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Amina Suleiman Rajah, Zakar M. Sardauna et Ladan Muhammad Awwal

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Résumé de l'article

Artificial intelligence (AI) is rapidly transforming various sectors, including healthcare and education. In nursing, AI has the potential to enhance educational outcomes and improve clinical practices. The study aim to explore the nuanced experiences and perceptions of nursing students at Bayero University, Kano, in relation to the use of AI in their academic and clinical environments. A qualitative narrative inquiry was conducted among nursing students at Bayero University, Kano. Focus group discussion was used to collect data from the participants. Thematic analysis was employed to identify and interpret themes related to their experiences and perceptions of AI. The study identified that the majority of students have engaged with AI technologies primarily for academic purposes, such as researching assignments and accessing clinical information. However, they demonstrated limited awareness of nursing-specific AI tools. Participants also reported significant challenges related to network connectivity and data access, which hindered their use of AI. Despite these challenges, the overall perception of AI was positive, with students acknowledging its potential to improve nursing education and practice. Concerns about technical errors, over-reliance, and job displacement were also noted. Nursing students at Bayero University, Kano, recognize the potential benefits of AI in education and clinical practice but face significant challenges due to infrastructural limitations. Their positive perception of AI suggests an openness to its integration into nursing, provided that technological and educational barriers are addressed. The findings highlight the need for improved technological infrastructure, targeted training on AI applications in nursing, and a balanced approach to integrating AI with human expertise.

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Abstract

Artificial intelligence (AI) is rapidly transforming various sectors, including health care and education. In nursing, AI has the potential to enhance educational outcomes and improve clinical practices. The study aims to explore the nuanced experiences and perceptions of nursing students at Bayero University, Kano, in relation to the use of AI in their academic and clinical environments. A qualitative narrative inquiry was conducted among nursing students at Bayero University, Kano. Focus group discussion was used to collect data from the participants. Thematic analysis was employed to identify and interpret themes related to their experiences and perceptions of AI. The study identified that the majority of students have engaged with AI technologies primarily for academic purposes, such as researching assignments and accessing clinical information. However, they demonstrated limited awareness of nursing-specific AI tools. Participants also reported significant challenges related to network connectivity and data access, which hindered their use of AI. Despite these challenges, the overall perception of AI was positive, with students acknowledging its potential to improve nursing education and practice. Concerns about technical errors, over-reliance, and job displacement were also noted. Nursing students at Bayero University, Kano, recognize the potential benefits of AI in education and clinical practice, but face significant challenges due to infrastructural limitations. Their positive perception of AI suggests an openness to its integration into nursing, provided that technological and educational barriers are addressed. The findings highlight the need for improved technological infrastructure, targeted training on AI applications in nursing, and a balanced approach to integrating AI with human expertise.

Keywords: artificial intelligence, nursing education, perceptions, experiences

Amina Suleiman Rajah (RN, RM, RNE, RBPN, BNSc., PGDE, MSc, PhDc) is a passionate educator and researcher at Bayero University Kano, Nigeria. She is a registered nurse, midwife, nurse educator and burns and plastic nurse. Currently pursuing a PhD in Maternal and Child Health Nursing, she has a strong focus on maternal and child health, healthcare innovation, and the impact of technology on healthcare. She is a published author of multiple books and peer-reviewed articles. Email asrajah.nur@buk.edu.ng
Zakar M. Sardauna is an undergraduate nursing student at Bayero University Kano, Nigeria with a strong interest in advancing healthcare through education and clinical practice. He is dedicated to enhancing his skills in nursing to make a meaningful impact in patient care.
Ladan Muhammad Awwal is an Associate Professor in the Department of Nursing Science at Bayero University, Kano, Nigeria. He holds a Bachelor of Nursing Science (BNSc) and a Master's degree in Disaster and Risk Management from Ahmadu Bello University, Zaria. He earned his PhD in Nursing Studies with a focus on Nursing Informatics from the University of Nottingham, UK. In addition to his teaching responsibilities, Ladan is actively involved in research, focusing on health informatics, occupational health, and the impact of educational technologies in nursing. He has published extensively in reputable journals and has participated in various training programs, enhancing his expertise in research methodologies and health policy advocacy.

