

READINESS OF HEALTHCARE FACULTY FOR ARTIFICIAL INTELLIGENCE INTEGRATION IN SIMULATION -BASED EDUCATION: A QUALITATIVE STUDY

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Abstract

Artificial Intelligence (AI) is transforming healthcare education and creating a growing need for educators who are prepared to integrate AI technologies effectively and responsibly into teaching and learning practices. Faculty readiness is critical for the successful implementation of AI-supported healthcare simulation education. This study aimed to explore the readiness, perceptions, and preparedness of healthcare educators regarding the implementation of AI-supported healthcare simulation education. A qualitative phenomenological research design was employed, and participants were selected through purposive sampling. Data were collected through semi-structured interviews and analyzed using thematic analysis. Four major themes emerged from the findings. Participants perceived AI as a valuable educational tool that enhances simulation realism, supports personalized learning, improves clinical decision-making, and provides immediate feedback. However, several technological and financial barriers were identified, including inadequate infrastructure, software limitations, unreliable internet connectivity, and high implementation costs. Participants also emphasized the importance of AI literacy, digital competencies, and practical training to ensure the effective use of AI technologies in healthcare simulation settings. Additionally, ethical concerns related to data privacy, security, and accountability were highlighted as important considerations for AI adoption. Overall, healthcare educators demonstrated positive attitudes toward AI-supported healthcare simulation education and recognized its potential to improve teaching and learning outcomes. However, successful integration requires addressing technological, financial, educational, and ethical challenges. The study concludes that comprehensive training programs, institutional support, adequate technological infrastructure, and clear policy

frameworks are essential for the effective and sustainable implementation of AI in healthcare simulation education.

INTRODUCTION

Artificial Intelligence (AI) has become one of the most influential technological innovations of the twenty-first century (Çağlar, 2026; Sadiq, 2025; Fu, 2026). It has revolutionized healthcare systems, learning, and workforce development (Panahi, 2025; Saeed, 2025). AI stands for artificial intelligence. Artificial intelligence is when computers can do things that usually require a human's intelligence (Duong, 2025; Alghamdi, 2025; Halpin, 2025). This includes things like learning, reasoning, problem-solving, decision-making and processing language. AI technologies are increasingly used in healthcare for disease diagnosis, clinical decision support, patient monitoring, predictive analytics and healthcare management (Kolla, 2025, Lashari, Morio & Jalbani, 20206). As healthcare settings become more and more digital, educational institutions are expected to prepare future healthcare professionals to work effectively with AI-enabled technologies. (WHO, 2025). Simulation-based education has become a cornerstone of healthcare training, offering learners safe and controlled environments for developing clinical competencies (Dzhumatovich, 2025; Yadav, 2025). Recent developments have allowed the incorporation of AI into simulation environments, resulting in improvements in realism, adaptive learning pathways, automated feedback systems, and personalized education experiences (Torun, 2025; Khakpaki, 2025; Lashari & Imran, 2023). AI-supported simulation can enable complex clinical scenarios, real-time performance assessment and support personalized learning needs (Cole, 2025; Khalifa, 2025). Thus, AI has the potential to improve students' critical thinking, clinical reasoning and decision-making skills while ensuring patient safety (WHO, 2025; Lashari & Umrani, 2023). Moreover, the integration of AI-driven virtual patients, intelligent tutoring systems, and learning analytics

in healthcare simulation programs is being increasingly adopted to enhance learner engagement and educational outcomes (Luckin & Cukurova, 2025; Schwendicke et al., 2025; Imran & Lashari, 2023).

