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Original Article

Nigerian Nurses' and Nurse Educators' Readiness for Technology and Artificial Intelligence in Training and Practice: A Cross-Sectional Survey in Oyo State, Nigeria.

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Abstract

Background: Globally, AI and technology are being integrated into nursing education and practice, providing students with realistic patient care scenarios for safe, hands-on learning. These technological advancements and AI have also aided Nurses in documentation and data input, allowing nurses to focus more on patient care. However, the adoption of AI and other technologies in Nigeria's nursing environment is still in its early stages compared to more developed countries.
This study investigates the readiness of Nigerian nurses and nurse educators in Oyo state to integrate technology and Artificial Intelligence (AI) into their training and clinical practice.
Methodology: A quantitative survey design was employed, with 115 registered nurses from Oyo State, Nigeria, participating.
Results: The study reveals moderate levels of technological use, with 73% of respondents having used some form of technology or AI tools in their practice. Perceptions towards AI integration were predominantly positive, with over 95% agreeing on its potential to improve healthcare delivery and patient outcomes. Readiness to utilise AI was high, with almost all respondents (97.4%) ready to utilise AI tools in practice. Key barriers to adoption included unavailability of necessary technologies (65.2%), insufficient infrastructure (62.7%), and inadequate training (60.8%). The study found significant associations between previous utilisation of AI, practice designation and readiness to utilise AI, as well as between nursing roles and perceptions of AI integration.
Conclusion: These findings highlight the need to develop and implement comprehensive AI training programs for Nurses, focusing on hands-on experience and understanding of AI applications in patient care. Given the high level of readiness, tailored training programs can help close the gap created by inadequate training.

Keywords: AI, digital Literacy, Nursing Technologies, Artificial Intelligence, Readiness and Utilisation.

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Introduction

The integration of AI presents a wide range of opportunities in nursing practice, including enhanced teaching processes, better learning outcomes, and improved efficiency in care delivery; however, it also presents certain challenges related to privacy and security, ethical considerations, and resistance to adoption [1]. All over the world, AI and technology are being integrated into nursing education, including AI-based clinical simulation programmes [2] which provide students with realistic patient care scenarios for safe, hands-on learning. The employment of chatbots in training by students has also shown favourable results [3]. Similarly, technological advancements and AI have aided in documentation and data input, allowing nurses to focus more on patient care [4]. However, the adoption of AI and other technologies in Nigeria's nursing environment is still in its early stages compared to more developed countries [5].

Despite current growth and the anticipated massive increase in the global use of AI and technology in nursing education and practice, there is little or no research on Nigerian nurses' readiness to adopt AI and technology in training and practice. Research in other countries has shown varying levels of readiness among nurses and nursing students. In a study by Al-Sabawy [6], 84% of the population, which constituted 410 nursing professionals in Kirkuk, Iraq, demonstrated a positive attitude towards the adoption of AI in their nursing practice. Likewise, nursing students in Palestine demonstrated moderate readiness to adopt AI in their studies and held a relatively high perception of AI in nursing practice [7,8]. However, challenges such as infrastructure limitations, the digital divide, data security concerns, and resistance to change could hinder technology readiness [9]. Shang [10] noted that many nurses are technologically averse, which is one of the factors contributing to the decreased adoption and use of AI among nurses. This is exacerbated by unfavourable public perceptions of AI and technology on the internet and in the media, where AI is often portrayed negatively, leading to an overall negative attitude towards it.

Studies have shown that the use of AI can improve nursing management, nursing quality, safe management, and team collaboration among nurses [11]. However, getting nurses to use the technology depends on several factors. Some of these factors that determine readiness to adopt advanced technology in nursing practice include positive attitudes towards technology, increased experience with information technology, and perceptions of AI's usefulness [8,12].

To properly integrate AI technology successfully into the healthcare industry, it is important to ensure that nurses are prepared and ready to adopt it [8]. This study, therefore, investigates the readiness of Nigerian nurses and nurse educators to integrate technology and AI into nursing training and practice.

Here, technology readiness denotes the state of preparedness within a society or organisational framework to incorporate and utilise technological advancements, encompassing infrastructural adequacy, skill proficiency, and a general disposition to accept technology. AI readiness specifically refers to a community's ability to embrace, adopt, implement, and effectively utilise AI technologies, with considerations for educational frameworks, policy structures, and innovation support. This research will provide comprehensive information for healthcare organisations, institutes of learning and policymakers to improve the integration of technology and AI in training and clinical practices for nurses and nurse educators in Nigeria.

Study Aims and Objectives

This study aimed to determine the level of knowledge and readiness of Nigerian nurses and nurse educators for technology and AI in their practices and teaching. The specific objectives were:

i. To evaluate the current level of technological use and familiarity with AI tools among Nigerian nurses and nurse educators.
ii. To ascertain the perception of Nigerian nurses and nurse educators towards the integration of Technology and AI in training and practice.

iii. To determine the readiness of Nigerian nurses to utilize Technology and AI in training and practice.
iv. To identify barriers hindering Nigerian nurses and nurse educators from adopting technology and AI in training and practice.

Methods

Study Area and Population

The study was conducted in Oyo State, an inland Yoruba-dominant state in southwest Nigeria with Ibadan as its capital city. Oyo State is the sixth most populated state in Nigeria, with an estimated 7,840,864 residents in 2016, while Ibadan is presently the third most populated city in Africa. The study population comprised the 1373 registered nurses in Oyo State practising in both clinical and academic settings. The total number of registered nurses was provided by the Oyo State branch of the National Association of Nigerian Nurses and Midwives.

Study Design

This study utilised a cross-sectional quantitative survey design to explore and describe Nigerian nurses' readiness to embrace artificial intelligence and other technologies in their practice, across both clinical and academic spheres.

Sample and Sampling Method

To determine sample size, the population and the type of research were considered, and the proportional allocation formula was determined as the most appropriate, as shown below. Using proportional allocation formula: $n_i = N_i/N \; x \; n$ where n_i = sample size for group, N_i = size of group I, N = total population size (1373), n = desired total sample size (using 10% of the population), and n= 137, with a 10% attrition rate. Although 137 questionnaires were administered, 115 valid responses were obtained.

The random sampling technique was adopted, using various telephone contacts from nursing groups, drawn after permission was sought from the group and the admins. Hospitals were physically visited to obtain responses from nurses selected at random from the list of employed nurses using the Wheelspin Application. This was the most suitable method as each member of the population had an equal chance of being selected. Participants were only Nurses and Nurse Educators in Oyo State who were in active practice, willing, and able to participate in the study.

Data Collection

The questionnaire was developed using the Technology Readiness Index (TRI) [13] and the Artificial Intelligence Readiness Score (AIRS) [14]. It comprised sociodemographic data, level of technology literacy, perception of technology and AI integration into practice, readiness to utilise technology and AI tools, and barriers towards the adoption of technology and AI.

2.5 Data Analysis

Descriptive statistical analysis was carried out using tables, frequencies, percentages, means, and standard deviations. Data cleaning and checking data for missing values, outliers, and errors were conducted. Fisher's exact test was used to determine relationships among variables; the significance level was 0.05, and the analyses were carried out in Microsoft Excel and IBM SPSS version 29.

Ethical Considerations

Ethical approval was obtained from the Oyo State Ministry of Health Research Ethics Committee, Ibadan, Oyo State, with approval number NHREC/OYOSHRIEC/10/11/22 on 13th of May 2024 and subsequently presented to heads of health institutions and nursing schools in Oyo State for permission to conduct the

study. The platforms for the Nigerian National Association of Nursing and Midwives (NNANM), Oyo State Chapter was also approached for access to nurses in facilities across the state. Data collection was conducted via electronic questionnaires sent to respondents via email and other secure channels, including scanning QR codes and direct WhatsApp. Informed consent, respondents' anonymity, and self-autonomy were maintained throughout the research.