Introduction

The advent of computer systems with artificial intelligence (AI) shows the evolution of systems capable of performing tasks that typically require human intelligence. These tasks may range from generating information, learning from data, making decisions, simulating human behaviour, expressing reasoning, and employing problem-solving skills (Buabbas et al., 2023; European Commission: Joint Research Centre et al., 2018; Mahomed, 2018).

The rapid advancement of AI is significantly transforming the landscape of higher education (OECD, 2023; International Commission on the Futures of Education, 2021). The growing accessibility of AI technologies among students represents a key long-term impact of the increasing prevalence of AI tools designed for educational use, which could be seen as the evolution of what is known as “smart classrooms,” emphasizing how AI is becoming increasingly integrated into various sectors, including education (Guanah & Oribhabor, 2023).

Consequently, the integration of AI technologies has prompted varied reactions within academia, leading some educational institutions to impose restrictions (Ladan, 2024). In the same regard, research exploring healthcare students' and professionals' perceptions of AI has yielded mixed findings (Oluwadiya et al., 2023), with studies involving physicians and medical students in developed countries showing optimism about AI's potential to improve efficiency and patient care (Blease et al., 2019; Wood et al., 2021).

Despite the widespread adoption of AI, there is a noticeable lack of research that qualitatively explores students' experiences and perceptions of AI, particularly in Nigeria. This study aims to address this gap by exploring the nuanced experiences and perceptions of AI use among nursing students of Bayero University, Kano.

Methodology

This qualitative study employed a narrative inquiry design to explore the experiences and perceptions of artificial intelligence (AI) among nursing students. Narrative inquiry was selected for its ability to capture participants' personal experiences with AI, offering a nuanced understanding of how they perceive and engage with AI in academic and clinical settings.

Participant Selection

Participants were selected through purposive sampling to ensure that only students with first-hand experience using AI tools in their academic work were included. Specifically, nursing students who had used AI applications, such as software for data analysis, literature reviews, or other academic tasks, were targeted. The sample primarily consisted of undergraduate students nearing the completion of their studies, ensuring that participants had substantial engagement with AI and could provide rich insights.

Data Collection

Prior to the focus group discussions, the purpose and significance of the study were clearly explained to participants, and informed consent was obtained. The discussions, led by the researchers, lasted approximately 90 minutes. Sessions began with participant introductions, followed by open-ended questions encouraging free discussion. Conversations were audio-recorded and later transcribed for analysis. Notes on key points raised by participants were also taken during the sessions. All interactions were conducted in a way that fostered open dialogue and participation. After 12 students participated in one focus group discussion, data saturation was reached, with no new themes emerging from the conversations.

Data Analysis

The thematic analysis was conducted collaboratively by three investigators. The initial phase of the analysis involved each investigator independently reviewing the transcriptions to identify key codes. Afterwards, the investigators convened to compare their coding results, discuss discrepancies, and reach a consensus on the codes to ensure accuracy and consistency in the interpretation of the data.

Once the codes were established, they were grouped into broader sub-themes, which were then synthesized into themes. During this phase, the team engaged in regular discussions to ensure the themes captured the full range of participants' experiences with AI. The coding process followed the criteria for ensuring the trustworthiness of qualitative research as outlined by Lincoln et al. (1985), focusing on credibility, transferability, dependability, and confirmability.