The adoption of AI in health education is consistent with worldwide initiatives to promote digital transformation and prepare the workforce (Buriro et al., 2023; Semi, 2026). International organizations have identified AI literacy as a necessary competency for both educators and learners. The UNESCO AI Competency Framework emphasizes the need for educators to develop competencies in AI ethics, pedagogy, professional learning, and technological applications. The framework emphasizes the key role of teachers in facilitating the responsible and ethical use of AI in educational contexts (UNESCO, 2025). Furthermore, educators with higher levels of AI literacy are more likely to effectively integrate AI technologies and critically evaluate AI-generated outputs in educational settings (Chan & Hu, 2025; Miao et al., 2025). Likewise, the Organization for Economic Co-operation and Development (OECD) has highlighted the impact of AI and digital technologies on education systems and the skills that will be required of workers in the future. Educational institutions are thus expected to prepare learners with the digital competencies, critical thinking skills and adaptive problem-solving abilities required in AI-driven workplaces (Lashari, Morio & Jalbani, 2026; Lashari & Umrani, 2023). The OECD Skills Outlook 2025 highlights the need for lifelong learning and ongoing professional development to keep up with the rapidly evolving technological requirements (OECD, 2025). Similarly, the World Economic Forum (2025) recognizes AI competencies as critical skills for the workforce needed to address future healthcare and education challenges.

While interest in using AI is growing, successful implementation largely depends on faculty readiness. Faculty are charged with embedding AI technologies into curricula, enabling student engagement, ensuring ethical compliance, and assessing learning outcomes (Abbasi, Lashari & Golo, 2025). But, many educators say they don't have the knowledge, AI literacy and training opportunities, and have concerns about data privacy and ethical governance. Such challenges could impact educators' confidence and willingness to integrate AI technologies into healthcare simulation environments (Lashari & Umrani, 2023; Markus et al., 2025; Kennedy & Gupta, 2025). Research has also shown that faculty often need support in areas such as AI ethics, prompt engineering, data governance, and pedagogical applications of generative AI technologies (Lashari, Morio & Jalbani 2026; Tlili et al., 2025; Zawacki-Richter et al., 2025). Faculty preparedness is not only about technical competence but also about attitudes, perceptions, self-efficacy and organizational support (Lashari, Umrani & Buriro, 2021). Research indicates that teachers require comprehensive professional development programs that address the technical and pedagogical dimensions of AI integration. Institutions also need to provide adequate infrastructure, policy frameworks and finances to enable successful implementation (Abbasi, Lashari & Golo, 2025). Without adequate preparation, the educational potential of AI may remain underutilized (Cukurova et al., 2025; UNESCO, 2025). Further studies suggest that comprehensive faculty development programs can substantially enhance educators' readiness and confidence in utilizing AI-supported pedagogies (Chan & Hu, 2025). Faculty perceptions are particularly important in healthcare simulation education, as educators are key stakeholders in the adoption process. Their experiences and perspectives can provide valuable insights into opportunities, obstacles and support mechanisms needed for sustainable implementation (Buriro et al., 2023). Also, understanding faculty readiness might inform institutional efforts to build capacity,

develop policy, and reform curriculum. The purpose of this study, therefore, is to explore healthcare educators' readiness, perceptions and preparedness in the implementation of AI-supported healthcare simulation education.

Problem Statement:

Artificial Intelligence (AI) is changing healthcare education at a rapid pace, improving simulation-based learning, clinical decision-making, personalized instruction, and competency assessment (Pandey, 2025; Ganesh, 2025). AI-powered technologies are increasingly being used in simulation education in healthcare to increase realism and engagement for learners. Successful implementation of AI-supported simulation, however, is highly dependent upon the readiness and preparedness of faculty who design, facilitate, and evaluate educational experiences. Despite the increased investment in AI technologies, many educators lack the required AI literacy, digital skills and pedagogical knowledge to effectively integrate AI into teaching and learning practices. International organizations have underscored workforce readiness and educator competence as prerequisites for sustainable AI adoption in education (WHO, 2025; OECD, 2025; UNESCO, 2025).

The technical applications of AI in healthcare education have been studied. However, little is known about healthcare educators' perceptions, readiness, and preparedness to apply AI-supported simulation education. Faculty members face a lot of challenges including lack of technology infrastructure, training, money, ethical concerns about data privacy and uncertainty about how to govern AI. These barriers could prevent successful deployment of AI technologies and limit their learning benefits. There is a need to explore the experiences and perceptions of healthcare educators to gain a better understanding of the factors that influence AI readiness and to identify strategies that can facilitate successful implementation of AI-supported healthcare simulation education (WHO, 2025; Liu & Levy, 2026).