Results

A total of 115 questionnaires were administered to respondents, and 115 were retrieved and analysed using Statistical Package for the Social Sciences (SPSS) version 29. Details of the results obtained are presented in tables and charts shown below, and the testing of hypotheses is presented.

Table 1: Sociodemographic Profile of Respondents (n= 115)

Characteristics	Response	Frequency	Percentage
Age	20-39 years	4	3.5
	30-39 years	22	19.1
	40-49 years	40	34.8
	50 and above	49	42.6
Gender	Female	105	91.3
	Male	10	8.7
Religion	Christianity	94	81.7
	Islam	21	18.3
Educational Qualification	Bachelor's Degree	72	62.6
	Diploma/Associate Degree	22	19.1
	Master's Degree or higher	21	18.3
Nursing Role	Clinical Nurse	91	79.1
	Nurse Educator	4	3.5
	Both	20	17.4
Designation of practice	College of Health	3	2.6
	College of Nursing	3	2.6
	Health Management Board	60	52.2
	LAUTECH teaching hospital	19	16.5
	Local Government	23	20.0
	Ministry of Health	7	6.1

Years of Work experience	0-2 Years	3	2.6
	3-5 Years	7	6.1
	6 years and above	105	91.3
Specialty in Nursing that best describes you	Nurse Anaesthetist	1	0.9
	Burns and plastic nursing	1	0.9
	Emergency Nursing	1	0.9
	General RN	15	13.0
	Infection control	1	0.9
	Mental Health Nursing	2	1.7
	Midwifery	55	47.9
	Nephrology Nursing	1	0.9
	Nursing Administration	1	0.9
	Nursing Education	2	1.7
	Occupational Health Nursing	1	0.9
	Paediatric Nursing	1	0.9
	Perioperative Nursing	5	4.3
	Public Health Nursing	28	24.4

Table 1 shows that 42.6% of respondents were aged 50 years or older, 91.3% were female, 81.7% practised Christianity, 62.6% had a bachelor's degree, and 79.1% were clinical nurses. Additionally, 52.2% worked with the hospital management board, and 91.3% had 6 or more years of work experience. Speciality Profile of Respondents (n=115) Table 1b shows that a high proportion of the respondents 55(47.9%) were midwives, less than half of them 28(24.4%) were public health nurse, few of them 15(13.0%) were general registered nurse while very few of them 1(0.9%) were nurse anaesthetist, burns and plastic nurse, occupational health nurse, paediatric nurse, nephrology nurse and emergency nurse.

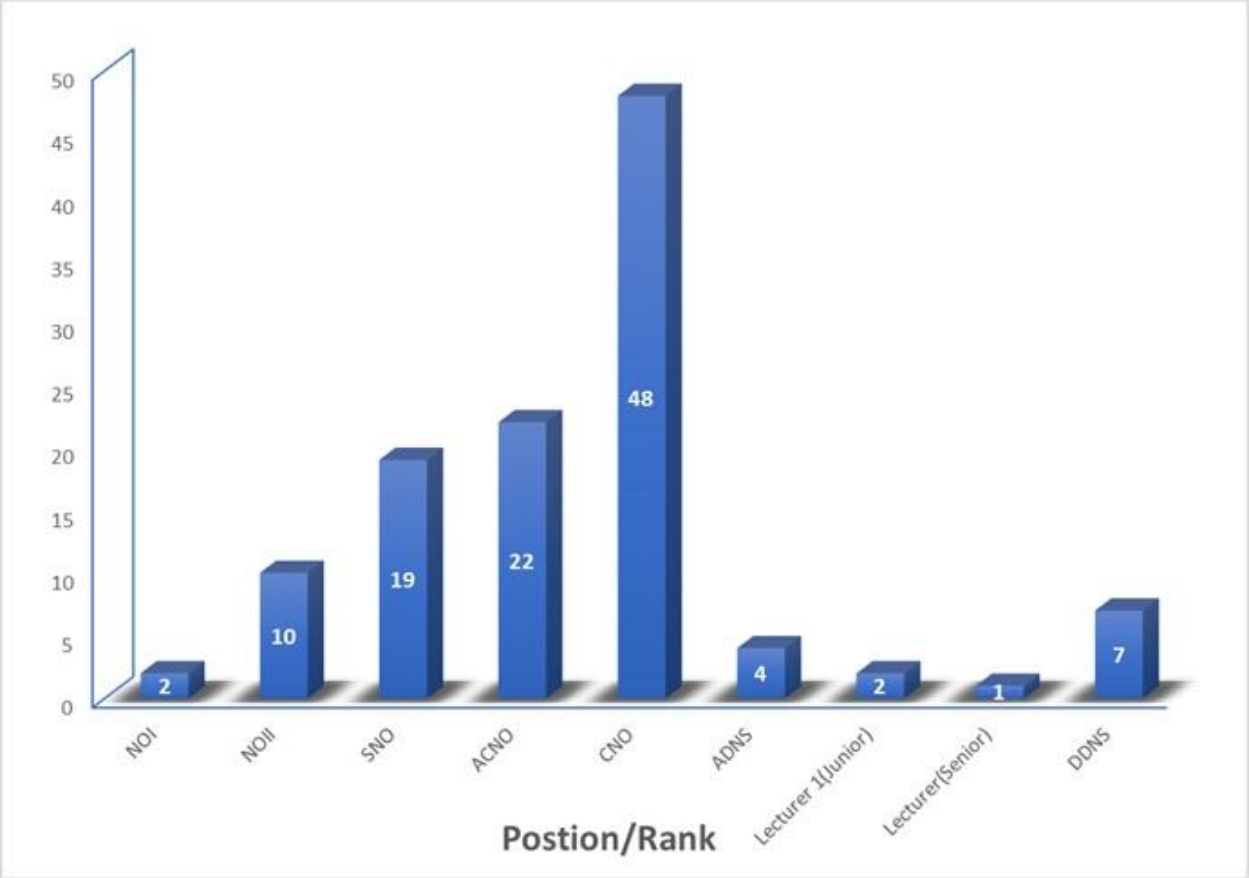

Figure 1: Position/Rank of the respondents (n=115)

Figure 1 showed that most nurses were CNOs (41.0%), followed by ACNOs (22.0%), SNOs (19,0%), and NO1s (10,0%).

Table 2: Nurses and Nurse Educators' level of Technology Use and familiarity with AI tools (n=115).

Variable	**Response**		**Frequency**	**Percentage**
Have you used any technology or AI tools in your nursing practice or teaching?	No		31	27.0
	Yes		84	73.0
If yes, how often do you use it?	Everyday		45	39.1
	Once a week		22	19.1
	Once a month		17	14.8
	Not Applicable		31	27.0
		Yes (%)	***No (%)***	***NA (%)***

If yes, which type of technology or AI tools have you used before	Electronic Health Records	0 (0.0)	85(73.0)	31(27.0)
	Telehealth	63 (54.8)	21(18.2)	31(27.0)
	Digital Monitors	83 (72.1)	1(0.9)	31(27.0)
	Smart beds	42 (36.5)	42(36.5)	31(27.0)
	Robotics	20(17.4)	64(55.6)	31(27.0)
	Infusion pumps	43(37.4)	41(35.6)	31(27.0)
	AI-Virtual health assistant	20(17.4)	64(55.6)	31(27.0)
	Wearable Health Devices	20(17.4)	64(55.6)	31(27.0)
	Clinical decision support system	62(53.9)	22(19.1)	31(27.0)
	AI-powered chatbots	40(34.8)	44(38.2)	31(27.0)
If yes, what did you use it for?	Accurate diagnosis	62(53.9)	22(19.1)	31(27.0)
	Management of rare diseases	42(36.5)	42(36.5)	31(27.0)
	Health education	84(73.0)	0(0.0)	31(27.0)
	Monitoring of Vital signs	64(55.7)	20(17.3)	31(27.0)
	Managing medications and reducing dosage errors	43(37.4)	41(35.6)	31(27.0)
	Assisting surgeons in the operating room	21(18.2)	63(54.8)	31(27.0)
	Answering patients' queries	43(37.4)	41(35.6)	31(27.0)
	Managing patients from home	44(38.2)	40(34.8)	31(27.0)
	Teaching	63(54.8)	21(18.2)	31(27.0)

	Learning and personal assignment	41(35.6)	43(37.4)	31(27.0)
	Professional or academic research	41(35.6)	43(37.4)	31(27.0)

Table 2 reveals that most respondents (73.0%) have used technology or AI tools in their nursing practice or teaching, with 19.1% using AI daily, 14.8% using it weekly, and over half (54.8%) having experience with telehealth, digital monitors, and clinical decision support systems. However, more than half have not used wearable health devices, robotics, or AI-virtual health assistants, and the majority (73.9%) have not used electronic health records, though many have used AI for accurate diagnosis, health education, and vital signs monitoring.