Ethical Considerations

Ethical clearance for the study was obtained from the Health Research Ethics Committee of the College of Health Sciences, Bayero University,

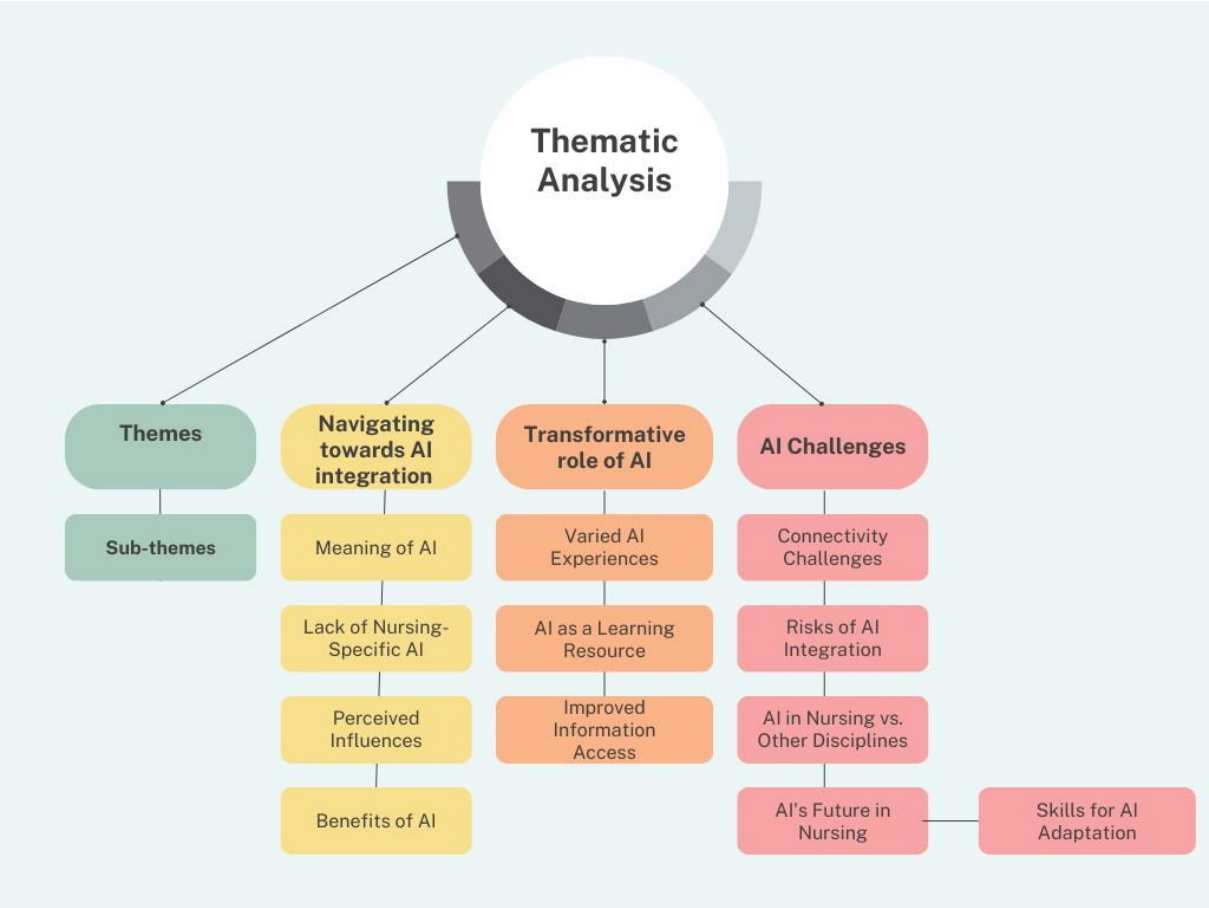
Kano, with the reference number NHREC/BUK-HREC/481/10/23II. Confidentiality and anonymity were ensured by using identification codes instead of names for analysis purposes. A written informed consent form was signed before any data collection was done.

Results

The findings of the thematic analysis of the data collected from focus group discussions revealed students' understanding of AI, its benefits in education and practice, and the challenges they encountered with its integration. The results highlight how AI tools, such as ChatGPT and other academic software, are being used to support tasks like research and assignments while also exposing the knowledge gaps and concerns about AI's role in nursing-specific applications.

