The Research of Medical Science Review

Received: 11 December, 2024
Accepted: 11 January, 2025
Published: 18 January, 2025

ISSN: 3007-1208 | 3007-1216
Volume 3, Issue 1, 2025

DETERMINING UNDERGRADUATE NURSING STUDENTS' READINESS LEVEL TOWARDS ARTIFICIAL INTELLIGENCE IN PRIVATE NURSING COLLEGES AT DISTRICT CHARSADDA, KPK, PAKISTAN

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ABSTRACT

Background: *AI is transforming the health sector through more precise diagnoses, automation of administrative work, and even the most conducive ground for predictive analysis in patient care. This aspect of AI applications has the potential to enhance patient outcomes and decision-making towards quickening clinical operations in nursing. As AI features health care settings, nursing students should not only be prepared but also know how AI will affect their profession upon graduation. In addition, preparedness means not only the knowledge itself, but also the ability to apply concepts in clinical practice and understanding of the ethical issues in the use of AI in patient care. This study focuses on the readiness for AI among undergraduate nursing students in private institutions of Charsadda, KPK, Pakistan, intending to identify knowledge gaps that may impede successful integration of AI into the practice of nursing. It explores the need for readiness among students about health care environments which might be driven by AI so that the educational techniques are built which foster abilities to function effectively in such technologically enhanced health care environments.*

Aim: *To determine undergraduate nursing students' readiness level towards artificial intelligence (AI) in private nursing colleges at Charsadda, KPK.*

Methodology: *The study uses a cross-sectional design and a questionnaire adapted from a study published in 2024 focusing on how prepared undergraduate nursing students are toward artificial intelligence. A Likert scale was used to determine the level of AI readiness among 109 participants, who were third and fourth-year students in undergraduate nursing programs.*

Results: *According to the results, 56.0% of the students showed a medium level of readiness, followed by high readiness (32.1%) and low readiness (11.9%). Even though most students had some prior exposure to AI, there is still a gap between theoretical understanding and real-world application in clinical settings.*

Conclusion: *The study emphasizes the incorporation of AI in nursing education, how to use it practically, and ethical considerations related to AI-driven technologies. This would guarantee that nursing students have the necessary tools to function in healthcare settings powered by AI. Future research should concentrate on longitudinal studies to assess how readiness levels change over time, what factors affect the readiness level, and the long-term effects of AI-ready training on nursing practices.*

Keywords: *Artificial intelligence, AI readiness, nursing education, healthcare technology, nursing students, clinical application, ethical considerations, Pakistan, Charsadda, educational strategies*

INTRODUCTION

1.1 Background:

Artificial intelligence (AI) technologies are anticipated to be used more often in nursing education by academics and students as technology evolves (1). According to John McCarthy, one of the pioneers of the field, AI is the science and engineering of creating intelligent machines, particularly clever computer programs. The meaning of artificial intelligence has evolved throughout time, and it is currently undefined (2). However, according to a recent study conducted by the European Commission, artificial intelligence may be defined as "software (and possibly also hardware) systems designed by humans that, given a complex goal, act in the physical or digital dimension by perceiving their environment through data acquisition, interpreting the collected structured or unstructured data, reasoning on the knowledge, or processing the information, derived from this data and deciding the best actions to take to achieve the given goal"(3).

Readiness describes individuals' preparedness for new technology. The emergence of a new behavioral change in the educational setting depends upon the learner's preparedness. Additionally, being prepared is essential for helping nursing students adjust to new advancements in healthcare technology (4).

The application of AI to the provision of healthcare services is expanding quickly (5). Artificial intelligence is quickly becoming a part of healthcare, changing how services are provided and improving patient outcomes. AI is quickly becoming a necessary component of modern healthcare, from machine learning-powered personalized treatment plans to diagnostic tools that assist physicians in making more accurate diagnoses. In medicine, it's about improving the human experience, not just about technology. AI helps healthcare workers focus more on providing direct patient care by automating repetitive chores, which enhances the relationship between patients and caregivers. This increasing AI integration aims to improve healthcare accessibility, effectiveness, and, ultimately, compassion. AI is quickly adapting in healthcare, and patients get better outcomes from it as it shows its capability to make more accurate diagnoses and reduce the chances of misdiagnosis. AI helps improve the relationship between caregivers and patients as healthcare providers will focus more efficiently on providing direct care. The primary aim of adapting AI is to make access to health more accessible and improve its effectiveness. AI is improving the care and productivity of nursing, and the nursing profession is getting much more help from AI. AI intelligent systems make nurses autonomous and more competent to diagnose patients and provide patient-centered care based on each patient's needs. Support and clinical guidance from virtual assistants make nurses more skilled in making decisions.

AI also helps eliminate excessive and bizarre paperwork and scheduling as it takes responsibility for administrative duties, so nurses' focus will be directed towards providing direct patient care and improving staff productivity, ultimately improving patient outcomes and a better working environment for nurses (6). According to the latest research, which highlighted a few critical areas in nursing, the management and prediction of sick people, whose aim is to detect hazards related to health and direct effective therapies, is another area of interest of AI research in nursing. Another important field in which AI helps collect and analyze data is information data management to improve decision-making procedures. Furthermore, the future of nursing education by adapting Artificial intelligence is also investigated. AI can make practical simulations and tools to help students improve their learning and become more efficient in the fast-paced, growing healthcare (6).