Table 3: Perception of Nurses and Nurse Educators Towards Integration of Technology and AI Tools in Practice (n=115)

Variables	**SA (%)**	**A (%)**	**D (%)**	**SD (%)**	**NA (%)**
Perception of the Benefits of AI					
Tech and AI tools are available to help nurses with their work	52(45.2)	48(41.7)	12(10.4)	2(1.7)	1(0.9)
Tech and AI tools can help nurses have more control over their daily lives	45(39.1)	51(44.3)	15(13.0)	0(0.0)	4(3.5)
Tech and AI tools have the potential to improve healthcare delivery	76(66.1)	34(29.6)	5(4.3)	0(0.0)	0(0.0)
Tech and AI tools have the potential to improve patient outcomes	62(53.9)	49(42.6	4(3.5)	0(0.0)	0(0.0)
Educational Tech and AI tools will help to improve students' experience	67(58.3)	44(38.3)	3(2.6)	1(0.9)	0(0.0)
Tech and AI tools will improve nurses' personal and professional actions	65(56.5)	48(41.7)	2(1.7)	0(0.0)	0(0.0)
Tech and AI tools utilisation can enhance nurses' quality of life	54(47.0)	56(48.7)	4(3.5)	1(0.9)	0(0.0)
Tech and AI tools utilisation will offer nurses more freedom and flexibility	49(42.6)	52(45.2)	11(9.6)	3(2.6)	0(0.0)
Tech and AI tools utilisation can make nurses' work less stressful	66(57.4)	45(39.1)	4(3.5)	0(0.0)	0(0.0)
Perceptions of Negative Impacts of AI					
I feel like Tech and AI tools will do more harm than good	1(0.9)	10(8.7)	86(74.8)	17(14.8)	1(0.9)

I believe that Tech and AI tools will make our students and nurses lazy	2(1.7)	29(25.2)	69(60.0)	15(13.0)	0(0.0)
I believe that Tech and AI tools are always difficult to learn	0(0.0)	10(8.7)	82(71.3)	21(18.3)	0(0.0)
I believe Tech and AI tools are always difficult to use	1(0.9)	11(9.6)	77(67.0)	26(22.6)	0(0.0)

I believe Tech and AI tools will take over nursing jobs	4(3.5)	22(19.1)	66(57.4)	23(20.0)	0(0.0)
I believe Tech and AI tools Tech and AI tools are a risk for patients	2(1.7)	11(9.6)	77(67.0)	23(20.0)	2(1.7)

Keys: SA; Strongly Agree, A: Agree, SD: Strongly Disagree, D: Disagree, NA: Not Applicable

Table 3 shows that the majority of respondents believe AI tools improve healthcare delivery, enhance nurses' quality of life, and reduce work stress, while only a small percentage disagreed. Most respondents also disagreed with the negative impacts of AI, including concerns about harm, laziness, and risks to patients.

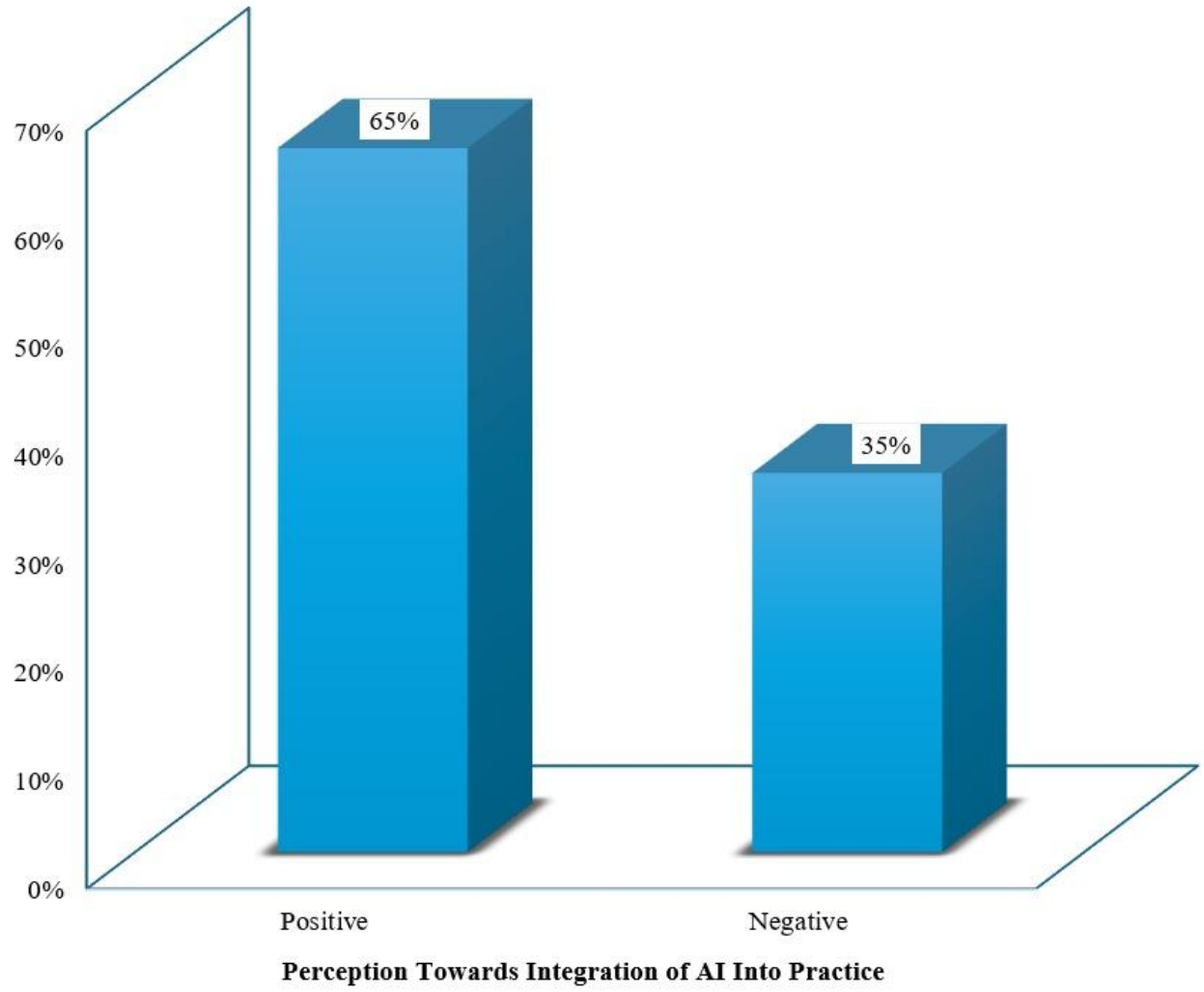

Figure 2: Perception of the respondents towards integration of AI tools into practice (n=115)

Using Strongly Agree 4, Agree 3, Disagree 2, Strongly Disagree 1, and Not Applicable 0. The respondents' perceptions were collated into a score range of 0 to 60, with 42 (i.e., 50%) as the cut-off for a positive perception. The aggregate is shown in Figure 2, with 65% of respondents reporting a positive perception of the integration of AI tools.

