2018), according to the convergent design, which combines measuring reality in a quantitative manner through a closed questionnaire and exploring the challenges of use through an open-ended question directed to the same sample members and analyzed objectively.

Study Population and Sample:

The study population consisted of all undergraduate and postgraduate students in three major and emerging Saudi universities, with a total of 135,300 male and female students, according to official statistics from university administrations for the academic year 2025–2026.

Stratified random sampling was used on a sample of 456 students from the humanities and applied disciplines. This number is considered an expression of the population according to Robert Mason's equation, which stipulates that the sample number corresponding to the current population size should not be less than 383 male and female students.

Study Tool:

A questionnaire was prepared to collect data after reviewing the literature and previous studies. The questionnaire consisted of two sections, the first of which is closed, and consists of 13 statements distributed over three sub-axes: the level of use of AI tools, benefits and educational impact, and future trends and acceptance, to be answered according to a four-part Likert scale (i.e., strongly agree, agree, disagree, and strongly disagree). The raw scores (4, 3, 2, 1) are compared, with the arithmetic mean ranging from 1 to 4. The following criteria can then be used to assess the level in the first section of the questionnaire:

-High level: if the arithmetic mean of the responses falls between 3.00 and 4.00.

-Medium level: if the arithmetic mean of the responses falls between 2.00 and less than 3.00.

-Low level: if the arithmetic mean of the responses falls between 1.00 and less than 2.00.

The second section consists of two open-ended questions about the challenges of students' use of tools. AI in personalized learning, suggested areas of improvement, and open-ended questions were used for this part because they require a deeper explanatory description.

The validity and reliability of the questionnaire were confirmed in the following ways:

- Content veracity:

The questionnaire was presented in its initial form to a group of eight arbitrators from faculty members specializing in educational technologies. A 75% agreement rate was adopted between the arbitrators on

deletion, addition, and modification according to Lawshe's equation. Three phrases were deleted from the first section of the questionnaire, and the wording of four phrases was modified. The open-ended question regarding suggested areas of improvement was also deleted. Thus, the questionnaire consisted of 10 statements in the first closed section and one question in the open section. The phrases of the first section were distributed at a rate of three phrases (i.e., 3, 7, and 9) for the first axis, three phrases for the second axis (i.e., 4, 5, and 8), and four phrases for the third axis (i.e., 1, 2, 6, and 10).

- Internal consistency:

To ensure the consistency of the questionnaire, it was applied to an exploratory sample other than the main study sample, consisting of 40 male and female students, distributed equally across the three universities. Then, Pearson correlation coefficients were calculated between the statements and their axes, as well as the correlation of the axes with the total score. Table 1 shows the results.

Table 1 Pearson correlation coefficients between statements and their axes (n = 40)

First dimension: Use of AI tools		Second dimension: Benefits and educational impact			Third dimension: Future trends and acceptance
N	Correlation	N	Correlation	N	Correlation
3	0.826**	4	0.850**	1	0.602**
7	0.666**	5	0.781**	2	0.662**
9	0.643**	8	0.793**	6	0.800**
				10	0.829**
Correlation with total score					
0.826**		0.880**			0.753**

**Correlation is significant at the 0.01 level.

Table 1 shows that the questionnaire phrases are related to their axes with correlation coefficients with values ranging between 0.602 and 0.850. Moreover, the three axes are

associated with the total score with correlation coefficients that range between 0.753 and 0.880, all of which are statistically significant values at the 0.01 level, which confirms the participation of the phrases in measuring the concept of its dimensions and the participation of the dimensions in measuring the general theme of the questionnaire in an integrated manner.

-Resolution stability:

The stability of the questionnaire dimensions was confirmed using Cronbach's alpha, with the overall reliability calculated using stratified coefficient alpha. The stability of the dimensions and the questionnaire as a whole was confirmed using McDonald's omega. Table 2 shows the results.