The educational requirements and the capabilities of nurses will likely change as AI use becomes more and more prevalent in healthcare, and nurses will have to adjust to their new roles and responsibilities as AI becomes more frequent in healthcare delivery. Due to this transition, nurses should be skillful in using these AI technologies, decoding AI-generated data, and implementing AI-driven technologies' insights into patient care. So, nursing education must provide training about how to manage technology, understand data

meaningfully, and address ethical issues related to AI. Healthcare can ensure that AI will help you provide more compassionate care; it strengthens, not replaces, so nurses should acknowledge these recent updates (7). To properly utilize AI-based health technology in their practice, nurses who play a crucial role in patient care must be proficient in its use. AI can help with several aspects of nursing, including workflow optimization, decision-making process improvement, outcome prediction, and patient health monitoring. Nurses proficient in AI technology can improve efficiency and safety in healthcare delivery by offering more accurate and customized treatment. Nurses may play a critical role in incorporating these developments into patient-centered care and ensuring that the advantages of technology are fully realized in clinical settings by remaining knowledgeable about and trained in AI applications (8). There is a notable disparity in the advancements and application of these technologies between nursing and medicine because of the slow adoption of technologies, especially artificial intelligence (AI), in nursing practice and education (9). AI adoption will alter patient care delivery and the role of nurses (10). As a result, nursing curricula must be created with future-ready capabilities and the particular skills needed in healthcare settings and their line of work in mind. Given the anticipated growing integration of AI into healthcare technologies, it is essential to look into how people perceive and plan to use it. AI can potentially improve human decision-making and increase overall efficacy in a wide range of contexts (11).

Artificial intelligence (AI) has become a crucial disruptive technology, particularly in healthcare. AI is transforming healthcare workflows, improving clinical outcomes, and delivering patient care revolutionary (12, 13). The foundation of nursing practice is compassion, which sets it apart as a field committed to providing people with comprehensive care. Nurses create a safe atmosphere where patients feel understood and appreciated by cultivating sympathetic interactions. This emotional bond facilitates frank communication about worries, fears, and preferences, speeding up healing. Patients' entire experience and happiness with the healthcare system can be significantly enhanced when they believe their caregivers are kind and attentive. Ensuring that patients receive compassionate, evidence-based care in various clinical settings is one of the main objectives of nursing (14,15). Nurses must be equipped to use any technology to improve patient outcomes since they provide direct patient care. The swift progression of technology has given rise to novel fields of specialization, posing significant obstacles for contemporary nursing scholars. Artificial intelligence (AI) is one of these technologies that is especially significant for being a revolutionary force that is changing healthcare and modern society in general. Although AI is still in its infancy, it already provides robust tools that have the potential to transform patient monitoring, personalized care, and clinical decision-making. However, to properly utilize AI, aspiring nurses will need to adjust to these developments and develop the critical thinking and technical skills necessary to weigh the ethical implications of AI-driven healthcare (16, 17).

Artificial intelligence (AI) is becoming increasingly well-known as a ground-breaking technical development. Its uses are becoming increasingly widespread in both the personal and professional spheres, changing how we work and live. This technology revolution is especially noteworthy in the healthcare industry, where artificial intelligence (AI) revolutionizes patient care, optimizes operations, and strengthens decision-making. Healthcare organizations and experts are becoming more interested in artificial intelligence (AI) to address complex problems, enhance patient outcomes, and promote innovation. AI is a crucial area of study for both researchers and practitioners as it develops further and has the potential to drastically change the healthcare industry (18, 19). Although the origins of artificial intelligence are attributed to Aristotle, the term was coined at a conference by John McCarthy, who defined it as "the science and engineering of making intelligent machines, brilliant computer programs." In the 1970s, artificial intelligence AI, for the first time, was highlighted in research. Are machines able to think? This question by Alan Mathison Turing has sparked debates in this field (20).

It is important to look into the reliability of these AI tools and the difficulties in including them in nursing education to understand how ready nursing students are for AI. An intelligent tutoring system (ITS) is an excellent example of an AI tool that will plan to improve individual learning in nursing institutions. Students can adjust these systems according to their own choices and the speed of each student. By triggering students' progress and responses, ITS can improve the contents of education, highlight specific areas that

need to be improved, and provide specific recommendations, too. Nursing students can better understand the tough ideas and develop essential skills that are important for their practice.

Additionally, ITS can provide a very safe environment for the students to practice clinical scenarios and make decisions without fear or hesitation, which will ultimately increase their competency and self-esteem. As nursing education develops, ITS is significant in producing well-prepared Healthcare professionals. These systems adjust themselves according to students' demands by tracking their progress. How artificial intelligence is having an impact on education? Open Learner Models are one of the best examples of that, which helps the learner identify their strengths and areas of improvement. These methods also improve the student's educational experience, as they provide constant feedback and support. Pearson's AIDA is another useful resource that students can use to operate complex materials according to their own choices. Teachers may play a significant role in encouraging and making a productive learning environment, enabling students to recognize their full potential by using these AI-driven resources. In helping students acquire skills, these individualized approaches will boost interest and engagement among students (21).