Table 4: Readiness to utilise technology and AI tools (n=115)

Items	SA (%)	A (%)	D (%)	SD (%)	NA (%)
I am interested in learning about various Technologies and AI uses	77(67.0)	37(32.2)	1(0.9)	0(0.0)	0(0.0)
I actively seek information and updates about AI and new technologies	46(40.0)	59(51.3)	9(7.8)	0(0.0)	1(0.9)
I am confident in my ability to use various AI tools effectively	33(28.7)	64(55.7)	14(12.2)	2(1.7)	2(1.7)
I am excited about the potential benefits of Technology and AI to my personal and professional development	42(36.5)	71(61.7)	2(1.7)	0(0.0)	0(0.0)
I feel like the use of AI in various situations will make me comfortable	47(40.9)	60(52.2)	6(5.2)	0(0.0)	2(1.7)
I frequently use AI applications for personal and professional purposes	28(24.3)	55(47.8)	24(20.9)	2(1.7)	4(3.5)
I share my experiences and opinions about AI with other nurses	16(13.9)	67(58.3)	22(19.1)	7(6.1)	1(0.9)
I recommend AI applications to other nurses	30(26.1)	70(60.9)	7(6.1)	2(1.7)	3(2.6)

Keys: SA; Strongly Agree, A: Agree, SD: Strongly Disagree, D: Disagree, NA: Not Applicable

Table 4 shows strong interest in AI among nurses: 67.0% strongly agreed they want to learn about AI, 51.3% actively seek updates, and 61.7% are excited about the benefits of AI. In addition, 60.9% recommend AI tools to peers, and 58.3% share their experiences, and 19.1% disagreed with doing so.

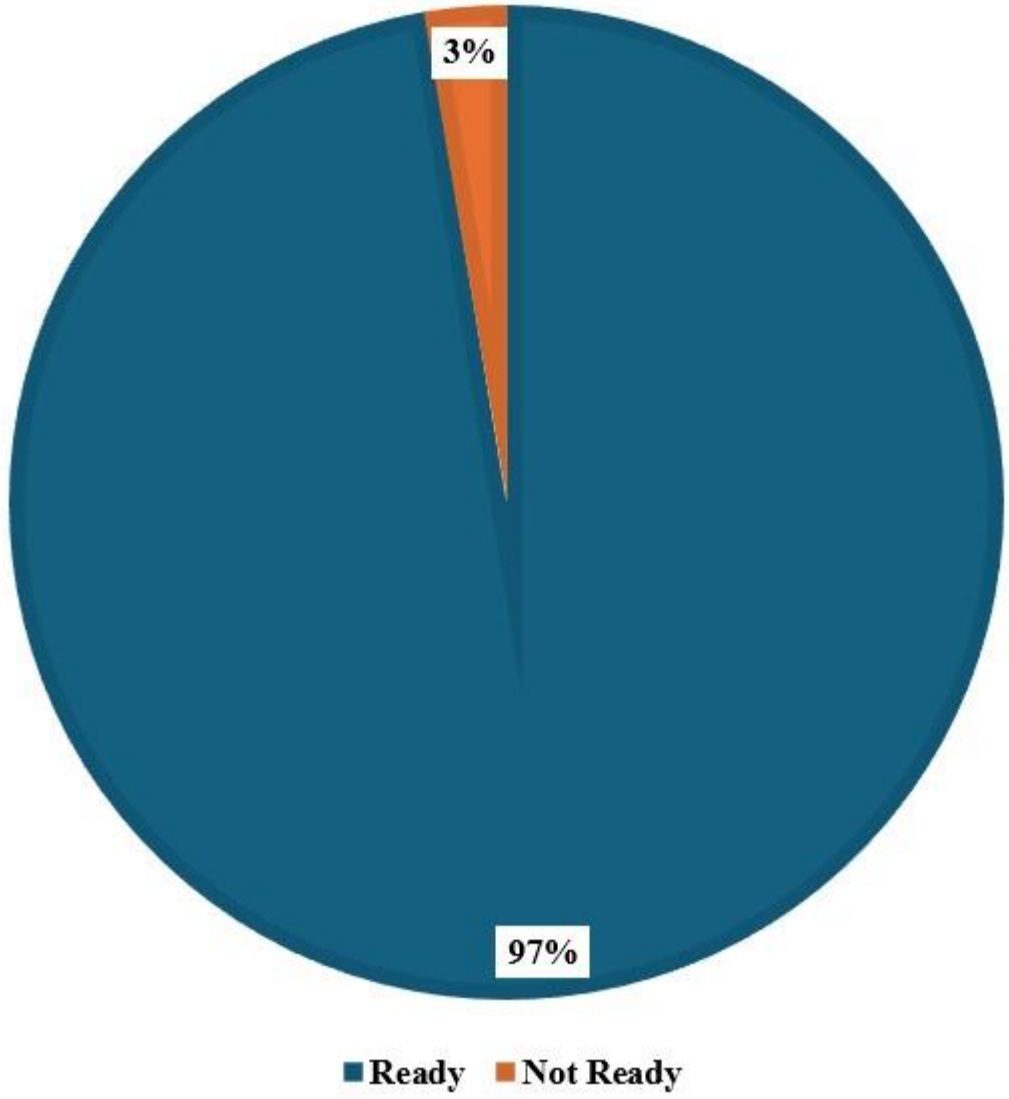

Figure 3. Average readiness to utilise technology and AI tools among nurses (n=115)

Using Strongly Agree 4, Agree 3, Disagree 2, Strongly Disagree 1, and Not Applicable 0, Figure 3 reveals a high level of readiness among the nurses to utilise technology and AI tools, with 97.4% (112 out of 115) scoring above 50% cut-off. Only 2.6% (3 nurses) fell below the benchmark.

Table 5: Barriers to the adoption of technology and AI tools in practice (n=115)

Items	SA (%)	A (%)	D (%)	SD (%)	NA (%)
I feel technology systems are too difficult for me to understand	1(0.9)	10(8.7)	**92(80.0)**	12(10.4)	0(0.0)
I feel apprehensive about using technologies that I am not familiar with	1(0.9)	39(33.9)	**66(57.4)**	7(6.1)	2(1.7)
I don't feel confident using unfamiliar or new technologies or AI	3(2.6)	30(26.1)	**68(59.1)**	12(10.4)	2(1.7)
I feel frustrated and irritated with the use of new technology and AI	1(0.9)	9(7.8)	**85(73.9)**	17(14.8)	3(2.6)
I waste a lot of time and effort with the use of technology and AI	2(1.7)	13(12.2)	**77(67.0)**	19(16.5)	3(2.6)
I fear installing any AI in my electronics due to personal data safety issues	4(3.5)	23(19.2)	**65(56.5)**	23(20.0)	1(0.9)
I often need assistance and support when I use new technologies or AI	9(7.8)	**48(41.7)**	**46(40.0)**	12(10.4)	0(0.0)
The necessary technologies and AI tools are not available to me for work	23(20.0)	**52(45.2)**	32(27.8)	6(5.2)	2(1.7)
I believe Tech and AI tools are very expensive to acquire and maintain	8(7.0)	**52(45.2)**	**41(35.7)**	13(11.3)	1(0.9)
There are no infrastructures to support and enhance the use of technology	18(15.7)	**54(47.0)**	37(32.2)	5(4.3)	1(0.9)
There is no training to support and enhance the use of technology	25(21.7)	**45(39.1)**	41(35.7)	4(3.5)	0(0.0)
My organisation is against the use of AI for practice or teaching	2(1.7)	12(10.5)	**76(66.1)**	14(12.2)	11(9.6)
I have heard a lot of negative things about AI, and I don't even want it	4(3.5)	8(6.9)	**80(69.6)**	14(12.2)	9(7.8)

Keys: SA; Strongly Agree, A: Agree, SD: Strongly Disagree, D: Disagree, NA: Not Applicable

Table 5 shows that most respondents disagreed with statements about technology being difficult to understand, frustrating, or time-consuming, while nearly half felt they often need support and lack access to necessary AI tools. A majority also disagreed with their organisation being against AI or hearing negative things about it.

