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Nursing Students' Knowledge and Attitudes Regarding Artificial Intelligence

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ABSTRACT

Background: The integration of Artificial Intelligence (AI) into healthcare education and practice is becoming increasingly prevalent. As future healthcare providers, nursing students' perceptions, knowledge, and attitudes toward AI technologies significantly influence their acceptance and utilization of these tools in clinical settings. **Objectives:** This study aimed to examine nursing students' knowledge and attitudes regarding Artificial Intelligence (AI), thereby providing critical insights that could guide future integration of this revolutionary technology into healthcare practices. **Methods:** This study employed a quantitative cross-sectional design, recruiting 250 nursing students via a convenience sample technique. The current study was conducted at the Kufa Technical Institute, Al-Najaf Governorate, Iraq. The study duration was seven months, starting in November 2024 and ending in May 2025. Data collection was carried out using a self-administered questionnaire that assessed participants' knowledge of artificial intelligence and their Attitudes Toward Artificial Intelligence (ATAI), both of which were tested for reliability and validity. A pilot study confirmed the feasibility of the tools. Statistical analysis involved both descriptive and inferential statistics to explore the demographic influences on AI knowledge and attitudes, using a significance level of $p < 0.05$. **Results:** The study revealed that the participants had a mean age of 20.88 years (SD = 0.63) and a median age of 21 years. Furthermore, the results provided vital information about nursing students' perceptions regarding AI technology, highlighting a critical gap in training that must be addressed to foster a workforce adept at utilizing AI effectively while preserving the essential human elements of nursing care. **Conclusion:** The results suggest that, while nursing students recognize the potential benefits of AI in healthcare settings, a significant gap remains in their knowledge and training regarding its application.

Keywords: Attitudes; Artificial Intelligence; Knowledge; Nursing Students, Technology Model

INTRODUCTION

The integration of Artificial Intelligence (AI) into healthcare education and practices is becoming increasingly prevalent. As future healthcare providers, nursing students' perceptions, knowledge, and attitudes toward AI technologies significantly influence their acceptance and utilization of these tools in clinical settings. Understanding these factors provides a framework for analyzing perceived usefulness and ease of use determine technology acceptance. It asserts that perceived usefulness and perceived ease of use are fundamental predictors of individuals' intentions to utilize technology. Scherer *et al*. (2019) demonstrated that the AI effectively explains educators' adoption of digital technologies, emphasizing the relevance of these constructs in educational contexts. This foundational understanding suggests that similar principles can be applied to nursing students' acceptance of AI tools.

Studies indicate that nursing students exhibit varied attitudes towards AI technologies, similar to those of their counterparts in other educational fields. Sit *et al*. (2020) surveyed UK medical students, revealing that while there is recognition of AI's potential, concerns persist about its implications for clinical practices. Similarly, Cajita *et al*. (2017) found that perceived ease of use and usefulness are critical factors that influence healthcare professionals' intention to adopt mobile health technologies. These findings emphasize the

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importance of addressing concerns and promoting positive attitudes toward AI in nursing education. Chocarro *et al.* (2023) explored teachers' attitudes toward chatbots in education, concluding that perceived usefulness and ease of use significantly influence acceptance. This suggests that nursing students may have analogous attitudes toward AI tools, such as chatbots, which could enhance their learning experiences.

A consistent theme across the literature is the role of perceived usefulness and ease of use in shaping attitudes toward the acceptance of technology. Vanduhe *et al*. (2020) highlighted how these factors influence the continuance intentions to use gamification in higher education, suggesting that similar motivational factors could be present among nursing students regarding AI technologies. If nursing students perceive AI tools as beneficial and user-friendly, they are more likely to incorporate these technologies into their education and future practice. Additionally, Shorey *et al*. (2019) examined the use of virtual patients (VPs) in nursing education and emphasized that perceived self-efficacy is vital for successful technology integration. This finding aligns with the AI framework, suggesting that enhancing nursing students' confidence in using AI tools facilitates acceptance.