Research Objective:

1. To explore healthcare educators' perceptions of the role and potential benefits of Artificial Intelligence (AI) in healthcare simulation education.
2. To identify the technological and financial barriers perceived by healthcare educators as influencing the implementation of AI in healthcare simulation education.
3. To explore the knowledge, skills, competencies, and training needs considered necessary by healthcare educators for the effective use of AI in healthcare simulation education.
4. To examine the ethical concerns and other factors influencing healthcare educators' acceptance or resistance toward the implementation of AI in healthcare simulation education.

Research Question:

1. How do healthcare educators perceive the role and benefits of AI in healthcare simulation education?
2. What technological and financial barriers do healthcare educators perceive as influencing the implementation of AI in healthcare simulation education?
3. What knowledge, skills, competencies, and training do healthcare educators consider necessary for the effective use of AI in healthcare simulation education?
4. What ethical concerns and factors influence the acceptance or resistance of AI implementation in healthcare simulation education?

Literature Review:

There is a lot of interest in Artificial Intelligence in healthcare education because of its potential to improve teaching effectiveness, personalize the learning experience and improve simulation-based training. AI powered simulation systems can create authentic clinical scenarios, offer automated feedback, and enable adaptive learning based on student performance. Such technologies have been linked with enhanced learner

engagement, clinical reasoning and decision-making skills and AI represents a promising educational innovation in healthcare settings (WHO, 2025; Schwendicke et al., 2025). Faculty readiness has become a key factor for successful AI implementation. UNESCO's AI Competency Framework identifies three key domains for educators: AI literacy, ethical awareness, and pedagogical competence and professional development. The framework highlights that educators should have not only technical knowledge but also the ability to critically assess and responsibly use AI technologies in educational contexts (UNESCO, 2025). Similarly, Miao et al. (2025) suggest that AI literacy should consist of ethical awareness, critical evaluation skills, and responsible use of AI technologies to enable meaningful educational practices.

Recent work has highlighted the increasing significance of AI literacy in higher education. Markus et al. (2025) developed the AI Competency Objective Scale and found that AI literacy includes understanding AI concepts, evaluating AI-generated outputs, and applying AI responsibly in professional settings. Following this, Kennedy and Gupta (2025) proposed a holistic framework encompassing the technical, ethical, and sociocultural dimensions of AI literacy. Chan and Hu (2025) also emphasized that AI readiness does not only concern the technical aspect but also the confidence, attitudes, and willingness of educators to engage in AI-enabled teaching practices. Their findings suggest that specific professional development initiatives are successful in enhancing faculty readiness and technology utilization. The advantages of AI are well known, but there still remain many barriers to its implementation. Studies have shown that inadequate technological infrastructure, lack of internet connectivity, software compatibility problems, inadequate funding and lack of institutional support are major challenges. These barriers are particularly relevant in healthcare education, where simulation technologies often require significant financial investment and technical expertise (WHO, 2025). Moreover,

Zawacki-Richter et al. (2025) found that vague institutional policies and governance frameworks often lead to ambiguity of the responsible use of AI technologies. Again, Tili et al. (2025) showed insufficient professional support and scarce organizational resources as the principal barriers to the integration of AI in higher education.