Table 6: Fisher's exact contingency test of Statistical associations between selected socio-demographic characteristics and perception of the respondents towards integration of technology and AI tools in practice (n=115)

		Perception		***Df***	X^2	***p***
		Negative	**Positive**			
Age	20-39 Years	11 (42.3)	15(57.7)	1	0.019	1.000
	40 and above	39 (43.8)	50(56.2)			
Educational Qualification	Bachelor's Degree / Masters	43(46.2)	50(53.8)	1	1.505	0.242
	Diploma/Associate	7(31.8)	15(68.2)			
Designation of Practice	Clinical Nursing Institution	48 (44.0)	61 (56.0)	1	0.265	0.696
	Educational Nursing Institution	2(33.3)	4(66.7)			
Years of work experience	0-5 Years	5(50.0)	5(50.0)	1	0.190	0.745
	6 years and above	45(42.9)	60(57.1)			
Nursing Role	Clinical Nurse	38 (41.8)	53(58.2)	1	0.525	0.495
	Nurse Educator +/- Clinical	12(50.0)	12(50.0)			
Previous Utilisation of AI in Nursing Practice	Yes	32(38.1)	52(61.9)	1	3.674	0.067
	No	18(58.1)	13(41.9)			

**Significant, HMB: Hospital Management Board, LTH: LAUTECH Teaching Hospital, LGA: Local Government Area, MOH: Ministry of Health*

Table 6 shows that no statistically significant relationships exist between socio-demographic characteristics and nurses' perceptions of AI integration (all p-values > 0.05). However, the percentage trends reveal a subtle difference in perceptions, with nurses aged 20-39 (57.7%) having slightly more positive perceptions than those aged 40+ (56.2%). Similarly, diploma/associate holders (68.2%) vs bachelor's/master's (53.8%. Nurses in academia (66.7%) showed a more positive perception towards AI than clinical nurses (56.0%), and nurses with 6+ years of experience (57.1%) were slightly more positive than those with less experience (50.0%). Notably, nurses with prior AI use (61.9%) had a bit more favourable perception than those without (58.1%) (p=0.067)

Table 7: Fisher's exact contingency test of statistical associations between selected socio-demographic characteristics and the respondent's readiness to utilise technology and AI tools (n=115)

		Readiness		Df	X2	p
		Not Ready	Ready			
Age	20-39 Years	0 (0.0)	26(100.0)	1	0.900	1.000
	40 and above	3 (3.4)	86(96.6)			
Educational Qualification	Bachelor's Degree / Masters	3 (3.2)	90(96.8)	1	0.729	1.000
	Diploma/Associate	0(0.0)	22(100.0)			
Designation of Practice	Clinical Nursing Institution	2(1.8)	107(98.2)	1	4.924	0.150
	Educational Nursing Institution	1(16.7)	5(83.3)			
Years of work experience	0-5 Years	0(0.0)	10(100.0)	1	0.293	1.000
	6 years and above	3(2.9)	102(97.1)			
Nursing Role	Clinical Nurse	3 (3.3)	88(96.7)	1	0.812	1.000
	Nurse Educator +/- Clinical	0(0.0)	24(100.0)			
Previous Utilisation of AI in Nursing Practice	Yes	1(1.2)	83(98.8)	1	2.467	0.176
	No	2(6.5)	29(93.5)			

**Significant, HMB: Hospital Management Board, LTH: LAUTECH Teaching Hospital, LGA: Local Government Area, MOH: Ministry of Health*

Table 7 shows no significant differences between nurses' readiness to utilise AI tools across sociodemographic groups (all $p > 0.05$). However, readiness was generally high among nurses aged 20-29, with 100% readiness among those with a diploma/associate degree, and clinical nurses (98.2%) and those with prior AI use (98.8%) also reported strong readiness. There was a minimal difference across groups.

Table 8: Fisher's exact contingency test of statistical associations between selected socio-demographic characteristics and the respondent's use of technology and AI tools (n=115).

		AI tools Utilisation		*Df*	X^2	*p*
		Not Used	**Used**			
Age	20-39 Years	8 (30.8)	18 (69.2)	1	0.248	0.622
	40 Years and above	23 (25.8)	66 (74.2)			
Educational Qualification	Bachelor's Degree/Masters	24 (25.8)	69 (74.2)	1	0.327	0.598
	Diploma/Associate	7 (31.8)	15 (68.2)			
Designation of Practice	Clinical Nursing Institution	29 (26.6)	80 (73.4)	1	0.131	0.660
	Educational Nursing Institution	2 (33.3)	4 (66.7)			
Years of work experience	0-5 Years	2 (20.0)	8 (80.0)	1	0.269	0.727
	6 Years and above	29 (27.6)	76 (72.4)			
Nursing Role	Clinical Nurse	26 (28.6)	65 (71.4)	2	0.578	0.607
	Nurse Educator +/- Clinical	5 (20.8)	19 (79.2)			
Gender	Female	29 (27.6)	76 (72.4)	1	0.269	0.727
	Male	2 (20.0)	8 (80.0)			

Significant at 0.05

Table 8 shows no significant association between sociodemographic attributes and prior use of AI tools (all $p > 0.05$). Nonetheless, slight variations were noticed as nurses aged 40+ (74.2%) used AI tools more than those aged 20-39 (69.2%), and bachelor's/master's holders (74.2%) more than diploma/associate holders (68.2%)/ Also, clinical nurses (73.4% and those with 0-5 years' experience (80.0%) also showed marginally higher usage. Differences across gender and nursing roles were less significant.

Discussion

This study aimed to evaluate the readiness of Nigerian nurses and nurse educators in Oyo state to integrate technology and AI into their training and clinical practice. The findings provide valuable insights into the current state of technological use, perceptions, readiness, and the barriers nursing professionals face when adopting advanced technologies in a developing country context.

Current Level of Technological Use and AI Familiarity

The results indicate a moderate level of technological use and AI familiarity among the surveyed nurses and nurse educators. The result of this study aligns with the findings of the integrative review by Gausse [15], which noted an upward trend in technology use for teaching and learning among nurses and that this use extends beyond classroom boundaries into the clinical sector. This is expected, as computer literacy is increasingly essential for nursing students and faculty, with formal coursework evolving from basic computer use to more advanced applications such as data analysis and computer-assisted instruction [16–18].

However, the finding that 27% had never used any technology at work is concerning and highlights a significant digital divide that needs to be addressed. This might be linked to an interest gap among nursing educators, as studies have demonstrated that some faculty members are yet to familiarise themselves with AI technologies [19]. The most used technologies were digital monitors (72.1%), telehealth (54.8%), and clinical decision support systems (53.9%). This reflects the growing integration of these tools in healthcare settings globally [20–22]. However, more advanced AI and technology applications like AI-virtual health assistants, wearable health devices, and robotics saw limited use (17.4% each), suggesting a gap in exposure to cutting-edge technologies, which may be attributed to resource limitations and infrastructure challenges in Nigeria and other developing countries [23–25]. Also, the study by Jallad et al. [26] revealed that nurses use technology: 9.8% utilised simulation, 5.4% used virtual reality, 19.1% used ChatGPT, 42.2% used mobile applications, and 23.5% used PowerPoint as part of the learning process.