Despite these insights, a significant knowledge gap persists. While the adoption of AI tools has been explored among practicing healthcare professionals and medical students, there is a dearth of research focusing specifically on the drivers of AI acceptance among nursing students. Existing studies often report general attitudes or knowledge levels but do not systematically measure and link the core concepts of perceived benefits, perceived usability, and adoption intention to the unique context of nursing education and future practice (Al-Adwan *et al*., 2023). It remains unclear how nursing students' existing knowledge of AI influences their perceptions and shapes their overall acceptance. Therefore, a study that explicitly investigates these key drivers is necessary to provide a more profound understanding of the factors that will facilitate or hinder AI integration in nursing.

This study aims to fill this gap by examining nursing students' knowledge and attitudes regarding artificial intelligence. Specifically, it seeks to assess their level of AI knowledge, measure their perceptions of AI's benefits and usability, and determine their intention to adopt AI in healthcare. By analyzing these dimensions and their relationship with demographic factors, this study will provide critical insights to guide the effective and sustainable integration of AI into nursing education and future clinical practice. The study also aimed to determine the correlation between demographic factors and nursing students' attitudes towards AI-integrated tools.

METHODOLOGY

This study employed a quantitative cross-sectional design to assess nursing students' knowledge and attitudes toward Artificial Intelligence (AI), with a focus on its application in clinical practice. A cross-sectional design was chosen because of its effectiveness in capturing a snapshot of the participants' perceptions and understanding at a single point in time. This methodology enables the collection of data that can be analyzed to identify patterns and correlations among the variables of interest (Khaled & Elborai, 2024). This study sought to elucidate nursing students' perceptions of AI technologies and their prospective integration into healthcare environments by analyzing these dimensions.

This study was conducted at the Kufa Technical Institute, Iraq. The institute comprised four scientific departments: medical surgical nursing departments, community health nursing departments, psychiatric/mental health nursing departments, and nursing administration departments. The study sample consisted of 250 nursing students recruited using a convenience sampling technique. The study participants were first- and second-stage nursing students enrolled in the Nursing Department at the Kufa Technical Institute in the Middle Euphrates region of Iraq during the 2024–2025 academic year. The selection of this cohort was based on the premise that these students are at a critical stage in their education where exposure to advanced technologies, including AI, can significantly influence their future professional practices.

Nevertheless, the inclusion criteria required participants to be currently enrolled in the nursing program and complete foundational nursing and healthcare technology coursework. Students whose academic enrollment was in disciplines apart from nursing were excluded. Informed consent was obtained from all participants prior to data collection, ensuring that they understood the purpose of the study, the voluntary nature of their participation, and their right to withdraw at any time, without penalty.

The data collection process involved two primary instruments: A Knowledge Regarding Artificial Intelligence Questionnaire and the Student Attitudes Toward Artificial Intelligence (SATAI) scale. These instruments were developed to comprehensively assess participants' knowledge and attitudes regarding AI in healthcare.

Knowledge regarding the Artificial Intelligence Questionnaire: This instrument was designed to evaluate participants' understanding of AI concepts, applications, and implications in clinical practice. The questionnaire consisted of 20 multiple-choice questions covering various topics, including definitions of AI, types of AI technologies, and their potential use in healthcare settings. Each question was formulated to assess the depth of knowledge and comprehension of AI among nursing students. The questionnaire was pilot tested with a small group of nursing students to ensure clarity, relevance, and appropriateness. Feedback from the pilot test was used to refine the instrument prior to its final implementation.

Basic AI Concepts (5 items): Assessing fundamental knowledge of AI definitions, types, and capabilities. AI Applications in Healthcare (7 items): Evaluating understanding of AI use in diagnosis, treatment planning, and patient monitoring. Clinical Implementation (5 items): Measuring knowledge of how AI integrates into clinical workflows and decision-making. Ethical Considerations (3 items): Assessing awareness of privacy, bias, and ethical implications of AI in healthcare. Each question had one correct answer, and the total knowledge score was calculated as the sum of correct responses, with a possible range of 0 to 20. Scores were categorized as: Low (0-10), Moderate (11-15), and High (16-20). The questionnaire demonstrated content validity through expert review by three nursing informatics specialists and was pilot tested with a small group of nursing students to ensure clarity, relevance, and appropriateness. Feedback from the pilot test was used to refine the instrument prior to its final implementation.