Figure 1

Development of Themes



Theme 1: Navigating Towards AI Integration

This theme captures the evolving and complex relationship nursing students at Bayero University, Kano, are developing with artificial intelligence. It reflects how they are gradually integrating innovative AI tools into their traditional educational and clinical practices while still grappling with limited awareness of AI's specific applications within their field. This theme highlights the tension and synergy between traditional nursing practices and the new frontier of AI-driven learning and practice. Four sub-themes emerged from this theme.

Sub-Theme 1: Meaning of AI

This sub-theme reflects a collective perception among nursing students that AI is a transformative tool designed to simplify and enhance daily tasks. Participants viewed AI as a technological advancement that mirrors human intelligence, offering solutions and efficiencies that traditional methods might lack. It was perceived not just as a tool, but as a sophisticated system capable of streamlining complex processes and making problem-solving more accessible.

> *"If I hear the term artificial intelligence, I think of using technologies to solve issues in our day-to-day activities."* (Participant 1)

> *"When I hear the word artificial intelligence, what first comes to mind is a technological system that mimics human intelligence and helps in reasoning like the human mind, only in a more efficient manner, which helps to break down difficult tasks into simpler and more understandable components."* (Participant 7)

Sub-Theme 2: Lacfi of Nursing-Specific AI

This sub-theme reflects a significant gap in awareness among nursing students regarding artificial intelligence tools specifically designed for the field of nursing. Participants frequently mentioned their familiarity

with general AI technologies such as ChatGPT and Bard, which are not tailored to nursing contexts.

> *"I don't know exactly the one that is specifically for nursing; I only know the general ones like ChatGPT and Bard."* (Participant 1)

> *"I only know the simulation machine, but I don't know any AI currently being used in the hospital."* (Participant 9)

Sub-Theme 3: Perceived Influences

This sub-theme reveals a nuanced view of AI in the nursing field. Participants generally perceived AI as having a predominantly positive impact, citing its role in advancing knowledge, enhancing educational resources, and preparing students for future healthcare demands.

> *"Yes, I perceived it as a positive because it is an advancement of this century and helps to move nurses' knowledge forward."* (Participant 4)

> *"I perceive it as a positive influence in the field of nursing education because it can enhance the quality of education, improving access to learning resources and preparing students for an evolving healthcare landscape."* (Participant 7)

> *"I perceive it as both positive and negative, but I side with the positive influence more than the negative influence."* (Participant 12).

Sub-Theme 4: Benefits of AI

Participants noted the benefits of AI in specific academic tasks, such as assignments, literature reviews, and clinical research.

> *"It benefited me in my nursing studies in an instance of written assignments, so it really benefited me in that aspect."* (Participant 4)

> *"For the benefit, like I said earlier, I used it to search information on a particular condition during our clinical posting in the ward, so in that instance, it benefited me a lot."* (Participant 12).

Theme 2: Transformative Role of AI

This theme delves into how nursing students encountered and utilized AI within their educational and practical experiences. It reveals a spectrum of interactions with AI, reflecting its role in both enhancing and challenging their learning and clinical practices. Three sub-themes emerged from this theme.

Sub-Theme 1: Varied AI Experiences

Participants had varying degrees of experience with artificial intelligence, with some having engaged with AI during both their studies and clinical practice, while others interacted with AI mainly in an academic setting.

> *"Related to nursing practice, I cannot say I have an encounter with artificial intelligence directly, both I engaged AI in my nursing study."* (Participant 6)

> *"Yes, I have had numerous experiences with artificial intelligence."* (Participant 7)

Sub-Theme 2: AI as a Learning Resource

AI was frequently used by participants as a tool for gathering information, particularly for assignments, research, and understanding complex topics. The use of AI in clinical settings was primarily centred on researching medical conditions encountered during practice.

> *"I recently had an experience with artificial intelligence during the NUNSA convention, where I engaged a simulation machine. That is the first time I had an experience with AI so far."* (Participant 1).

> *"I had some experiences with artificial intelligence like ChatGPT and Google Bard. I mostly used them for assignments to generate essays and explain some complex things taught in class. If I want to get a deeper explanation, I usually go there to get in-depth information."* (Participant 8).