Interestingly, no respondents reported using EHR. This is in sharp contrast with the dynamics in some developing and developed countries, such as the US, with 96% adoption rate in 2017, China, with an adoption rate of 85.3% in 2018, and Europe, with rates ranging from 60 to 90% [27,28]. A similar trend is seen, however, in low- and middle-income countries, especially in Sub-Saharan Africa, where the scarcity may be attributable to the implied high costs of procurement and maintenance, poor access to power and internet, and insufficient training [29,30]. There is thus the need to efficiently pursue the investment in basic health IT infrastructure in Nigeria, as enshrined in the National Policy on Health Workforce Migration [31], to lay the groundwork for more advanced AI integration.

Perceptions Towards Technology and AI Integration

The study revealed predominantly positive perceptions towards technology and AI integration among Nigerian nurses and nurse educators. The majority agree that tech and AI tools have the potential to improve healthcare delivery (95.7%) and patient outcomes (96.5%). These figures are slightly higher than those reported by Wang [32] among 1,243 nursing professionals in 25 provinces and municipalities in China. It is also slightly higher than figures from Germany, where Sommer et al [33] reported that two-thirds of German nurses view AI as an opportunity. This optimism is commendable and shows promise for easy adoption and integration of different AI technologies in nursing in Oyo State and Nigeria.

Respondents also strongly agreed that educational technology and AI tools can improve students' learning experience (96.6%). This perception is supported by evidence from nursing education literature demonstrating the benefits of simulation technologies, AI-enhanced learning tools, and other tools in improving clinical reasoning skills and knowledge retention [25,26,33,34].

However, it is noteworthy that a significant minority (26.9%) believed that technology and AI tools might make students and nurses lazy, and that they will take over nursing jobs (22.6%). These concerns resonate with broader debates in the literature about the potential negative impacts of over-reliance on technology in healthcare education and practice [35,36]. There is a need to address these concerns through proper training and by emphasising the complementary role of AI to human expertise to ensure successful integration.

Readiness to Utilise Technology and AI Tools

The study found that 97.4% of respondents were ready to utilise technology and AI tools in practice, while 2.6% were not. This implies that there is an overwhelming readiness among nurses to embrace technology and AI in their practice/teaching. This suggests that the majority of nurses see the value in these tools and are willing to integrate them into patient care and workflow processes. While there is a lower level of confidence in using AI tools effectively (84.4%) and in the frequency of AI application use (72.1%), there is a high level of interest in learning about various technologies and AI uses (99.2%), which has also been reported in other studies of nurses and nursing educators [7,37]. This suggests a gap between interest and practical implementation, with a strong foundation for building readiness and improving adoption, which should be leveraged to address the needs.

The respondents pointed out issues which might hinder the adoption of AI and technology in nursing practice; the findings align with the Technology Acceptance Model (TAM), which posits that perceived usefulness and ease of use are key determinants of technology adoption [37–39]. The high interest levels suggest perceived usefulness, but the lower confidence levels point to concerns that may require targeted training and user-friendly interfaces to assuage and boost readiness levels.

The current analysis revealed no significant association between previous utilisation of AI tools in practice or teaching and nurses' readiness to utilise AI. This contrasts with earlier findings, including those of Thapa et al [40] which reported a significant relationship. The absence of an association in this study suggests that prior exposure to AI tools alone may not be a sufficient predictor of nurses' readiness. It is possible that other factors, such as organisational support, ongoing training, or perceived ease of use, play a more central role in shaping AI adoption readiness.

Similarly, no significant association was found between years of work experience or practice designation and nurses' readiness to utilise AI. While some studies have highlighted a potential influence of professional experience on technological readiness [41,42], other research suggests that experience does not consistently predict AI adoption behaviour [43]. This aligns with the present findings and indicates that readiness to adopt AI may depend more on individual attitudes, access to resources, or workplace culture than on tenure or rank alone.

Furthermore, the analysis found no significant relationship between nursing roles and perceptions toward the integration of AI tools in practice. This finding diverges from previous literature, suggesting that professional roles may shape how nurses perceive AI implementation, particularly with respect to ethical concerns, job security, and scope of practice [44–46]. The lack of association in this study may point to a more uniform perception of AI integration across different nursing roles, possibly due to shared educational backgrounds, common institutional policies, or generalised exposure to AI discourse

Barriers to Technology and AI Adoption

The study identified several key barriers hindering the adoption of technology and AI tools in nursing practice in Nigeria. The most prominent barriers were: unavailability of necessary technologies and AI tools (65.2%); insufficient infrastructure to support technology use (62.7%); inadequate training (60.8%); and perceived high costs of acquiring and maintaining tech and AI tools (52.2%).

These findings are consistent with challenges reported in other studies, especially in developing countries attempting to implement health IT and AI solutions[24,47,48]. The infrastructure and resource limitations highlight the need for strategic investments and partnerships to build the necessary technological ecosystem for AI integration in the Nigerian healthcare system.

It is interesting to note that personal factors such as difficulty understanding technology systems, fear of using unfamiliar technologies were less prominent barriers (9.6% and 28.7% respectively). This suggests that the primary obstacles are systemic and resource-related, rather than individual resistance to change, which spells hope for future adoption efforts.

Finally, the need for assistance and support when using new technologies reported by about half of the respondents emphasises the importance of ongoing technical support and mentorship programmes in facilitating successful AI integration. This aligns with Booth et al [49] call for increased efforts by stakeholders to "*support nurses to become knowledgeable in, and generate new scientific knowledge on*" the applications of technology for improved nursing education and practice.

Implications for Practice and Policy

The findings of this study have several important implications for nursing practice, education, and health policy in Nigeria:

i. *Curriculum Integration*: There is a clear need to integrate technology and AI literacy into nursing education curricula at all levels. This should include hands-on experience with a range of health IT tools and AI applications to build practical skills and confidence.
ii. *Continuing Education*: Given the rapid pace of technological advancement, ongoing professional development programs focused on emerging health technologies and AI applications are crucial for keeping the nursing workforce current.
iii. *Infrastructure Investment*: Significant investment in basic health IT infrastructure, particularly in areas like EHR systems, is needed to create a foundation for more advanced AI integration.
iv. *Policy Framework*: The development of national policies and guidelines for the ethical and effective use of AI in nursing practice is essential to ensure patient safety and standardise implementation across different healthcare settings.
v. *Public-Private Partnerships*: Collaborations between government, healthcare institutions, and technology companies could help address resource limitations and accelerate the adoption of AI solutions in nursing practice.
vi. *User-Centred Design*: The development and implementation of AI tools should prioritise user-friendly interfaces and workflows that align with nursing practice realities in resource-limited settings.
vii. *Research and Innovation*: There is a need for more context-specific research on AI applications in nursing within the Nigerian healthcare system to identify the most impactful and cost-effective solutions.

Limitations and Future Research

This study provides valuable insights into the current state of readiness among nurses and nurse educators in utilising technology and AI in training and clinical practice in Nigeria. However, the sample was limited to Oyo State; future research on a national scale is needed to capture regional variations in technology readiness. Also, the study relied on self-reported measures of technological literacy and AI familiarity, which may be subject to inaccuracies in respondents' assessments of their own technological literacy and readiness. Nurses who were more technologically literate might have been more likely to participate. Future research could benefit from more objective assessments of these constructs, possibly through practical demonstrations or simulations.