Another important area in the literature is ethical issues. Faculty often raise issues relating to data privacy, algorithmic bias, transparency, accountability, and the potential misuse of AI-generated data. UNESCO (2025) stresses the importance of maintaining ethics at the forefront of AI implementation and the need for educators to be prepared to handle these issues in an effective way. Holmes et al. (2025) further argue that ethical implementation of AI requires fairness, explainability, transparency, and human oversight to ensure accountability in educational decisions and to keep the learner at the center. Repeatedly identified professional development and training as effective strategies to improve faculty preparedness. Liu and Levy (2026) proposed a developmental continuum of AI literacy, advancing the idea that educators develop from basic awareness to critical evaluation and improvement-oriented engagement with AI technologies. Also Cukurova et al. (2025) emphasized the significance of collaborative interactions between educators and AI systems, asserting that successful implementation depends on ongoing capacity building and institutional support. Luckin and Cukurova (2025) also support a partnership model that leverages the complementary strengths of educators and AI systems to improve educational effectiveness while maintaining the importance of human judgment. The existing literature describes the educational potential of AI and common implementation challenges, but there is limited qualitative research examining healthcare educators' lived experience and preparedness for the integration of AI-supported simulation education. Therefore, more research is needed to understand faculty perceptions, levels of readiness

and training needs to inform future policy, practice and faculty development initiatives.

Research Methodology:

Research Design

A qualitative phenomenological research design was utilized in this study to explore the lived experiences, perceptions, readiness and preparedness of healthcare educators in the implementation of Artificial Intelligence-supported healthcare simulation education. The phenomenological approach was considered appropriate as it allows a deep understanding of participants' experiences, beliefs and perspectives related to a particular phenomenon.

Sampling Technique:

Participants with relevant knowledge and experience in healthcare education and simulation-based training were recruited using a purposive sampling technique. Faculty members from healthcare disciplines directly involved in teaching, simulation facilitation or curriculum development were selected as they could provide rich and meaningful insights regarding the integration of AI within healthcare education.

Research Instrument:

Data were collected using a semi-structured interview guide, developed based on the literature on AI in healthcare education, faculty readiness and digital competencies. The interview guide consisted of open-ended questions that aimed to elicit participants' views on their perceptions, experiences, preparedness, challenges and training needs within the context of AI supported simulation education. Follow-up probing questions were asked to elicit more detailed and clarified responses. Questionnaire was validated by experts opinions and was piloted prior to the actual data collection process.

Ethical Consideration:

Data collection was approved by the appropriate Institutional Review Board before data collection. Participants were advised of the study's purpose,

voluntary nature of participation, confidentiality of information, and their right to withdraw from the study at any stage without penalty. All participants provided their written informed consent before the interviews. Participants' identities were protected through the use of pseudonyms and all data collected were stored securely and used for research purposes only.

Data Analysis:

Thematic Analysis:

Data was collected and is analyzed using Braun and Clarke thematic analysis technique. After coding and chunking following themes erupted from the data.