Student Attitudes Toward Artificial Intelligence (SATAI): This scale was developed to measure students' attitudes toward integrating AI technologies in clinical practice. There were 26 Likert-type items on this scale, with answers ranging from "strongly disagree" to "strongly agree." The items were designed to capture various dimensions of attitude, including perceived usefulness, perceived ease of use, and overall acceptance of AI technologies in nursing. 15 The SATAI scale was also pilot-tested to establish its reliability and validity; it represents an artificial intelligence knowledge questionnaire with a Cronbach's alpha coefficient of 0.85 and student attitudes toward artificial intelligence (0.87), indicating satisfactory internal consistency.

Scores for each domain were calculated as mean item scores, with higher scores indicating more positive perceptions. The overall attitude score was computed as the mean of all 26 items. The SATAI scale was pilot-tested to establish its reliability and validity, demonstrating a Cronbach's alpha coefficient of 0.87 for the entire scale, with subscale reliabilities of 0.85 for Perceived Benefits, 0.82 for Perceived Usability, and 0.84 for Adoption Intention, indicating satisfactory internal consistency.

Pilot Study

At the start of February 2025, a pilot study was conducted among 25 nursing students, making up ten percent of the study sample. Its purpose was to assess the tools' feasibility, practicability, clarity, and the time required to complete them. The questionnaires took between 15 and 20 minutes to finish. Following the outcomes of the pilot study, no modifications were made. Participants of the pilot study were excluded from the main study sample.

Data Collection Procedure

Data collection was conducted over a two-week period, during which participants completed the questionnaires in a controlled environment, such as a classroom or a designated study area within the Kufa Technical Institute. The researchers ensured that all participants had access to the necessary materials, such as pens and paper, and that the environment was conducive to the focused completion of the questionnaires.

Prior to administering the self-administered questionnaire, a brief orientation session was held to explain the purpose of the study, the importance of AI in nursing, and the significance of their participation. Participants

were assured of the confidentiality and anonymity of their responses, which were collected in sealed envelopes to further protect their privacy. Once the questionnaire was completed, the responses were collected and stored securely for analysis. The data collection process was closely monitored to ensure adherence to ethical standards and to maintain the integrity of the study process.

Data Analysis

Data analyses were performed using statistical software (SPSS version 26). Descriptive statistics were employed to summarize the demographic characteristics of the participants, including age, gender, and prior exposure to AI technologies. Knowledge scores were calculated on the basis of the number of correct responses to the Knowledge Regarding Artificial Intelligence Questionnaire, with higher scores indicating greater knowledge. Inferential statistics, such as *t*-tests and ANOVA, were employed to investigate the differences in knowledge and attitudes across demographic variables. Correlation analyses were conducted to explore the relationships between knowledge and attitudes towards AI technologies. A significance level of $p < 0.05$ was established for all statistical tests.

Ethical Consideration

Ethical approval for the study was obtained from the Institutional Review Board (IRB) of the Kufa Technical Institute, Iraq, prior to the commencement of data collection, with reference number 1854 dated 14th November, 2024.

Informed consent was obtained from all participants to ensure that they were fully aware of the aims of the study, procedures, and potential risks. Participants were informed that their participation was voluntary and that they had the right to withdraw at any time, without affecting their academic standing. Confidentiality was maintained throughout the study by assigning unique identification numbers to each participant, thereby ensuring that individual responses could not be traced back to them. The data were stored securely and were accessible only to the research team. The findings of this study will be disseminated in aggregate form, ensuring that no individual participants can be identified.

RESULTS

Table 1: Sociodemographic Characteristics of Study Participants

Characteristic	Number	Percentage (%)
Age Group (years)		
Less than 20	44	17.6%
20 - 22	178	71.2%
≥ 22	28	11.2%
Mean ± SD	**20.88 ± 0.63**	
Median Age	**21**	
Sex		
Male	76	30.4%
Female	174	69.6%
Marital Status		
Single	196	78.4 %
Married	54	21.6 %
Stage Education		
First stage	23	9.2%
Second stage	227	90.8%
Educational Level of Parents		
Educated	163	65.2%
Illiterate	87	34.8%
Residence		
Urban	171	68.4%
Rural	79	31.6%
Total Number of Participants	**250**	**100 %**

Table 1 shows that the mean age was 20.88 years (SD = 0.63), with a median age of 21 years. The majority of participants (71.2%) were aged between 20 and 22 years, while 17.6% were less than 20 years old, and

11.2% were 22 years or older. The sample was predominantly female (69.6%), with (30.4%) male participants. Most respondents were single (78.4%), and the educational stage indicated that a significant majority (90.8%) were in the second stage of their nursing education. Regarding parental education, 65.2% of the students reported having educated parents, while 34.8% had illiterate parents. In terms of residence, 68.4% of the participants lived in urban areas, whereas 31.6% resided in rural regions.