To successfully implement these AI-driven technologies, teachers and students should be familiar with them. Suppose they are not fully familiar with it. In that case, resistance may occur due to misunderstandings between conventional teaching methods and AI technologies, which will ultimately hinder the use of these AI technologies in an educational environment and lead to the termination of these technologies. To improve the learning experience, nursing programs must provide training and develop strategies to combine the accepted educational procedure with AI-driven technologies. This strategy will benefit future nurses as it will provide a more comprehensive learning environment (22). With the integration of AI in nursing education, a new era of professionals with superb digital knowledge could be produced, and this development is so important as the scope of the nursing profession is widespread. Suppose nursing programs incorporate AI tools in the curriculum. In that case, students will be much more competent in analyzing and handling health data, providing patient-centered care, and increasing communication across multidisciplinary teams (23). Combining artificial intelligence with the nursing curriculum will also enhance students' skills, significantly benefiting the nursing profession (24).

In the era of artificial intelligence (AI), preparing nursing students and practicing nurses for clinical practice requires striking a careful balance between meeting present educational needs and projecting demands for the future. Nursing education must change as AI technology continues to advance and enter more areas of healthcare to provide aspiring professionals with the abilities and information required to succeed in this dynamic environment (25). Additionally, the Nursing Informatics Entry-to-Practice Competencies for Registered Nurses paper was released in 2012 by the Canadian Association of Schools of Nursing (CASN) (26, 27). These resources have been available for a while, but it's not obvious if educators use them and encourage others to use them efficiently. One reason for the lack of uptake of these resources may be that many nurse educators possess the requisite knowledge, skills, and confidence to address students' learning associated with AI and digital health concepts (27). Nursing programs will need to change to guarantee that aspiring nurses have the digital and data literacy skills essential to operate in clinical environments where artificial intelligence and machine learning are increasingly used. Strong nursing leadership will be necessary to encourage nurse educators to embrace the need for curriculum reform and adopt new pedagogies that enable nurses and nursing students to exploit these emerging technologies (28).

One of the main research problems regarding the inclusion of AI in healthcare is whether undergraduate nursing students are well-equipped and aware of the need to work with these AI technologies. Many studies have been done on how other healthcare workers are prepared for this AI-changing healthcare environment, but no studies have been done on undergraduate nursing students' preparedness as these students are future healthcare providers. These students have to work with AI technology more rigorously and consistently. Therefore, determining how prepared they are to use AI in their healthcare settings is very important and necessary.

1.2 Rationale:
Artificial intelligence is changing the healthcare environment at a very high rate. Future healthcare providers, like nursing students, must be ready to face AI-driven tools that can increase patient care, make tasks easier, and further their decision-making capabilities. No one knows whether nursing students, especially those in regions like Charsadda, are geared toward introducing AI into their work environment. The readiness level of nursing students to work with AI is important for several reasons. First, it identifies knowledge and skills gaps, allowing the educational programs to fill those gaps. Secondly, it shapes the future of nursing education by highlighting areas of improvement where future integration with AI will serve best. It will be assured that future nursing graduates are well-prepared to use AI productively in clinical practice and advance the scope of care and outcomes of care to improve patient care. Lacking this assessment, nursing graduates may enter the workforce less well-prepared to manage an AI-driven healthcare system. It aims, therefore, to fill the gap by determining the preparedness of students in private nursing colleges at Charsadda to perform with AI technologies. The findings will illuminate information for nursing education as well as inform the design of future training programs.

1.3 Significance:
This study is important because it can orient nursing education and practice about the readiness level of nursing students in working with artificial intelligence technologies. This will make provision for the overall knowledge, preparedness, and possible gaps within the curriculum. This might help develop more rounded educational programs that will encompass AI, so students are adequately prepared for the healthcare environment they are going to encounter in the future.

1.4 Objective:
The main objective of the research is

- To determine the readiness level of undergraduate nursing students towards artificial intelligence AI in private nursing colleges at Charsadda, KPK.

1.5 Research Question:

- What is the current readiness level of undergraduate nursing students in Charsadda towards Artificial Intelligence in education and healthcare?

1.6 Operational Definitions:
Readiness:
The state or degree of being fully prepared, aware, equipped, and energized to take on a challenge or opportunity.

Artificial intelligence:
It refer to the utilization of tools and technologies such as intelligent tutoring systems, interactive learning platforms, and virtual assistants like ChatGPT, which provide personalized educational support, simulate clinical scenarios, and facilitate efficient information retrieval.

LITERATURE REVIEW
The literature was completed with the use of electronic databases, Google Scholar, PubMed, Scopus, and CINAHL. Published articles during different periods were selected. The search terms were “Readiness”, “Artificial intelligence”, “AI”, “AI Understanding”, “Readiness level”, and “AI in Nursing”.
The integration of artificial intelligence (AI) into healthcare is on the rise, and this trend extends to nursing education as well. It is crucial to assess nursing students' preparedness for this transition, given that they will soon be required to utilize AI technologies in various healthcare environments. Preparedness encompasses knowledge, attitudes, perceptions, and the capacity to incorporate AI into nursing practice. This literature

review consolidates existing research on the readiness of nursing students and outlines the potential obstacles and strategies for improving their preparedness for AI integration.

A study by Taskiran N shows that AI courses have useful results on students' preparedness. Students who accomplish a 28-hour course in AI show greater readiness as compared to those who did not accomplish the course. These results were significant as they show that combining artificial intelligence with nursing education increases the confidence and skills of the students (29).