> *"I have used AI since my first day at the university to solve or break down complex topics that I found hard. But in clinical practice, I don't have any experience with artificial intelligence."* (Participant 11)

Sub-Theme 3: Improved Information Access

Participants highlighted the significant impact of AI on their learning process, particularly in accessing information quickly and efficiently.

> *"They impacted my learning a lot in making research and in written assignments."* (Participant 8)

> *"It has impacted it greatly in a positive way. If it was before, there are things you have to go online or Google, and you will not find exactly what you want, but due to those generative artificial intelligence, I will just type and it brings the answers, most times very specific to your queries."* (Participant 11)

Theme 3: AI Challenges

This theme reflects the complex landscape of technological advancement in nursing education and practice. Five sub-themes emerged.

Sub-Theme 1: Connectivity Challenges

This sub-theme addresses the practical issues that hinder effective AI use. Participants experienced difficulties such as poor network connectivity, data limitations, and high traffic loads that affected their access to and interaction with AI tools. These barriers underscore the need for improved infrastructure and resources to facilitate seamless AI integration.

> *"For the challenges, it's network issues."* (Participant 3)

> *"The challenging part I faced when using artificial intelligence is sometimes network issues and lack of data to get access to it."* (Participant 4)

> *"For the challenges, I once asked artificial intelligence a particular question, but it failed to give me a response due to high traffic load on it."* (Participant 12)

Sub-Theme 2: Risfis of AI Integration

The focus of this sub-theme is on the potential downsides and risks of AI in nursing. Participants expressed concerns about the accuracy of AI information, job displacement, and over-reliance on technology. The fears of technological errors and misdiagnoses highlight the need for careful management and oversight to ensure AI enhances rather than undermines nursing practice.

> *"The risk will be like I say it can bring the wrong information, which in turn could lead to poor outcomes in nursing practice and education."* (Participant 1)

> *"It can lead to giving wrong information, so over-reliance on it, for example, in making diagnoses as we are seeing now in developed countries, may lead to misdiagnosis."* (Participant 3)

> *"My concern associated with the integration of AI in nursing includes issues of potential ịob displacement due to the automation of certain tasks."* (Participant 6)

Sub-Theme 3: AI in Nursing vs. Other Disciplines

Participants observed that AI is more integrated and prioritized in other healthcare disciplines compared to nursing, where it is seen as an augmentative tool rather than a replacement.

> *"In other disciplines, I can say they are directly dependent on AI, probably AI can take over most of their responsibilities, unlike nursing, where AI will only augment our work instead of rendering it completely subordinate."* (Participant 2)

> *"Well, in nursing education, you know there is something about humanity that we are dealing with. So AI cannot do most of the*

things, unlike in other disciplines where AI can do almost all their work." (Participant 6)

"My observation is that AI was not prioritized in nursing education as in other disciplines because there are so many tasks that cannot be performed by AI in nursing practice." (Participant 8)

Sub-Theme 4: AI's Future in Nursing

Looking ahead, participants discussed the transformative potential of AI in nursing. They envisioned AI improving efficiency, such as by monitoring vital signs remotely or managing larger patient loads, which could enhance both practice and education. This forward-looking perspective suggests that AI could drive significant advancements in the field.

"I think it will really help, for example, like now vital signs are still taken by nurses going from one bed to another, but in the future, we are going to have artificial intelligence that will monitor vital signs of patients without nurses going to the bedside." (Participant 1)

"Actually, in the near future, we will see many artificial intelligence systems in the field of nursing carrying out many tasks of nurses like monitoring vital signs and others." (Participant 8)

"Well, it will improve effectiveness in both nursing practice and education in the future." (Participant 11)

Sub-Theme 5: Sfiills for AI Adaptation

To effectively integrate AI, participants identified a need for enhanced technical skills among nurses. They emphasized computer literacy and familiarity with emerging technologies, underscoring the importance of training and education to ensure that nurses can fully utilize AI tools and adapt to technological changes.