Table 2: Descriptive Statistics for Knowledge and Attitude Domains

SATAI Domains	Mean	SD	*P*-Value
Perceived Benefits	3.8	0.7	0.001
Perceived Usability	3.5	0.8	0.001
Adoption Intention	3.1	0.9	0.080
Knowledge Score	14.2	2.8	0.001

Table 2 presents the descriptive statistics for the main study variables. The mean knowledge score was 14.2 (SD=2.8) out of 20, indicating a moderate level of AI knowledge. For the attitude domains, Perceived Benefits had the highest mean score (3.8/5), followed by Perceived Usability (3.5/5). Adoption Intention had the lowest mean score (3.1/5), suggesting some reluctance to actively use AI in future practice.

Table 3: Nurses' Knowledge and Attitudes toward AI in Healthcare

Statement	Disagree n (%)	Neutral n (%)	Agree n (%)
Knowledge about AI			
I have good knowledge of artificial intelligence (AI)	30 (15.0%)	70 (35.0%)	150 (50.0%)
I am interested in using artificial intelligence systems in my daily life	84 (42.0%)	46 (23.0%)	120 (35.0%)
AI could substitute me in my study	182 (91.0%)	4 (2.0%)	14 (7.0%)
I have hopes for AI applications in the study	28 (14.0%)	72 (36.0%)	150 (50.0%)
Advantages of Using AI			
AI can improve the practice of healthcare	46 (23.0%)	22 (11.0%)	182 (66.0%)
AI can decrease the number of medical mistakes	36 (18.0%)	42 (21.0%)	172 (61.0%)
AI can offer clinically relevant, high-quality data	30 (15.0%)	32 (16.0%)	188 (69.0%)
AI has no space-time limitation	50 (25.0%)	74 (37.0%)	126 (38.0%)
AI can offer clinically relevant, high-quality data	30 (15.0%)	32 (16.0%)	188 (69.0%)
AI has no space-time limitation	50 (25.0%)	74 (37.0%)	126 (38.0%)
Application of AI in Healthcare			
AI cannot be used to offer ideas in unexpected conditions	52 (26.0%)	60 (30.0%)	138 (44.0%)
AI is not flexible enough to be useful for every patient	62 (31.0%)	24 (12.0%)	164 (57.0%)
AI is difficult to apply to arguable subjects	42 (21.0%)	46 (23.0%)	112 (56.0%)
AI has a low capability to empathize and reflect the emotional well-being of the patient	64 (32.0%)	28 (14.0%)	158 (54.0%)
A specialist with slight clinical experience in medical practice established AI	58 (29.0%)	66 (33.0%)	126 (38.0%)
Total Number of Participants	**250**	**100 %**	

Table 3 presents the assessment of nurses' knowledge and attitudes toward artificial intelligence (AI) in healthcare, revealing mixed perceptions. While 50% of the participants felt they had good knowledge of AI, a significant portion (42%) expressed disinterest in using AI systems in their daily lives. Conversely, 66% agreed that AI could improve healthcare practices, and 61% acknowledged that AI could reduce medical errors. However, a notable 91% disagreed with the notion that AI could substitute them in their studies, indicating a lack of confidence in AI's potential to replace human roles.