Table 2 Reliability coefficients of the questionnaire (n = 40)

Dimensions	Number of items	Cronbach's alpha	McDonald's Omega
First dimension: Use of AI tools	3	0.785	0.814
Second dimension: Benefits and educational impact	3	0.793	0.794
Third dimension: Future trends and acceptance	4	0.801	0.797
Total reliability	10	0.800	0.831

Table 2 shows that the reliability values for the dimensions ranged between 0.785 and 0.814 and the overall reliability values reached 0.800 and 0.831 for the two methods, indicating the stability of the questionnaire when it is re-applied to other samples from the study population.

Results and Discussion:

Data Analysis:

Quantitative data were processed using the SPSS statistical package, descriptive questions were answered using the arithmetic mean, and differences were calculated

using the Mann–Whitney nonparametric test due to the nonnormal distribution of the data.

Qualitative data are processed objectively. In the first stage, it was divided into themes, and the initial codes were assigned. Then, the main categories were extracted in the second stage. In the third stage, the categories were combined to form the main themes that explain the challenges, which were arranged according to their frequency and emphasis in the responses.

Q1: Presentation and discussion of the results of the first question

The first question was, “What is the level of Saudi university students’ use of AI tools in personalized learning?” The arithmetic means and standard deviations of the responses were extracted on the first axis of the questionnaire. Table 3 shows the results.

Table 3 Arithmetic averages of the response on the axis of the level of use of AI tools in personalized learning (n = 456)

Number	Phrase	Mean	Std. deviation	Level
1	I regularly use AI tools for personalized learning.	2.94	0.645	Medium
2	AI-based personalized learning tools offer many features that support learning (e.g., real-time feedback, adaptive content, interactive simulations, and personalized recommendations).	2.66	0.620	Medium
3	I trust the accuracy of the educational content provided by AI tools during personalized learning	2.84	0.631	Medium
Overall level		2.81	0.622	Medium

Table 3 shows that the level of Saudi university students’ use of AI tools in personalized learning was

average, as the overall arithmetic average reached 2.81, and all sub-phrases were average, as their arithmetic averages ranged between 2.66 and 2.94.

This average level of students' use of AI tools in personalized learning is somewhat logical as these tools are still in their infancy. However, their use is still increasing unexpectedly, and students are still exploring their capabilities and benefits, which is why they use them cautiously, particularly in light of the concerns related to the accuracy of information and confidence in AI's outputs. This is a balanced trend in use as the students neither completely reject AI tools nor depend entirely on them. This result is consistent with the diffusion of innovations theory, which indicates that individuals initially have the necessary knowledge about innovations and that they do not tend to adopt them until after experimentation. This result indicates that their adoption is cautious and any expanded use is based on practical applications that confirm the validity of theoretical knowledge about these innovations.

Q2: Presentation and discussion of the results of the second question

The second question states, "What is the level of positive impact of Saudi university students' use of AI tools on their personalized learning?" The arithmetic means and standard deviations of the responses on the second axis of the questionnaire were extracted. Table 4 shows the results.

Table 4 Arithmetic averages of the response on the axis of benefits and impact of using AI tools in personalized learning (n = 456)

Number	Phrase	Mean	Std. deviation	Level
1	Using AI tools for personalized learning provides me with many educational benefits (e.g., improved comprehension, increased engagement, time management, and enhanced personalized learning ability).	3.61	0.880	High
2	Using AI tools has enhanced my awareness of the importance of personalized learning within my university education experience.	3.54	0.561	High
3	The use of AI positively impacts my personalized learning experience.	3.30	0.614	High
Overall level		3.48	0.514	High

The results show that Saudi university students were highly aware of the benefits and positive impact of using AI tools on their personalized learning. The overall arithmetic average reached 3.48, and all sub-phrases appeared at a high level, with arithmetic averages ranging between 3.30 and 3.61.

These results confirm the highly positive impact of students' use of AI tools, indicating that the initial experimental uses of these tools increased students' awareness and sense of their importance and the difference they make in their personalized learning. Although they use AI tools cautiously and without expansion, AI tools brought added value owing to their potential to improve students' understanding of educational content, contribute to time management, and allocate learning while providing immediate support, which enhances their ability to self-

learn. These are more influential and tangible factors compared with traditional learning.