Theme 1: Positive Perceptions of AI in Healthcare Simulation Education

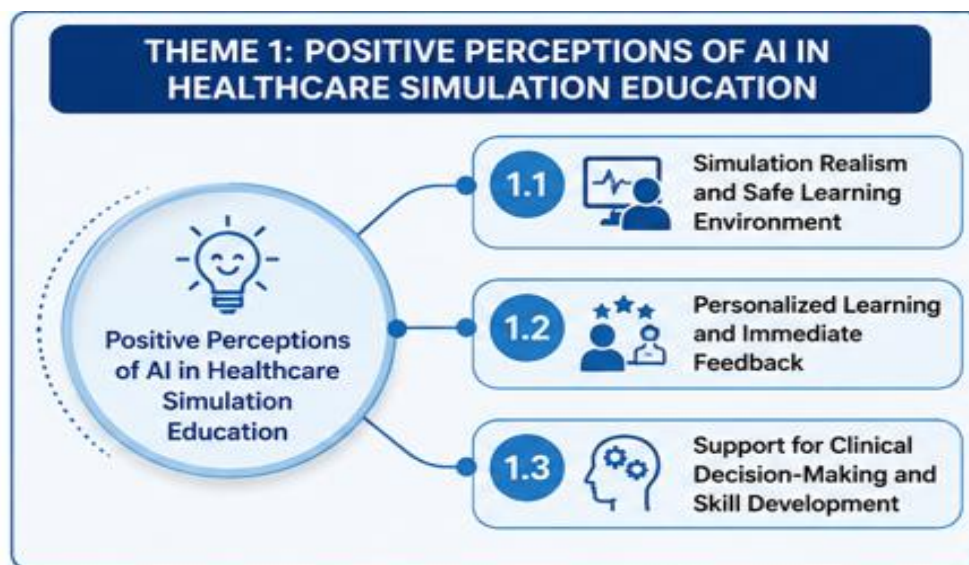


Fig 1: Graphical Representation of Theme 1

Sub-theme 1.1: Simulation Realism and Safe Learning Environment

Participants viewed AI as a powerful tool to enhance realism in healthcare simulation education. AI-supported technologies were expected to produce realistic clinical scenarios, virtual patients, and adaptive simulation environments that replicate real-world healthcare scenarios. Realistic learning experiences provide students opportunities to develop clinical competencies in a controlled, safe environment without compromising patient safety. Participants saw AI as being especially helpful in giving chances for practice and hands-on learning.

P1: AI generates virtual patients, personalizes scenarios, provides immediate feedback and monitors performance so students can practice in

a safe environment and improve their clinical skills.

P3: I think AI makes healthcare simulations more realistic and interactive, and it gives students a chance to learn and practice their clinical skills in a safe environment.

Participants' perceptions are consistent with recent evidence that AI-enhanced simulation increases educational realism and provides psychologically safe learning environments. AI technologies allow healthcare educators to develop sophisticated clinical simulations that replicate intricate patient interactions, allowing for experiential learning, according to Schwendicke et al. (2025). In a similar vein, Luckin and Cukurova (2025) revealed that AI-powered simulation environments boost learner engagement by

offering authentic and adaptive learning experiences, which aid in developing skills and competencies.

P2: Provides a safe environment for students to learn.

In general, participants acknowledged the role of AI in providing realistic and secure simulation environments. Their responses suggest that AI has the potential to enhance healthcare education by offering practice repetitions, experiential learning, and opportunities for developing clinical skills, all while ensuring patient safety.

Subtheme 1.2 Personalized Learning and Immediate Feedback

Participants pointed to AI's ability to enable personalized learning experiences, providing tailored feedback and adaptive learning paths. The opinion was that AI could recognize learner strengths and weaknesses, adapt education content and offer instant feedback that would support students in boosting their performance. This personalization was viewed as increasing learning efficiency and facilitating continuous improvement.

P6: AI improves healthcare simulation by creating realistic and adaptive learning environments, providing automated feedback, and helping to personalize learning experiences.

P7: Personalized learning, 24/7 practice, instant feedback, safe error-free environment and objective skill assessment.

The move towards personalized learning is informed by growing evidence that AI can support learner-centered education. Recent research indicates that AI-driven systems can evaluate student performance and customize educational materials according to personal learning requirements, thus improving engagement and educational results (Chan & Hu, 2025; WHO, 2025). The immediate feedback produced by AI systems allows for early detection of mistakes by the learners and the improvement of their clinical reasoning skills, leading to better learning effectiveness (Schwendicke et al., 2025).

P5: AI can enhance learning through customized feedback, real-world patient scenarios, and chances to practice decision-making skills.

In total, participants identified the main advantages of AI-supported healthcare simulation education as personalized learning and immediate feedback. These capabilities were thought to result in increased engagement and performance of learners and self-directed learning.

Subtheme 1.3: Support for Clinical Decision-Making and Skill Development

Participants believed that AI could play an important role in developing clinical reasoning and decision making skills. AI was seen as helping students to improve their diagnostic thinking and clinical judgment with real patient cases, automated guidance, and performance tracking. The participants also shared that AI can be a helpful educational tool which supports learners in grasping complicated healthcare concepts.

P1: AI can increase realism, provide instant feedback, allow for individual learning, improve clinical decision making skills and make training more efficient.

P6: Experience in taking history, diagnosis and clinical reasoning using AI chatbots & virtual patient simulators. "They provide instant feedback and explain errors."