Conclusion

This study demonstrates a high level of readiness among Nigerian nurses and nurse educators to adopt digital technologies and artificial intelligence in nursing education and practice. While this indicates strong interest and readiness, key systemic barriers such as the unavailability of necessary technologies, insufficient infrastructure, and inadequate training still need to be addressed, as they pose significant challenges to full-scale AI adoption. Policymakers, educators, and healthcare administrators must focus on

creating enabling environments through targeted strategies, such as education reform and infrastructure development, to facilitate the integration of AI. This study provides a foundation for developing interventions that prepare Nigerian nurses to embrace AI and improve healthcare delivery. Future research should expand to a broader geographic area and delve into specific AI applications, including qualitative data for deeper insights.

Recommendations

Based on the findings from the study, it is recommended that the Oyo state Ministry of Health, the Ministry of Education and the Nursing and Midwifery Council of Nigeria should take steps to address the identified challenges using the following steps:

1. Invest in digital and technological infrastructure across nursing schools and healthcare institutions.
2. Integrate digital health and AI competencies into undergraduate and postgraduate nursing curricula.
3. Strengthen continuous professional development programs focused on digital literacy and AI applications.
4. Develop institutional and national policies that support ethical and sustainable use of AI in nursing.
5. Foster collaboration among government, educational institutions, and technology partners to support implementation.

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Credit Authorship Contribution Statement

BOJ led the study conceptualisation, methodology, supervision, and project administration, conducted the formal analysis, and coordinated the manuscript drafting and revision. MBS contributed to conceptualisation, data analysis, curation, and visualisation, and participated in drafting and revising the manuscript. ECE, APO, GIA, EKA, AOA, NTB, CBA, and GSI contributed to the study methodology, data collection, and data management and reviewed the manuscript. VTO contributed to methodology, formal analysis, visualisation, and manuscript drafting and revision. All authors reviewed and approved the final manuscript.

Declaration of Competing Interest

The authors declare no conflicts of interest that could influence the results or interpretation of this manuscript. We have no financial or personal relationships with any individuals or organisations that could inappropriately influence our work. For completeness of declarations, this research was conducted as part of the Institute of Nursing Research (INR) Nigeria's Journal Club Mentorship project.

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References

1. De Gagne JC. The State of Artificial Intelligence in Nursing Education: Past, Present, and Future Directions. IJERPH. 2023;20:4884. https://doi.org/10.3390/ijerph20064884

2. Harmon J, Pitt V, Summons P, Inder KJ. Use of artificial intelligence and virtual reality within clinical simulation for nursing pain education: A scoping review. Nurse Education Today. 2021;97:104700. https://doi.org/10.1016/j.nedt.2020.104700

3. Rodriguez-Arrastia M, Martinez-Ortigosa A, Ruiz-Gonzalez C, Ropero-Padilla C, Roman P, Sanchez-Labraca N. Experiences and perceptions of final-year nursing students of using a chatbot in a simulated emergency situation: A qualitative study. J Nursing Management. 2022;30:3874–84. https://doi.org/10.1111/jonm.13630

4. Schachner T, Keller R, V Wangenheim F. Artificial Intelligence-Based Conversational Agents for Chronic Conditions: Systematic Literature Review. J Med Internet Res. 2020;22:e20701. https://doi.org/10.2196/20701

5. Robinson-Bassey GC, Edet OB. Nursing informatics education and use: challenges and prospects in Nigeria. Glo Jnl Pure Appl Sci. 2015;21:171. https://doi.org/10.4314/gjpas.v21i2.9

6. Al-Sabawy,. Artificial Intelligence in Nursing: A Study On Nurses' Perceptions and Readiness | PDF | Artificial Intelligence | Intelligence (AI) & Semantics [Internet]. Scribd. 2023 [cited 2026 Feb 1]. https://www.scribd.com/document/827744021/3-1. Accessed 1 Feb 2026

7. Labrague LJ, Aguilar-Rosales R, Yboa BC, Sabio JB. Factors influencing student nurses' readiness to adopt artificial intelligence (AI) in their studies and their perceived barriers to accessing AI technology: A cross-sectional study. Nurse Education Today. 2023;130:105945. https://doi.org/10.1016/j.nedt.2023.105945

8. Labrague LJ, Aguilar-Rosales R, Yboa BC, Sabio JB, De Los Santos JA. Student nurses' attitudes, perceived utilization, and intention to adopt artificial intelligence (AI) technology in nursing practice: A cross-sectional study. Nurse Education in Practice. 2023;73:103815. https://doi.org/10.1016/j.nepr.2023.103815

9. Ominini Brother Asako Walson PD, Jennifer Ngozi Blessing Okanu-Igwela PD. Issues, Challenges And Prospects In The Use Of Educational Technology For Instructional Delivery In The Management Of 21st University Education In Nigeria. Oklahoma State University Libraries; 2019 [cited 2026 Feb 1]; https://open.library.okstate.edu/adect/chapter/issues-challenges-and-prospects-in-the-use-of-educational-technology-for-instructional-delivery-in-the-management-of-21st-university-education-in-nigeria/. Accessed 1 Feb 2026

10. Shang Z. A Concept Analysis on the Use of Artificial Intelligence in Nursing. Cureus [Internet]. 2021 [cited 2026 Jan 30]; https://doi.org/10.7759/cureus.14857

11. Chang C, Jen H, Su W. Trends in artificial intelligence in nursing: Impacts on nursing management. J Nursing Management. 2022;30:3644–53. https://doi.org/10.1111/jonm.13770

12. Al Wael H, Abdallah W, Ghura H, Buallay A. Factors influencing artificial intelligence adoption in the accounting profession: the case of public sector in Kuwait. CR. 2024;34:3–27. https://doi.org/10.1108/CR-09-2022-0137

13. Mukerjee HS, Deshmukh GK, Prasad UD. Technology Readiness and Likelihood to Use Self-Checkout Services Using Smartphone in Retail Grocery Stores: Empirical Evidences from Hyderabad, India. Business Perspectives and Research. 2019;7:1–15. https://doi.org/10.1177/2278533718800118

14. Watkins R, Leigh D, Triner D. Assessing Readiness for E-Learning. Performance Improvement Quarterly. 2004;17:66–79. https://doi.org/10.1111/j.1937-8327.2004.tb00321.x

15. Gause G, Mokgaola IO, Rakhudu MA. Technology usage for teaching and learning in nursing education: An integrative review. Curationis [Internet]. 2022 [cited 2026 Jan 31];45. https://doi.org/10.4102/curationis.v45i1.2261

16. McNeil BJ, Elfrink VL, Bickford CJ, Pierce ST, Beyea SC, Averill C, et al. Nursing Information Technology Knowledge, Skills, and Preparation of Student Nurses, Nursing Faculty, and Clinicians: A U.S. Survey. J Nurs Educ. 2003;42:341–9. https://doi.org/10.3928/0148-4834-20030801-05

17. Nes AAG, Steindal SA, Larsen MH, Heer HC, Lærum-Onsager E, Gjevjon ER. Technological literacy in nursing education: A scoping review. Journal of Professional Nursing. 2021;37:320–34. https://doi.org/10.1016/j.profnurs.2021.01.008

18. Newbern VB. Computer Literacy in Nursing Education. Nursing Clinics of North America. 1985;20:549–56. https://doi.org/10.1016/S0029-6465(22)01898-9

19. Dorin M, Atkinson HL. Getting to know AI: Gaps and opportunities for nurse educators. Teaching and Learning in Nursing. 2024;19:218–24. https://doi.org/10.1016/j.teln.2024.02.013

20. Hilty DM, Armstrong CM, Edwards-Stewart A, Gentry MT, Luxton DD, Krupinski EA. Sensor, Wearable, and Remote Patient Monitoring Competencies for Clinical Care and Training: Scoping Review. J technol behav sci. 2021;6:252–77. https://doi.org/10.1007/s41347-020-00190-3