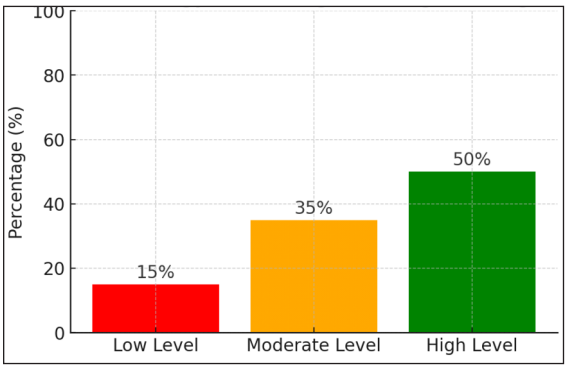

Figure 1: Artificial Intelligence Technology Knowledge among Study Participants

This bar graph illustrates the distribution of participants across three distinct levels of a measured characteristic. The data reveal that half (50%) of the participants are at a Moderate Level, representing the largest group. A significant portion (35%) falls into the High-Level category, while a smaller segment (15%) is at the Low Level (Figure 1).

Table 4: Nursing Students' Perception of AI

Items	High		Moderate		Low	
	No.	%	No.	%	No.	%
The syllabus should include some basic knowledge of AI	40	16.0	169	67.6	41	16.4
AI should be educated in the undergraduate program	17	6.8	202	**80.8**	31	12.4
I have some knowledge about AI	35	14.0	178	71.2	37	14.8
I was trained and educated on AI	23	9.2	165	66.0	62	24.8
I am knowledgeable about AI through news, posters, media, and social networking sites	30	12.0	188	75.2	32	12.8
I know about AI, but I don't apply this knowledge with great sureness	55	22.0	146	58.4	49	19.6
I am excited about what AI means and would like it to be present in all nursing practices	12	4.8	197	78.8	41	16.4
The use of AI will change the nature of healthcare practices	22	8.8	175	70.0	53	21.2
Total Number of Participants	**250**		**100 %**			

Table 4 presents the exploration of the participants' perceptions regarding the integration of AI into nursing education. The majority (80.8%) believed that AI should be included in the undergraduate curriculum, and 71.2% reported having some knowledge of AI, although only 9.2% felt adequately trained in its application.

Table 5: Difference in Nurses' Attitudes Toward the Integration of Artificial Intelligence Technology in Nursing Practices

Attitude	N	Mean	Mean Difference	*df*	*T*-test	*P*-Value	Significant (Between Groups)
Negative	65	2.43	0.19	248	2.64*	0.008	**H. S**
Positive	185	2.62					

**95% confidence level H. S: Highly significant*

Table 5 shows that most participants had positive attitudes toward incorporating AI in clinical practice.

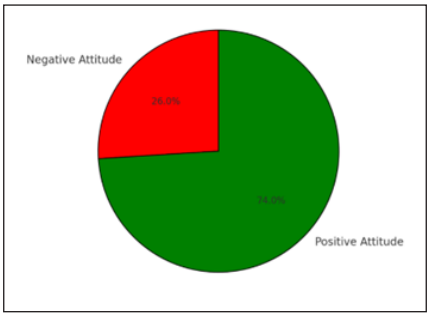

Figure 2: Artificial Intelligence Attitudes among Nursing Students

Figure 2 summarizes the distribution of attitudes within a surveyed group, revealing a predominantly favorable sentiment. The data indicate that positive attitudes constitute the overwhelming majority at 74%, while negative attitudes represent a smaller, yet significant, minority at 26%. This distribution suggests that, while the overall perception is strongly positive, a substantial portion—over one-quarter of the group—has negative views that highlight key areas for improvement or underlying issues that require further investigation and targeted intervention.

Table 6: Demographic Variables and Nursing Students' Attitudes Toward AI

Variable	Category	Negative n (%)	Positive n (%)	χ^2 / *p*-value
Gender	Male	30 (12.0%)	46 (18.4%)	$\chi^2 = 4.12$* $p = 0.04$*
	Female	84 (33.6%)	90 (36.0%)	
Marital Status	Single	152 (60.8%)	44 (17.6%)	$\chi^2 = 0.89$ $p = 0.65$
	Married	38 (15.2%)	16 (6.4%)	
Age Group (years)	Less than 20	30 (12.0%)	14 (5.6%)	$\chi^2 = 6.21$* $p = 0.03$*
	20 - 22	120 (48.0%)	58 (23.2%)	
	≥ 22	40 (16.0%)	12 (4.8%)	
Stage of Education	First Stage	16 (6.4%)	7 (2.8%)	$\chi^2 = 3.14$ $p = 0.02$*
	Second Stage	174 (69.6%)	93 (37.2%)	
Educational Level of Parents	Educated	108 (43.2%)	55 (22.0%)	$\chi^2 = 5.67$ $p = 0.07$
	Illiterate	82 (32.8%)	22 (8.8%)	
Place of Birth	Urban	112 (44.8%)	59 (23.6%)	$\chi^2 = 2.91$ $p = 0.08$
	Rural	78 (31.2%)	18 (7.2%)	
Total Number of Participants	**250**		**100%**	