The participants' views are consistent with the current literature, which stresses the importance of AI in enhancing clinical competencies. According to WHO (2025), AI technologies can help in healthcare education by enhancing diagnostic reasoning, problem solving skills and clinical decision making skills. In this vein, Kennedy and Gupta (2025) observed that AI-supported educational resources allow learners to engage in complex clinical scenarios, developing higher-order thinking skills and professional competence.

Overall, participants viewed AI as an important educational resource to support clinical decision-making and competency development. The responses indicated that AI can improve students' confidence, critical thinking, and readiness for

real-world healthcare practice by providing interactive and adaptive learning experiences.

Theme 2: Technological and Financial Barriers to AI Integration

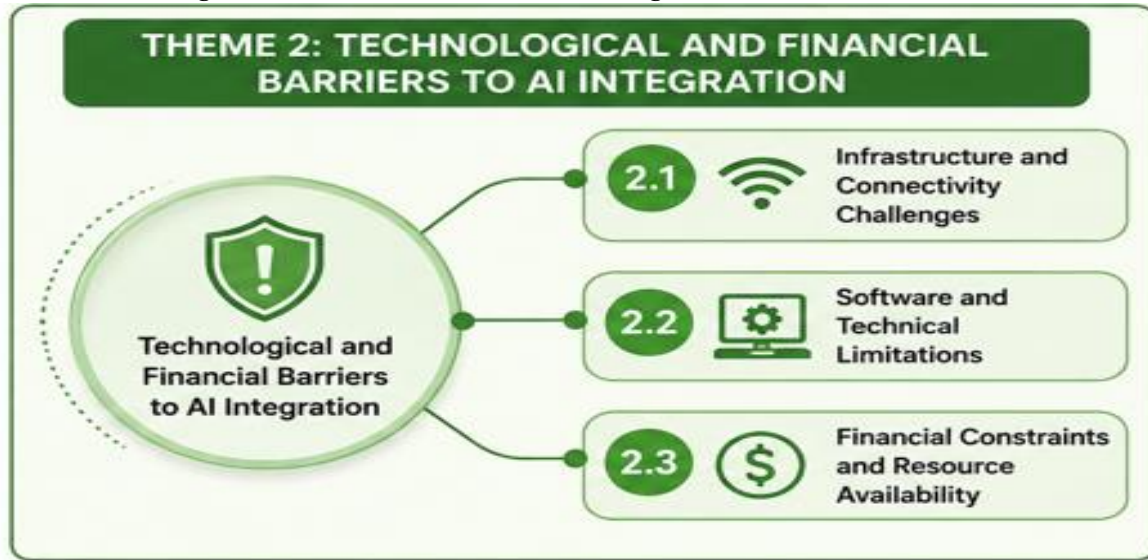


Fig 2: Graphical Representation of Theme 2

Subtheme 2.1: Infrastructure and Connectivity Challenges

Participants identified key barriers to the successful implementation of AI in healthcare simulation education, including inadequate technological infrastructure and unreliable internet connectivity. Many AI-based simulation systems require good internet connectivity, sophisticated computing resources and established digital infrastructure to work effectively. Participants voiced concerns that limited technological capacity could restrict access to AI tools, and diminish the effectiveness of simulation-based learning activities.

P1:Challenges are limited infrastructure, high technical requirements, software compatibility issues, unreliable internet access and lack of technical expertise.

P3:Her class m net available ho tak hum AI sy help ly sakhin jahan zarurat ho. Dosra ye k agar multimedia b chalti ho to AI chal paye ga."

The issues raised by participants are in line with recent literature that has identified challenges related to infrastructure for the adoption of AI.

Research has indicated that lack of internet access, limited technological resources, and scarcity of digital infrastructure continue to be substantial obstacles to the adoption of AI technologies in education (Tlili et al., 2025; Zawacki-Richter et al., 2025). The World Health Organization (2025) also points out that effective integration of AI in healthcare education necessitates robust technological systems that can support advanced simulation applications and data-driven learning environments.