21. Papadopoulos P, Soflano M, Chaudy Y, Adejo W, Connolly TM. A systematic review of technologies and standards used in the development of rule-based clinical decision support systems. Health Technol. 2022;12:713–27. https://doi.org/10.1007/s12553-022-00672-9

22. Phuong J, Ordóñez P, Cao J, Moukheiber M, Moukheiber L, Caspi A, et al. Telehealth and digital health innovations: A mixed landscape of access. Kalua K, editor. PLOS Digit Health. 2023;2:e0000401. https://doi.org/10.1371/journal.pdig.0000401

23. Adebayo Olusegun Aderibigbe, Peter Efosa Ohenhen, Nwabueze Kelvin Nwaobia, Joachim Osheyor Gidiagba, Emmanuel Chigozie Ani. ARTIFICIAL INTELLIGENCE IN DEVELOPING COUNTRIES: BRIDGING THE GAP BETWEEN POTENTIAL AND IMPLEMENTATION. Comput sci IT res j. 2023;4:185–99. https://doi.org/10.51594/csitrj.v4i3.629

24. Alami H, Rivard L, Lehoux P, Hoffman SJ, Cadeddu SBM, Savoldelli M, et al. Artificial intelligence in health care: laying the Foundation for Responsible, sustainable, and inclusive innovation in low- and middle-income countries. Global Health. 2020;16:52. https://doi.org/10.1186/s12992-020-00584-1

25. Wahl B, Cossy-Gantner A, Germann S, Schwalbe NR. Artificial intelligence (AI) and global health: how can AI contribute to health in resource-poor settings? BMJ Glob Health. 2018;3:e000798. https://doi.org/10.1136/bmjgh-2018-000798

26. Jallad ST, Alsaqer K, Albadareen BI, Al-maghaireh D. Artificial intelligence tools utilized in nursing education: Incidence and associated factors. Nurse Education Today. 2024;142:106355. https://doi.org/10.1016/j.nedt.2024.106355

27. Jiang J (Xuefeng), Qi K, Bai G, Schulman K. Pre-pandemic assessment: a decade of progress in electronic health record adoption among U.S. hospitals. Health Affairs Scholar. 2023;1:qxad056. https://doi.org/10.1093/haschl/qxad056

28. Liang J, Li Y, Zhang Z, Shen D, Xu J, Zheng X, et al. Adoption of Electronic Health Records (EHRs) in China During the Past 10 Years: Consecutive Survey Data Analysis and Comparison of Sino-American Challenges and Experiences. J Med Internet Res. 2021;23:e24813. https://doi.org/10.2196/24813

29. Akwaowo CD, Sabi HM, Ekpenyong N, Isiguzo CM, Andem NF, Maduka O, et al. Adoption of electronic medical records in developing countries—A multi-state study of the Nigerian healthcare system. Front Digit Health. 2022;4:1017231. https://doi.org/10.3389/fdgth.2022.1017231

30. Derecho KC, Cafino R, Aquino-Cafino SL, Isla A, Esencia JA, Lactuan NJ, et al. Technology adoption of electronic medical records in developing economies: A systematic review on physicians' perspective. DIGITAL HEALTH. 2024;10:20552076231224605. https://doi.org/10.1177/20552076231224605

31. Akintayo O. Full Document On National Policy On Health Workforce Migration [Internet]. Channels Television. 2024 [cited 2026 Feb 1]. https://www.channelstv.com/2024/08/14/full-document-on-national-policy-on-health-workforce-migration/. Accessed 1 Feb 2026

32. Wang X, Fei F, Wei J, Huang M, Xiang F, Tu J, et al. Knowledge and attitudes toward artificial intelligence in nursing among various categories of professionals in China: a cross-sectional study. Front Public Health. 2024;12:1433252. https://doi.org/10.3389/fpubh.2024.1433252

33. Sommer D, Schmidbauer L, Wahl F. Nurses' perceptions, experience and knowledge regarding artificial intelligence: results from a cross-sectional online survey in Germany. BMC Nurs. 2024;23:205. https://doi.org/10.1186/s12912-024-01884-2

34. Loureiro F, Sousa L, Antunes V. Use of Digital Educational Technologies among Nursing Students and Teachers: An Exploratory Study. JPM. 2021;11:1010. https://doi.org/10.3390/jpm11101010

35. Khan B, Fatima H, Qureshi A, Kumar S, Hanan A, Hussain J, et al. Drawbacks of Artificial Intelligence and Their Potential Solutions in the Healthcare Sector. Biomedical Materials & Devices. 2023;1:731–8. https://doi.org/10.1007/s44174-023-00063-2

36. McBride S, Alexander GL, Baernholdt M, Vugrin M, Epstein B. Scoping review: Positive and negative impact of technology on clinicians. Nursing Outlook. 2023;71:101918. https://doi.org/10.1016/j.outlook.2023.101918

37. Pilcher JW, Bedford L. Willingness and Preferences of Nurses Related to Learning With Technology: Journal For Nurses in Staff Development (JNSD). 2011;27:E10–6. https://doi.org/10.1097/NND.0b013e318217b447

38. Scherer R, Siddiq F, Tondeur J. The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education. Computers & Education. 2019;128:13–35. https://doi.org/10.1016/j.compedu.2018.09.009

39. Davis FD. A technology acceptance model for empirically testing new end-user information systems: theory and results. 1985.

40. Thapa S, Nielsen JB, Aldahmash AM, Qadri FR, Leppin A. Willingness to Use Digital Health Tools in Patient Care Among Health Care Professionals and Students at a University Hospital in Saudi Arabia: Quantitative Cross-sectional Survey. JMIR Med Educ. 2021;7:e18590. https://doi.org/10.2196/18590

41. Alnasib BNM. Factors Affecting Faculty Members' Readiness to Integrate Artificial Intelligence into Their Teaching Practices: A Study from the Saudi Higher Education Context. IJLTER. 2023;22:465–91. https://doi.org/10.26803/ijlter.22.8.24

42. Chen Y, Wu Z, Wang P, Xie L, Yan M, Jiang M, et al. Radiology Residents' Perceptions of Artificial Intelligence: Nationwide Cross-Sectional Survey Study. J Med Internet Res. 2023;25:e48249. https://doi.org/10.2196/48249

43. Vogel M, Strina G, Said C, Schmallenbach T. The evolution of artificial intelligence adoption in industry. 2023 [cited 2026 Jan 31]. https://doi.org/10.54941/ahfe1003282

44. Abuzaid MM, Elshami W, Fadden SM. Integration of artificial intelligence into nursing practice. Health Technol. 2022;12:1109–15. https://doi.org/10.1007/s12553-022-00697-0

45. Sharma MK, Ramawat VK, Bhatt S. The Role of Artificial Intelligence in Nursing: Advancements, Challenges, and Future Directions. 2024;45.

46. Glauberman G, Ito-Fujita A, Katz S, Callahan J. Artificial Intelligence in Nursing Education: Opportunities and Challenges. Hawai'i Journal of Health & Social Welfare. 2023;82:302.

47. Borges Do Nascimento IJ, Abdulazeem H, Vasanthan LT, Martinez EZ, Zucoloto ML, Østengaard L, et al. Barriers and facilitators to utilizing digital health technologies by healthcare professionals. npj Digit Med. 2023;6:161. https://doi.org/10.1038/s41746-023-00899-4

48. Rony MKK, Akter K, Debnath M, Rahman MM, Johra FT, Akter F, et al. Strengths, weaknesses, opportunities and threats (SWOT) analysis of artificial intelligence adoption in nursing care. Journal of Medicine, Surgery, and Public Health. 2024;3:100113. https://doi.org/10.1016/j.glmedi.2024.100113

49. Booth RG, Strudwick G, McBride S, O'Connor S, Solano López AL. How the nursing profession should adapt for a digital future. BMJ. 2021;n1190. https://doi.org/10.1136/bmj.n1190