The latest study by Chang Sr and Kim Y regarding students' preparedness for AI shows a major disparity. 52% of the students are unprepared to properly use AI technology, while 46.62% show a positive feeling of being prepared. The results show that students do have some theoretical knowledge, but they lack proper utilization of these technology in practice. To solve this issue, skill-based learning in AI is needed so that students not only know about the technologies but can properly use them in practice (30).

De Gagne JC highlighted that Knowledge about ethics is also very important especially using these AI technologies. When nursing students' values are clarified this helps them think deeply about how AI will have an impact on patients and the care being provided which will ultimately improve patient outcomes (31).

The study by Lebo C, Brown N shows that students with the use of virtual patients which is powered by AI are more skillful and confident as they interact with real-world scenarios and virtual patients. To increase the preparedness of students for real-world scenarios, these simulations are very helpful as they bridge the gap between theoretical knowledge and practice (32).

Incorporation of AI in teaching, the performance and satisfaction of students are significantly enhanced with the comparison of the AI-assisted immersion teaching method with the traditional teaching method as shown by the study of Xin W, Huiping M. Students who get AI-assisted teaching scored higher in theoretical knowledge and also showed a positive attitude towards their learning journey compared to those with the traditional teaching method. This shows how significant AI is in improving academic success and student satisfaction (33).

Ashwini P, Padhy PC study shows that with the use of AI, nursing students have the opportunity to master clinical skills using virtual simulations, get rapid feedback, and know their strengths and areas of improvement. One of the main issues is data privacy because it is very important to secure the information of the students. Including these AI technologies into the already existing curriculum is very challenging cause as it makes the teachers and educators feel unease utilizing these new technologies in their learning (34).

Talking about the positive and negative aspects of the inclusion of AI technology into the curriculum of nursing have some aspects, Positive aspects are the improved and up-to-date learning experience and real-world scenarios using simulations, and the negative pertain to too much dependence on Artificial intelligence which limits individual creativity. The potential for expansion lies in improved practical training, while the risks involve worries about job displacement and ethical concerns. This analysis by Abujaber AA et al. assists educators in thoughtfully incorporating AI into their programs to maximize advantages and minimize potential downsides (35).

An investigation into the understanding and opinions of AI among nursing students was carried out by Seo Y, Cho K. which found that there is a positive connection between AI knowledge, perceptions of AI, and attitudes toward AI utilization. This discovery indicates that students who possess greater AI knowledge are also more receptive to its implementation in healthcare environments (36).

Buchanan C et al. found that the next decade will see a review of how AI impacts nursing education, highlighting the necessity for changes in the curriculum. It is anticipated that AI health technologies (AIHTs) will transform nursing practice, necessitating students and educators to adjust to these developments. To ensure preparedness, nursing programs should integrate AI training to equip students for the clinical and ethical dilemmas in AI-integrated healthcare environments (37).

In a survey conducted in India by Sharma V et al, students' perspectives on AI in medical education were explored, revealing a strong interest in the topic and a desire for more focused instruction. While most students feel joy upon the inclusion of AI into their curriculum, there is still a significant bridge between comprehension and real-world usage in healthcare. More educational initiatives are needed so students can learn about the theory and its practical implementation in practice, as it is not necessary to have only

theoretical knowledge about AI technology. To bridge this gap, it is important to conduct seminars, workshops, and hands-on training in the nursing curriculum so that students are exposed to the real-world applications of these AI-driven technologies. By combining both theoretical and practical education on AI, institutions can produce a new era of healthcare professionals who are well-equipped to use AI to improve patient care and highlight emerging challenges in healthcare (38).

In the field of nursing, Artificial intelligence is showcasing its magic by accurately diagnosing and improving patient care. As a healthcare provider, it is very challenging to analyze sets of data and detect patterns; AI's ability to rapidly analyze large sets of data makes it a very useful tool for enhancing clinical decision-making. AI has the power to enhance nursing care by helping nurses make more precise nursing diagnoses and provide treatment based on patient data, which in turn improves patient outcomes. The study by Ahmad S, and Jenkins M. highlighted important obstacles that need to be overcome to successfully integrate AI in nursing. Ongoing training is provided for healthcare providers to better understand the advancing technology and integrate it into the practice for better patient outcomes (39).

When incorporating AI into nursing education, it is very important to address the ethical issues and methods to use, as emphasized by a study of Jung S published in 2023. As for improving simulation-based learning, AI is increasingly important as it is very crucial to take into account certain issues such as data privacy, AI ethical use in educational settings, and the transparency of algorithms. The study emphasizes making an effective learning environment for nursing students by carefully prioritizing ethical practices and AI methodologies (40).

A study on nursing students conducted by Ranbhise N, Rathod SR, Talsandekar A, found that 82% of the study participants had a moderate comprehension of artificial intelligence, and 71% showed a positive view of the use of AI in healthcare. The result highlighted that most nursing students have a basic understanding of AI, but there is still a need for improvement in their knowledge. However, the study pinpointed that students show a positive attitude toward the integration of AI in nursing education and practice. Conducting AI-based training programs will not only give theoretical knowledge to future nurses but also make them competent in successfully utilizing these technologies in practice, ultimately contributing to healthcare delivery (41).