P5:Some of the challenges are limited access to technology, internet issues, technical problems and lack of necessary infrastructure.

The participants understood generally that reliable infrastructure and internet connectivity are foundational to successful AI integration. Without sufficient technological backing, institutions may struggle to establish and maintain AI-supported healthcare simulation programs.

Subtheme 2.2. Software and Technical Limitations

Software compatibility, technical reliability, and the complexity of AI systems were also subjects of concern. Some respondents noted that existing healthcare or education software may not be compatible with AI applications, while others raised concerns about the accuracy of AI generated information. These challenges were seen as possible obstacles to the development of trust in AI technologies and to their educational effectiveness.

P5: There can be issues if the hospital's software is not AI compatible.

P2: It may not provide correct information sometimes. "Have to be careful."

The concerns voiced by the participants echo the results documented in recent research on the adoption of AI in healthcare and higher education. Research also shows that technical issues like software integration problems, system incompatibility, algorithmic constraints, and reliability issues can significantly impact AI adoption (WHO, 2025; Schwendicke et al., 2025). Furthermore, educators may be reluctant to employ AI systems if they perceive a potential for erroneous outputs or technical glitches that might adversely impact learning outcomes (Holmes et al., 2025).

P1: AI can sometimes misguide on nutrition.

Lastly, limitations of the software and technical difficulties were found to be major barriers to AI implementation. Participants stressed the need for reliable, user-friendly and compatible AI systems to ensure effective use in healthcare simulation education.

Subtheme 2.3: Financial Constraints and Resources Availability

Financial issues were frequently cited as a significant barrier to the use of AI in healthcare simulation education. Participants noted that the

costs of procuring equipment, acquiring licenses for software, maintaining systems and providing training may limit the institutional capacity to implement AI technologies. These issues were particularly relevant for educational and healthcare institutions that were resource constrained.

P7: High cost of buying, implementing and maintaining AI technologies can limit its adoption especially in resource-constrained educational institutions.

P3: The high costs of equipment, software and maintenance are slowing the adoption of AI. "Hospitals and colleges have limited budgets, which delays buying and updating AI tools."

Financial investment is also one of the most important determinants of successful AI implementation (as recognized in the literature). Adopting new technologies often poses a significant financial challenge for institutions, including costs associated with infrastructure development, technical support, and workforce training (OECD, 2025). Tlili et al. (2025) similarly found that financial constraints were a common obstacle for institutions to fully leverage the educational benefits of AI technologies. The World Economic Forum (2025) also notes that sustainable AI integration requires long-term investment strategies and institutional commitment.

P4: The most significant barrier to the adoption of Artificial Intelligence in healthcare simulation is financial factors.

Overall, participants felt that financial constraints were a major barrier to the adoption of AI. They acknowledged the educational potential of AI, but stressed that adequate funding, resource allocation, and institutional investment are required to achieve successful adoption and sustainability of AI-supported healthcare simulation education.