**Statistically Significant (at 95% confidence level)*

Table 6 demonstrates the statistical analysis, which indicates significant differences in attitudes toward AI based on demographic variables. Male students exhibited a more positive attitude (18.4%) than did female students (12.0%) ($p = 0.04$). Younger students (less than 20 years) also had a more favorable attitude compared to older age groups ($p = 0.03$). Furthermore, students in the second stage of their education demonstrated more positive attitudes than did those in the first stage ($p = 0.02$). Although the parents' educational level and place of birth showed trends, they did not reach statistical significance.

DISCUSSION

Several studies have asserted that AI is a useful tool for incorporation in nursing education, as the younger generation relies heavily on technology to enhance its benefits in both theoretical and clinical approaches (Adzim *et al*., 2025; Labrague & Al Harrasi, 2025; Şimşek *et al*., 2025). For instance, many nursing students require prompt answers to address the critical issues they face in their training sessions within complex healthcare settings. Hence, AI provides immediate solutions regarding students' questions. However, the findings of this study provide critical insights into nursing students' perceptions regarding artificial intelligence (AI) in healthcare settings.

The demographic composition of the study sample reveals a predominantly young population with a mean age in early adulthood, alongside a marked female majority, reflecting established patterns in nursing education globally. These characteristics align closely with contemporary nursing cohorts, which consistently demonstrate enrollment skewed toward younger females entering the profession. The similarity to comparative studies, particularly investigations of nursing students' AI ethical awareness and intentions to use technology, validates the representativeness of this sample and suggests that findings may generalize across nursing education contexts. This demographic is particularly significant when examining technology adoption, as age and gender have emerged as meaningful predictors of AI acceptance, with younger cohorts and male participants demonstrating relatively more favorable orientations toward novel technologies in healthcare settings.

Regarding the demographic characteristics of the participants, the findings predominantly consisted of young respondents, with a mean age of 20.88. Female participants constituted the majority, which aligns with

trends observed in nursing education, where the majority of students are typically in their early twenties and predominantly female (Mun *et al*., 2024). Moreover, the present findings are congruent with a study focused on AI ethical awareness, attitudes, anxiety, and intention-to-use AI technology among Jordanian nursing students, which was conducted by Migdadi *et al*. (2024), who found that the mean age of participants was 21.54 and most of their respondents were female.

Despite a significant proportion of students expressing confidence in their knowledge of AI, the notable disinterest in using AI systems highlights a paradox that warrants further exploration. This finding is consistent with previous research, which indicates that while healthcare professionals recognize the potential of AI to enhance clinical practices, they often express apprehension regarding its integration into routine workflows (Topol, 2019). The students' recognition that AI has the capacity to reduce medical errors and enhance healthcare practices demonstrates an awareness of its transformative capabilities. Conversely, their strong disagreement with the prospect of AI replacing human roles highlights persistent concerns regarding job security and the indispensable nature of human clinical judgment in nursing (Davenport & Ronanki, 2018).

Furthermore, a systematic review conducted by Amiri *et al*. (2024) stated that most of the students had a moderate to good level of knowledge about AI with regard to either theory or practices. The authors place great emphasis on incorporating AI educational courses into nursing curricula to meet students' teaching-learning preferences (Amiri *et al*., 2024). Conversely, a study in Egypt by Khaled and Elborai (2024) reported that the highest percentage of their study sample of nursing students had a moderate level of knowledge concerning AI. However, it was also found that nursing students had a low level of knowledge about AI.