Gaining more knowledge about AI had a huge impact on nursing students' acceptance and perception of AI-driven technology, as highlighted by a study conducted in South Korea by Mollart L et al. As students get to know more about AI, they significantly develop a positive feeling about its usage in healthcare, appreciate its potential to increase patient care, and improve clinical processes. This awareness not only affects their feeling towards AI but also develops a deeper comprehension of the capabilities of AI in diagnosing, treatment planning, and management of healthcare (42). This enhanced understanding of AI has sparked an enthusiasm in students' willingness to use AI technology in clinical environments.

Upon the analysis of nursing education Lee J, & Kim, J have found that AI is integrating very rigorously into healthcare, but its incorporation into the nursing curricula is very slow. As AI use in clinical settings has increased drastically in enhancing patient diagnostics, patient monitoring, and healthcare management, many nursing programs are very slow and lagging in adequately preparing nursing for this AI-driven technology. This incompetency of nursing education to incorporate AI poses a potential risk as future nurses will enter into a healthcare environment without the essential knowledge and skills to properly use AI-driven technology in clinical settings (43). As Nursing students are prepared to face the demands of a challenging healthcare environment, the nursing curriculum must be updated with AI-driven technology to overcome this issue as soon as possible. By including the use of AI principles, ethical consideration, and hands-on experience in the curriculum, educators can help students gain the skills and confidence necessary to properly use AI technologies in their practice.

Barika RASA found out that Electronic medical records (EMR) inclusion in nursing education has greatly improved the students' proficiency in healthcare documentation. The precise practice and effective documentation skills of nursing students have also improved due to the use of EMR, which has overcome the burden of paperwork. Nursing student's exposure to EMR during their clinical duties helps them to get to know more about EMR and ensure they can understand and effectively utilize it, enhancing patient outcomes

(44). The importance of EMR in integrating it into nursing education was highlighted in this analysis. With the increasing digitalization of the healthcare environment, nursing students must possess an understanding of EMR to keep pace with the digital health system. Knowledge regarding technologies and students' digital literacy affects how ready nursing students are to use AI tools. Students with a significant background in technology are better able to handle AI platforms and make better use of them.

Findings of the study of Chatzea VE et al shows that the emotions that students experience about AI, including enthusiasm, concern, and uncertainty, impact their willingness to utilize it (45).

The integration of AI-related material into nursing curricula greatly improves students' preparedness to incorporate technology into their professional practice as highlighted by the study of Kwak Y, Ahn J-W, Seo YH. Through studying AI applications like predictive analytics and decision support systems, students acquire valuable skills that are increasingly applicable in the healthcare field. This knowledge not only enhances their confidence in utilizing AI tools but also aids them in enhancing patient outcomes through data-driven decision-making. With ongoing technological advancements in the healthcare industry, a strong understanding of AI will better prepare nursing graduates to tackle future challenges (46). Students' preparation and confidence are boosted when they are exposed to AI in clinical settings.

MATERIALS AND METHODS

3.1 Study Design:

Cross-sectional descriptive study was used to determine the Readiness level of undergraduate nursing students towards Artificial intelligence. The study utilized an Adopted questionnaire from a study published in 2024 to assess AI readiness among undergraduate nursing students enrolled in private nursing colleges at Charsadda.

3.2 Study Setting:

Private nursing colleges at Charsadda include Shahid College of Nursing Shabqadar and Farabi College of Nursing Charsadda.

3.3 Study Duration:

The study was conducted over 04 months.

3.4 Sample Size:

The sample size was calculated through Raosoft with a 95% confidence interval and 5% margin of error; while the population size was 150, the calculated sample size was 109.

3.5 Sampling technique:

A convenient sampling technique was employed to select the Participants.

3.6 Sample Selection:

3.6.1 Inclusion Criteria:

- Students are currently enrolled in undergraduate nursing programs at private nursing colleges in Charsadda**.**
- Students who are in 3rd and 4th year of undergraduate nursing program

3.6.2 Exclusion Criteria:

- Undergraduate nursing students who are not willing to participate in the study
- Students who are on leave or absent on the day of data collection.

3.7 Data Collection Procedure:

Seek permission from both the institution's head. Provided a detailed study proposal, including objectives, methods, and potential impacts, to ensure the study meets ethical standards. Informed consent was obtained

from the participants to ensure their privacy and confidentiality and the right to withdraw from the study at any time. The questionnaire for determining nursing students' readiness level for artificial intelligence (AI) is adapted from the study published in 2024(47). "Readiness scale Cronbach's alpha reliability coefficient is 0.87"(48) includes two main sections: the first one is demographic variables, and the second one is an AI readiness scale.

Demographics Section: The demographic section includes questions such as Gender, Age, and Semester of the student, whether you have heard of AI before, and whether you have used AI in learning.

AI readiness Scale: The AI readiness scale consists of 22 items and employs a Likert scale with five 5 response options to assess students' readiness level towards AI. The scale includes: "Strongly disagree" (1), "Disagree" (2), "Neutral" (3), "Agree" (4), and "Strongly Agree" (5). The participant's readiness level for AI is based on their questionnaire response; the minimum score is 22, with a maximum score of 110. To determine readiness level, scores will be categorized as follows: Low level of readiness (22–51), Medium level of readiness (52–80), and High level of readiness (81–110)."