> *"They have to be computer literate so that everyone will have control of artificial intelligence because it is manmade and software-programmed, and every software cannot control itself."* (Participant 1)

> *"The knowledge that nurses need to adapt includes computer skills and other emerging technologies."* (Participant 9)

> *"Nurses need to have a lot of skills, especially at this time where everything is computerized. So they should be ICT literate."* (Participant 10)

Discussion

The integration of AI into education, especially in nursing, presents both opportunities and challenges. As AI technologies become more accessible to students, they offer the potential to reshape educational practices, moving towards more personalized and efficient learning experiences (Guanah & Oribhabor, 2023; Oluwadiya et al., 2023; Topol, 2019). However, this study highlights the disparity between general AI use in education and its specific applications in nursing, signalling a need for nursing-focused AI tools.

Participants in this study consistently reported positive experiences with AI in their academic work. AI tools such as ChatGPT and Google Bard have facilitated quicker and more comprehensive access to information, significantly enhancing students' ability to conduct research, complete assignments, and engage with complex topics. These findings align with research showing that AI integration into education can improve productivity and efficiency (Blease et al., 2019). Similarly, Grájeda et al. (2023) found that AI tools significantly enhance student comprehension, creativity, and productivity. The participants indicated that most of the AI tools they used were general-purpose applications, and there was limited awareness or access to nursing-specific AI tools. This gap could limit the potential of AI to meet the unique needs of nursing education and practice.

The perceived benefits of AI extend beyond academic settings into clinical practice. Participants noted AI's potential to assist in clinical decision making and patient care. This resonates with existing studies that suggest AI's capacity to empower clinical workflows, refine medical image analysis, and revolutionize patient monitoring, ultimately contributing to better patient outcomes and more efficient processes (Wood et al., 2021; Krishnan et al., 2023; Maleki & Forouzanfar, 2024).

The optimism expressed by students was tempered by concerns regarding the reliability of AI in clinical settings, particularly the risk of over-reliance on AI-generated information. This apprehension mirrors broader concerns within the healthcare community about AI's accuracy and ethical implications, especially in critical areas like diagnosis and treatment.

Although AI offers significant benefits, nursing students also highlighted several challenges. The most frequently mentioned were network connectivity issues and data limitations, which hindered their ability to access AI tools efficiently. Additionally, students raised concerns about the potential for over-reliance on AI, which could lead to errors in judgement, particularly in clinical decision making. These concerns are consistent with previous research, which warns of the risks associated with placing too much trust in AI, especially when it comes to nuanced clinical decisions that require human expertise (Oluwadiya et al., 2023; Topol, 2019).

The insights from this study suggest that nursing education needs to evolve to address the growing role of AI. Educational institutions must consider developing specific AI tools that cater to the needs of nursing students while also ensuring that students receive adequate training in the use of AI for clinical decision making. Such training could mitigate the risks associated with over-reliance on AI and enhance the role of AI as a complementary tool in nursing practice, rather than a replacement for human judgement. Moreover, healthcare systems must collaborate with

educational institutions to develop AI literacy in nursing curricula, preparing future nurses for an AI-driven healthcare environment.

As nursing students anticipate future changes in their field due to AI, they recognize the importance of developing information and communication technology (ICT) skills and computer literacy. Training in AI technologies is essential for preparing students to adapt to the evolving landscape of health care. The integration of AI in nursing education requires a balanced approach that emphasizes both the benefits and challenges. Educational institutions must prioritize informing students about nursing-specific AI applications while addressing the infrastructural barriers that hinder effective AI use.

Conclusion

The experiences and perceptions of nursing students at Bayero University, Kano, regarding AI utilization reveal a complex relationship with this transformative technology. Although students recognize the potential benefits of AI in enhancing their education and clinical practice, they also face challenges and concerns that must be addressed. As AI continues to evolve, it is crucial for nursing education to adapt accordingly, ensuring that students are equipped with the knowledge and skills necessary to navigate this new frontier in health care.

Conflict of Interest

The authors declare no conflict of interest in this project.

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