Interestingly, demographic analysis revealed that male students and younger participants had more favorable attitudes toward AI. The same results were found in a recent study conducted by Sumengen *et al*. (2025), that noted that male students have a more positive attitude toward AI, and junior students generally exhibit more favorable attitudes toward AI. Another study suggested that gender and age may influence perceptions of healthcare technology (Cohen *et al*., 2020). Furthermore, the inclination wasmore among the students in the second stage of their education to embrace AI positively than their first-stage counterparts. This is indicative of their increased exposure to technological advancements and educational content related to AI. According to many studies included in a systematic review by Sandanasamy *et al*. (2025), younger nursing students have high positive attitudes toward utilizing AI in their educational and training courses.

Nursing students in this study demonstrated sophisticated recognition of AI's potential clinical applications, with the substantial majority acknowledging that AI could effectively reduce medication errors and enhance overall healthcare quality. This acknowledgment reflects emerging evidence demonstrating the utility of AI in clinical decision support, patient safety enhancement, and quality improvement initiatives. However, this optimistic appraisal of AI's clinical benefits coexists with an overwhelming consensus that AI should not and cannot replace human nursing roles, a stance reflecting deep-seated values regarding the irreplaceable nature of human compassion, clinical judgment, and patient-centered care intrinsic to nursing practice. This nuanced perspective is neither technophobic nor uncritically enthusiastic; rather, it demonstrates that nursing students conceptualize AI as a complementary tool rather than a replacement mechanism.

The overwhelming consensus (80.8%) agreed on the necessity of integrating AI into nursing curricula (Table 3), which focuses on the urgent need for educational institutions to adapt their programs to equip future nurses with the requisite skills and knowledge to navigate an increasingly technology-driven health care environment. In the contemporary educational system, the focus should be on motivating the younger generation to properly utilize advanced tools that enable them to move forward. Nursing students have the advantages of content abundance, access to available technology resources, and opportunities for collaboration. AI plays a crucial role in bridging the gap between theory and practice by providing efficient, evidence-based approaches. Some studies have confirmed that AI is widely used in nursing education to make highly critical decisions regarding the provision of high-quality nursing care. This study highlights a critical gap in training that must be addressed to foster a workforce adept at effectively utilizing AI while preserving

the essential elements of nursing care.

Limitations

The study focused on a single educational institution, which may limit the the findings to a broader population of nursing students. Future research should consider longitudinal designs and larger, more diverse samples to enhance understanding of AI acceptance in nursing education.

CONCLUSION

The present study assessed nursing students' knowledge and attitudes toward artificial intelligence in healthcare through the lens of AI. The findings reveal that, although students generally recognize the potential benefits of AI in improving healthcare quality and reducing clinical errors, their overall knowledge remains moderate, and their practical exposure is limited. According to AI, technology uptake is strongly shaped by perceived usefulness and perceived ease of use. In this study, students demonstrated positive attitudes toward AI primarily when they viewed it as beneficial and adaptable to clinical practice. However, concerns about flexibility, empathy, and the replacement of human roles negatively influenced their acceptance. Demographic differences—particularly age, gender, and educational stage—further shaped attitudes, indicating that targeted educational interventions may be required for subgroups with lower acceptance.

Taken together, the importance of integrating structured and competency-based AI education into nursing curricula to enhance both perceived usefulness and perceived ease of use—two central constructs of AI that predict future adoption. Strengthening students' confidence, ethical understanding, and hands-on familiarity with AI tools will be essential for preparing a nursing workforce capable of working effectively alongside emerging technologies. Future research should employ longitudinal and multi-institutional designs to assess the impact of sustained AI-focused instruction on behavioral intention and the practical application of AI in nursing practice. By addressing the identified gaps, educational institutions can ensure that nursing graduates are well-positioned to leverage AI responsibly, ethically, and effectively in modern healthcare environments.

Recommendation

Nursing students generally exhibit positive attitudes toward AI. However, notable knowledge gaps and concerns must be addressed. Nursing curricula should be strengthened by integrating structured AI-focused education that includes practical experience with AI tools, attention to ethical and professional considerations, and strategies to build confidence and readiness for AI-supported practice. Existing AI adoption frameworks should be expanded to incorporate ethical, social, and professional dimensions relevant to nursing. Further research is required to refine theoretical models, evaluate educational interventions, and guide the practical integration of AI into clinical training. Addressing these gaps will support safer, more effective AI adoption and contribute to improved healthcare outcomes.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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