3.8 Data Analysis Procedure:

Data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS) version 27.0. Descriptive statistics, including frequency, mean, percentage, and standard deviation, were calculated to summarize the demographic characteristics and AI readiness score.

RESULTS

The statistics for the gender of the participants show that data was collected from all 109 participants, with no missing values. In the analysis of gender, out of a total of 109 individuals, 97 were male, and 12 were female. This resulted in 89.0% of the participants being male, while only 11.0% were female, as shown in table 1.

Table 1 Gender of the participants

GENDER OF THE PARTICIPANTS					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	97	89.0	89.0	89.0
	FEMALE	12	11.0	11.0	100.0
	TOTAL	109	100.0	100.0	

Based on the age distribution of the participants, with 109 participants in the study, 97.2% (106 out of 109) are in the (18–25) age range. The age group of (26–33) accounts for only 2.8% (3 out of 109) of the participants. All participants are counted, suggesting that the sample primarily comprises younger persons. As shown in table 2.

AGE GROUP OF PARTICIPANTS					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	106	97.2	97.2	97.2
	26-33	3	2.8	2.8	100.0
	Total	109	100.0	100.0	

Table 2 Age Group of Participants

Based on the student's semester distribution, 52.3% (57 out of 109) are enrolled in the 5th semester, and 47.7% (52 out of 109) are enrolled in the 8th semester. There are 109 participants in all, distributed pretty evenly between students from the 5th and 8th semesters, with a slight majority from the 5th semester. As shown in Figure 1.

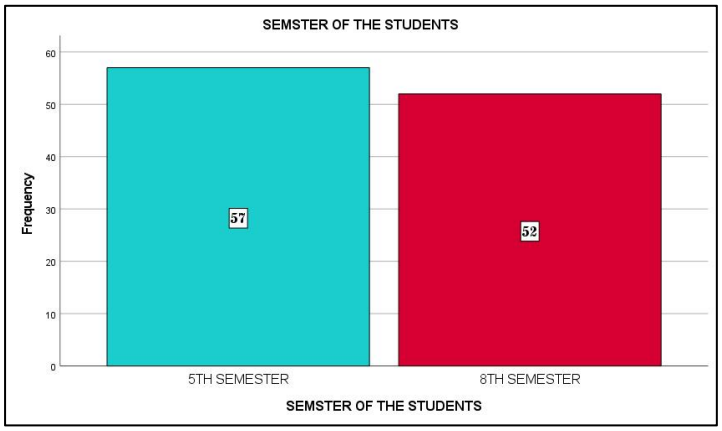

Figure 1 Semester of the Students

The data indicates that the majority of participants, 78.9% (86 out of 109), have heard of Artificial Intelligence (AI) before, while 21.1% (23 out of 109) have not. This suggests a high level of prior awareness of AI among the participants, with most being familiar with the concept. As shown in figure 2.

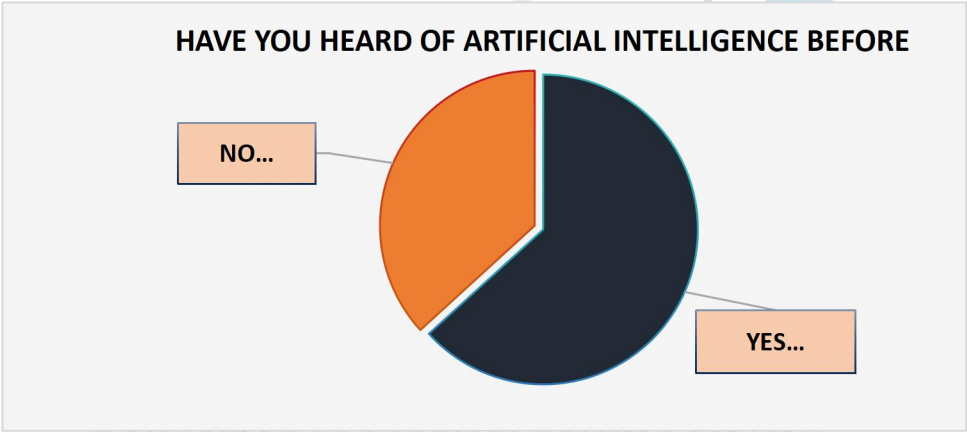

Figure 2 Have you Heard of AI before

The statistics regarding the use of Artificial Intelligence (AI) in learning show that data was collected from all 109 participants with no missing values. The data on participants' use of Artificial Intelligence (AI) in learning reveals that a majority, 76.1% (83 out of 109), have utilized AI for educational purposes, while 23.9% (26 out of 109) have not, as shown in Figure 3.