Q3: Presentation and discussion of the results of the third question

The third question states, “What is the level of acceptance and positive attitude among Saudi university students toward the continued use of AI tools in personalized learning in the future?” The arithmetic means and standard deviations of the responses on the third axis of the questionnaire were extracted. Table 5 shows the results.

Table 5 Arithmetic averages of the response on the axis of acceptance and the positive tendency to use AI tools in personalized learning in the future (n = 456)

Number	Phrase	Mean	Std. deviation	Level
1	I am satisfied with the use of AI tools in personalized learning.	3.29	0.602	High
2	I recommend that my colleagues use AI-based personalized learning tools.	3.41	0.605	High
3	AI tools can be an effective alternative to traditional teaching methods in the near future.	2.86	0.829	Medium
4	I intend to continue using AI-based personalized learning tools in the future.	3.54	0.588	High
Overall level		3.27	0.482	High

The results show a high level of acceptance of Saudi university students and positive attitudes toward the continued use of AI tools in personalized learning in the future. The overall arithmetic mean reached 3.27, and most of the sub-phrases appeared at a high level, with the exception of the phrase “AI tools can constitute an effective alternative to traditional teaching methods in the near future,” which appeared at a medium level.

The high overall level of this axis can be attributed to the positive personal experience of students in using these tools in learning. Its impact clearly appears in their high satisfaction, their recommendation to use them, and their intention to continue using them in the future. Students consider AI a good educational assistant. However, they do not see it as a substitute for the human educational relationship and its characteristic social interaction, including moral guidance, critical discussions and dialogues, and the development of various communication skills, thinking, and other social educational values. The results were based on a qualitative analysis of the challenges, during which the students emphasized the loss of human interaction in the educational process.

These results are generally consistent with the technology acceptance model (TAM), which indicates that the perceived usefulness of technology for individuals is a major factor in their acceptance of it and their positive inclination or intention to use it. The results of the second question showed a high awareness of the importance of using AI tools in personalized learning. The results of the third question showed acceptance of these tools and positive trends toward continued use in personalized learning in the future, but the challenges surrounding their use academically result in an average level of use.

Q4: Presentation and discussion of the results of the fourth question

The fourth question states, “What are the challenges facing Saudi university students when using AI tools in personalized learning?” The students’ answers to the open-ended question on challenges were analyzed objectively,

with 161 male and female students mentioning the presence of certain challenges, whereas the rest of the sample students indicated that there were no challenges, and some of them chose not to answer.

Four main topics that represent the most important challenges of using AI tools in students' personalized learning can be identified by analyzing the results. The following are presented in order of importance:

- Weak confidence in the data, its accuracy, and lack of guarantee of its quality, which represent the most important challenges, with a 53.4% agreement rate among students who emphasized the following sub-problems related to this challenge:

- Inaccuracy and the presence of errors, as students mentioned some indicators of this ("you sometimes get wrong answers," "AI tools often give inaccurate information," and "wrong information").

- Lack of sources and references. In this aspect, they referred to "not referring to reliable sources," "contradicting information without a proven reference," and "sometimes giving unreal references, which makes the information lose its academic credibility."

- Doubt and mistrust, as they mentioned some of their doubts, such as "worry about the information and whether its references are real" and "doubt about the correctness of the answer."

- Misinformation and variation from the topic. Among their evidence of this is "AI answers another topic" and "it distracts me."

- Difficulty communicating with AI tools and interacting with them, meaning that the interface for communicating

with the tool is not smooth enough to make it accurately understand what is required. This challenge was agreed upon by 41.3% of the students, who identified the most important problems associated with it as follows:

- AI tools do not understand human commands. Among the things they pointed out in this regard are “the difficulty of communicating the question as I want,” “it does not understand our actual needs,” and “the prompts must be repeated and refined to produce a better result.”
- Inappropriateness of some AI outputs, such as “difficulty understanding some answers,” “ambiguity of some results,” and “sometimes provides explanations different from what is required.”
- The problem of supporting the Arabic language; some participants pointed out that “some AI tools deal poorly with the Arabic language” and “inaccurate translation of terms.”
- Educational challenges, agreed upon by 35.1% of students, believe that using AI tools in personalized learning has multiple negative effects, such as the following:
 - Complete dependence on AI instead of thinking. “I rely on it completely ... I rarely use my thinking skills,” “laziness,” and “weak thinking skills.”
 - Loss of human interaction in the educational process as students indicated that AI led to “a lack of direct human interaction” and “lacks the ability to communicate compared with a real teacher or colleague.”
 - Superficial and nonspecialized content. Students indicated that the content it provides is “very superficial,” “does not distinguish the level of the

learner,” and is “nonspecialized,” in addition to the “similarity of the content.”

-Challenges and obstacles to accessing AI tools, which were agreed upon by 30.4% of students as they believe that some technical and material obstacles limit access to and benefit from these tools or reduce their efficiency, including:

-Complete dependence on the internet as “there must be a permanent strong connection to the Internet to access AI tools” and it is not possible to benefit from them in the event of a “slow or interrupted network.”

-The inappropriate financial cost for students in most AI tools used in personalized learning as students see that “the prices are high” with “limited free features.”

-Limited specialized AI tools that can provide documented information in specific specializations.

The issues given in the participants’ responses indicate several significant characteristics, the first of which is the students’ comprehension of the nature of the challenges they confront while employing AI technologies. According to Alammari's (2025) findings, students are able to understand the significance of using AI tools in personalized learning. Furthermore, the study’s findings illustrate the impact of AI tools on their schooling. In agreement with Sullivan et al. (2023), in this study, students who are attuned to the use of AI tools in their personalized learning combine their interest and eagerness to use these tools, but they are also aware of the negative impact, such as a lack of confidence in the data. The students’ use of AI tools enables them to evaluate them objectively. They were able to identify the most significant issues associated with the applied usage process, such as

the difficulty of communicating and interacting with AI tools, which are not comparable to human communication and interaction. To date, AI tools have failed to understand human commands in a clear and correct manner, resulting in noticeable inaccuracies in their outputs and interpretation processes, as well as a detrimental impact on the quality of the data and outcomes.

Q5: Presentation and discussion of the results of the fifth question

The fifth question states, “Are there statistically significant differences between the averages of the sample members’ responses to the questionnaire on the reality of Saudi university students’ use of AI tools in personalized learning due to differences in specialization?” The nonparametric Mann–Whitney test was used due to the absence of the moderation condition. Table 6 shows the results.

Table 6 Results of the Mann–Whitney test for differences between responses in light of the difference in specialization (n = 456)

Dimensions	Specializations	N	Mean rank	Sum of ranks	Mann–Whitney U	Z	Asymp. Sig.
First dimension: Use of AI tools	Humanities	225	217.26	48883.5	23458.5	-1.831	0.067
	Applied	231	239.45	55312.5			
Second dimension: Benefits and educational impact	Humanities	225	205.64	46269.5	20844.5	-3.773	0.000**
	Applied	231	250.76	57926.5			
Third dimension: future trends and acceptance	Humanities	225	203.04	45684.5	20259.5	-4.124	0.000**
	Applied	231	253.30	58511.5			

**Correlation is significant at the 0.01 level.

Table 6 shows that there are no statistically significant differences between the averages of the sample students’ responses on the axis of the level of use of AI tools in personalized learning, where its asymp. sig is greater than

0.05, whereas statistically significant differences were found in the three axes: benefits and educational impact, positive trends, and continued use in the future. The differences were statistically significant at the 0.01 level, and a review of the mean ranks shows that the differences tended to favor students of applied specializations. This trend can be attributed to the procedural nature of these specializations, which makes them more appropriate to what these tools are proficient in and their ability to deal with scientific concepts and facts, equations, and codes more accurately than with feelings, personal, and human aspects. This case increases the perceived benefit among students of applied specializations and strengthens their acceptance and future orientation to using AI tools. The lack of statistically significant differences in the level of actual use may be due to the fact that AI tools are available to all students regardless of their specializations as access capabilities and challenges are similar for all students.