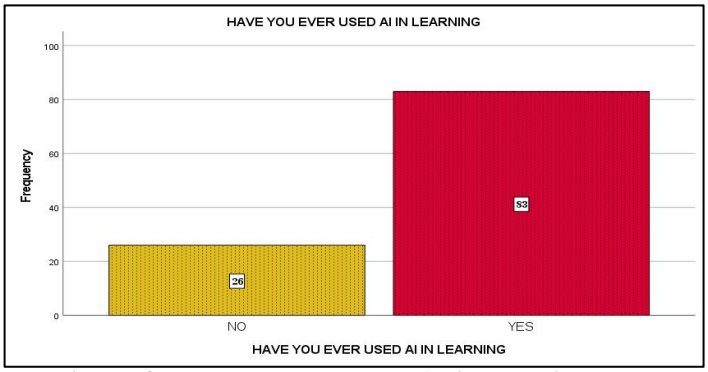

Figure 3 Have you ever used AI in learning

The descriptive statistics for the total score reveal that data was collected from 109 participants. The total scores ranged from a minimum of 26 to a maximum of 101. The mean score is 71.1560 indicating a wide range of performance levels and the standard deviation is 16.14069 as shown in table 3.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
TOTAL SCORE	109	26.00	101.00	71.1560	16.14069
Valid N (listwise)	109				

Table 3 Total Score Mean & Standard deviation

The statistics for the final Readiness Level reveal that data was collected from all 109 participants with no missing values. The findings regarding the final total scores of the participants reveal a diverse distribution of performance levels. Out of 109 individuals, 11.9% (13 participants) have a low level of readiness towards artificial intelligence. In contrast, a significant majority, 56.0% (61 participants), have a medium level of readiness level towards artificial intelligence. Furthermore, 32.1% (35 participants) have a high level of readiness toward artificial intelligence scores, as shown in Table 4 and Figure 4.

READINESS LEVEL					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LOW	13	11.9	11.9	11.9
	MEDIUM	61	56.0	56.0	67.9
	HIGH	35	32.1	32.1	100.0
	Total	109	100.0	100.0	

Table 4 Readiness Level

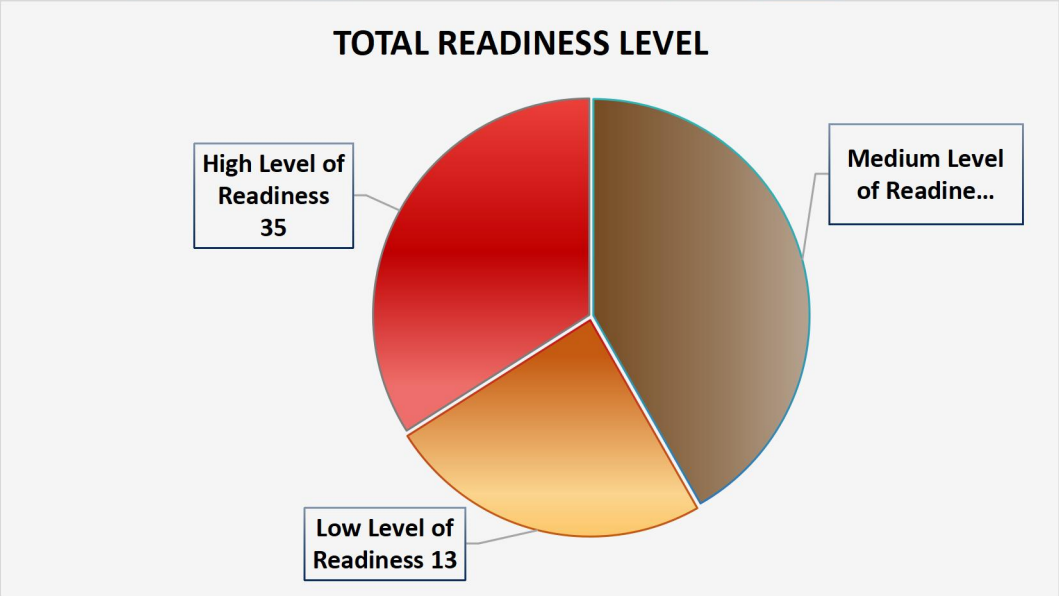

Figure 4 Readiness Level

DISCUSSION SECTION

The study's conclusions provide important new information on how prepared nursing students are to use artificial intelligence (AI) in healthcare and education today. The data indicates that the participants had a significant degree of awareness and firsthand experience with AI technology, but it also shows significant variation in preparation levels, with many students ill-prepared to use AI in real-world healthcare settings. This discussion elaborates on these results by talking about the wider consequences of nursing education, the curriculum modifications that need to be made, and possible research directions in the future.

The percentage of the participants who had heard of artificial intelligence before (78.9%) and most of them (76.1%) had utilized AI in educational settings. This shows that AI is making advances in educational settings already, which is in line with more general developments in nursing education and healthcare. Artificial intelligence (AI) technologies are being progressively integrated into nursing education to improve theoretical comprehension and practical abilities. Examples of these technologies include intelligent tutoring programs, virtual patient simulators, and AI-driven diagnostics (32).

Being familiar with AI doesn't mean you're proficient with it. The findings show that a lot of students still have trouble using AI in real-world healthcare settings. Research by Taskiran N also shows this gap between AI awareness and application, with students frequently reporting high levels of confidence in their comprehension of AI ideas but expressing reluctance when confronted with practical implementations of AI technologies in clinical practice (29). This highlights a critical weakness in the present nursing education curriculum: while exposure to AI may be enough, there is still a lack of practical application of these techniques.

Three readiness levels were found in the study: low level of readiness (11.9%), medium level of readiness (56.0%), and high level of readiness (32.1%). The majority of participants showed a medium level of readiness, which indicates that although students are learning theoretical material, they are still lacking in practical application and confidence when employing AI technologies in clinical settings. The distribution of preparedness levels is consistent with earlier study findings of Chang Sr, Kim Y, which show that many students believe they are intellectually prepared but have not used AI technologies (30). These findings are of significant importance in nursing education. Students with a medium or low preparedness level could find it difficult to adapt to the changing needs of a healthcare setting where artificial intelligence is having a bigger impact. For data administration, monitoring, and diagnosis of patients for such jobs, nurses must have the knowledge and competence to utilize AI tools, but without proper training, they might not be able to effectively use these AI technologies (40). The gap between the readiness level and the job demands of nurses draws attention to a crucial need that nursing programs must look after and solve.

It is impossible to ignore how important practical, skilled-based learning is in AI. The study results support the idea that how to use AI tools practically should be included in nursing programs. Practical exposure is also necessary as the students will get to know about AI-driven tools such as decision-making tools, virtual simulation, and real-time analysis of data to properly understand them and how this system works. The nursing curriculum must be upgraded with AI-driven tools to provide students with real-world simulations like organizing patient care plans and also lessen the impacts of illness by predicting it using AI-powered virtual patients. This latest upgrade will not only improve the practical abilities of the students but also enhance clinical decision-making when it comes to utilizing AI (31). For the practice and enhancement of nursing students' skills, nursing programs should include interactive learning settings and simulation-based learning.

Patient-centered care and empathy are essential to nursing practice, so integrating AI into healthcare is also a crucial cause of ethical considerations related to AI. There may be a significant difference in a clinical decision taken by an AI-driven technology and a nurse, as AI lacks the empathy, human touch, and compassionate care that is essential to nursing practice. Artificial intelligence can improve nursing practice and its efficiency, but becoming too dependent on AI poses significant risks as it reduces the human element, which is very important to patient care (35).

The results highlight how urgently nursing curricula need to be changed to take into account artificial intelligence's expanding importance in healthcare. Although the study's participants varied in their

preparedness, the general tendency suggests that the curriculum should be revised to emphasize ethical considerations in practice as well as AI proficiency. Programs for nursing education must be created to give students the digital literacy abilities such as data analytics, AI-based diagnoses, and predictive modeling necessary to function in AI-driven healthcare contexts (37).

Furthermore, for educators to properly teach AI principles, they must possess the requisite abilities. The integration of AI into nursing curricula may not reach its full potential without adequate training for educators. This has been observed in the past when a mismatch between AI tools and conventional teaching methods has resulted in student opposition and project failures (9). Thus, just as important as curricular change are faculty development initiatives that concentrate on AI competencies for educators.

This study has limitations, even though it offers a thorough assessment of nursing students' preparedness for integrating AI. The results' generalizability was limited by the sample's high gender distribution (89% male) and predominance of younger participants (97.2% aged 18–25). To gain a deeper understanding of the variations in preparedness levels across various demographic groups, future studies ought to incorporate a wider range of age groups and gender representation. More research should also look into the effects of prolonged AI exposure throughout the nursing college on long-term competency and attitudes toward AI technologies. Research that follows nursing students over time as they enter the workforce could also look into how their preparedness for AI changes. This would offer insightful information about how well nursing education-acquired skills and knowledge are being utilized in practical situations, as well as if ongoing education may be required to preserve AI competencies in the workforce.

CONCLUSION

This study gives important new information about how prepared undergraduate nursing students are to use artificial intelligence in nursing education and healthcare. Most of the students (56.0%) were categorized as having a medium level of readiness, showing that there is still a significant bridge between theoretical knowledge and how to use it practically, although some study participants' demonstrated that they have prior knowledge and experience with these AI-driven technologies. On behalf of this study's findings, nursing programs need to deliver practical instruction on how to use these AI tools and their ethical considerations while delivering care to the patient. For better comprehension of how to bridge this gap and make sure that nursing education incorporates AI-driven technologies, more studies should be conducted to assess the long-term effects of these changes and examine the change in the level of readiness over time.

Strength of the study:

The study is innovative, for this is the first attempt where any research has been conducted concerning the state of readiness for AI among undergraduate nursing students. It provides a sample that varies in age, gender, and semester, hence making the generalizability of the findings even higher. Most of the students (78.9%) have a medium level of readiness toward artificial intelligence, and this study can thus serve as a good basis for assessment as well as for areas of improvement. The research has useful information that would greatly contribute to curriculum development and the adequate preparation of future nurses to integrate AI into the profession effectively.

Limitation of the study:

A key limitation of the study is the use of a convenient sampling technique. If a random sampling technique were to be adopted, readiness levels toward AI would be different and could offer other insights. In addition, the study is conducted in one region only, which might affect generalization to other areas or educational settings with diversified student populations and learning environments.

Recommendation:

Several recommendations are made based on these study's limitations and findings to enhance the preparedness of undergraduate nursing students. First, nursing curricula need to be expanded to include modules on AI that would cover the principles, applications, and ethical issues in healthcare. This would

organize learning appropriately at all levels. Further research should be aimed at increased understanding of preparedness across the different populations by increasing the sample size to include students from all years, various geographical locations, and different learning environments. Also, future studies should assess the changes in the level of readiness over time and also focus on the factors that affect the readiness level of the students.

There should also be interactive seminars and workshops to enrich practical understanding besides mentorship programs where students, who have expertise in AI, can lead others to develop the same subject. The clinical training must also use AI technologies to bridge the gap between theoretical learning and knowledge of its applications.

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