The results are steady with prior studies. For example, Alammari (2025), Mejei et al. (2024), and Xia et al. (2024) stated that students used AI tools at the high level in their individualized learning in Q1. All described that students increased their use of AI tools and explored new tools to take advantage of them. In addition, the Q2 results determine that Saudi students believe that the use of AI tools enhances their personalized learning, which is consistent with Xia et al. (2024) in terms of faster and improved reporting and assessment at world level. Likewise, the students in this study show a considerable level of acceptance of AI tools and the ability to differentiate between AI and traditional tools, as evidenced by the Technology Acceptance Model (TAM) results for

Q3. Mariano et al. (2025) show that the future of AI tools is likely to be even more receptive to learners. As for the fourth question, Saudi students refer to facing similar challenges to those found in previous studies (Guettala et al., 2024; Zawacki-Richter et al., 2024) including access, digital literacy, language barriers, cautious integration, and ethical considerations. Also, the answers to Q5 indicate little change in the use of AI tools across different specializations, suggesting the need for further research on the effect of academic major as also suggested by Alammari (2025).

Conclusion:

Overall, the findings confirm the results of previous studies in other regions or with students from various backgrounds. For example, Mariano et al. (2025) discovered that students have a positive attitude toward AI use in their learning experience, confirming the answer to the first question of this study. It is also assisted by the theoretical framework that guides the investigation, such as the diffusion of innovations theory. For Q2, the findings confirm the researcher's results in the initial experimental and aligns with previous studies (e.g., Alammari, 2025; Mejeh et al., 2024; Xia et al., 2024) showing that students prefer to use AI tools due to their impact on and benefits for their learning, such as enhanced academic and personalized learning, time management, and engagement.

Moreover, for Q3, the results surpass earlier work in this area in terms of acceptance and positive attitude toward using AI tools regardless of the challenges or level of adoption in their formal education system with regard to personalized learning. Also, they are aware of how AI tools hinder personalized learning if not used well, such as the

absence of the human aspect of the educational experience, which means AI tools are still far from replacing traditional education. This finding is consistent with TAM, which is key to students' positive attitude and acceptance of AI tools. Furthermore, this finding demonstrates excellent agreement in future trends and acceptance for AI in personalized learning. Xia et al. (2024) highlighted one example of the usefulness of AI in providing effective feedback, which increased the number of independent studies and supported the findings of this study. Guettala et al. (2024) explained that adoptive AI tools pave the way and cultivate learning among students because of the level of acceptance. Finally, in Q4, the challenges faced by Saudi students are not different from those faced around the world. However, due to the exception of a specific population of this study, namely, Saudi Arabian students who are native Arabic speakers, the findings are challenged by Arabic content. Furthermore, in answering Q5, it is unsurprising to find a none considerable difference in students of applied specializations and that agree by Alammari (2025).

In summary, Saudi Arabian university students use AI tools in their personalized learning, which have a highly positive effect on their learning experience, and are also aware of challenges posed by AI tools and are willing to continue using them.

Recommendations:

- Help students improve their use of AI tools in their personalized learning.
- Decreasing challenges of AI tools to enhance their usage in students' personalized learning, such as offering more effective Arabic language AI tools.

- Enhance formal education on using AI tools, such as teaching how to create AI prompts; engineering prompts will impact personalized learning.
- Give students the opportunity to employ AI techniques to enhance personalized learning while preparing for any course missions.

Limitations of the Study:

One limitation of this study is the sample size, which includes only a few students. Thus, the result might not be generalizable for all students in universities in Saudi Arabia. Any limitations can be overcome by conducting statistical work, enhancing the validity and reliability of the method, using the mixed-method approach, deepening the data analysis, and increasing understanding of the topic.

Future Work:

AI is reshaping education and shifting learning to empower personalizing, support self-directed learning. Future research can be expanded to all students who engage in techniques other than personalized learning and are studying different subjects. One limitation of this study is the sample used; future research can include more students in different types of universities and with different majors. Moreover, Arabic language content can be incorporated in AI-driven personalized learning.

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