Theme 3: Need for AI Literacy, Digital Competence and Training

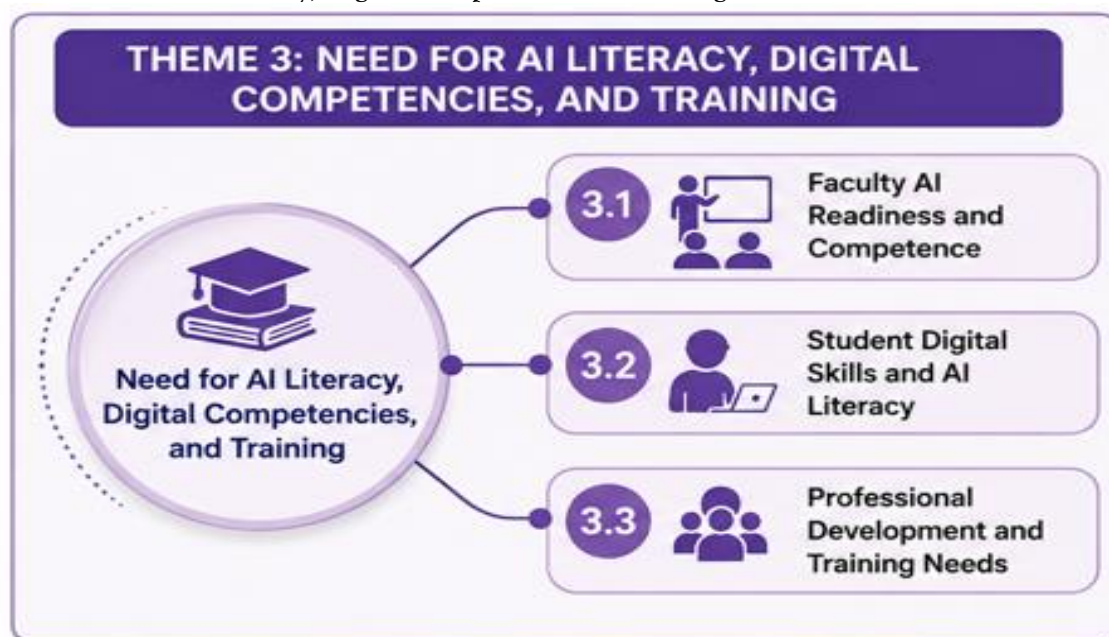


Fig 3: Graphical Representation of Theme 3

Subtheme 3.1: Faculty AI Readiness & Competence

Participants emphasized that faculty readiness is the foundation for successful integration of AI into healthcare simulation education. They noted that teachers should have sufficient knowledge of AI technologies, digital skills and practical skills to effectively implement AI into teaching and learning activities. Participants also highlighted the role of faculty members in guiding students' use of AI and ensuring appropriate use of AI technologies in educational settings.

P7: They need to be literate in AI, digitally competent, have critical thinking skills, and be ethically aware and practically trained to use AI-based simulation tools.

P3: Teachers should be very good at using AI, giving it commands and handling it.

The participants' views align with current literature that underscores the importance of faculty readiness in AI-supported education. The essential competencies for educators are AI literacy, technological competence, ethical awareness and pedagogical knowledge (UNESCO,

2025). Similarly, Chan and Hu (2025) found that the more prepared teachers were for AI, the more confident they were in using AI technologies in their teaching practice and the better they were in helping students learn. Faculty competence is especially important in health care simulation education, where faculty are central to the design of authentic learning experiences and the facilitation of meaningful interactions between learners and AI technologies.

P4: IT knowledge and education.

Overall, participants viewed faculty readiness as a requirement for successful AI integration. Their responses suggest that educators require technical expertise and pedagogical competence in order to maximize the educational benefits of AI-supported healthcare simulation.

Subtheme 3.2: Students' Digital Skills and AI Literacy

The participants stressed the importance of developing AI literacy and digital skills among students. They stressed the importance for

students to understand how AI systems operate, how to interpret AI-generated outputs and how to responsibly employ AI technologies. Participants also worried that if students are not taught critical thinking and proper ways to use AI, they may become too dependent on it.

P2: Basic computer skills, an understanding of how AI works, training in simulation software, and the ability to interpret AI feedback and data.

P2: Educators and students need foundational knowledge on AI, digital skills and appropriate training to use AI tools effectively and confidently.

There is a growing recognition in educational research of the importance of student AI literacy. Markus et al. (2025) contend that AI literacy entails not only technical knowledge but also the ability to critically evaluate AI-generated information and to make informed decisions based on AI outputs. In a similar vein, Kennedy and Gupta (2025) argue that students must develop technical, ethical, and analytical competencies to effectively deal with AI technologies. concerns about participants' overuse of AI are consistent with the findings of recent research that critical thinking skills should remain central to AI-supported learning environments (Miao et al., 2025).

P6: If teacher will hide his way, how will student learn to use AI. Bacha sirf simple MCQs nikalay ga aur smart learning nahi kar paye ga.

Overall, the participants felt that AI literacy of students was necessary for meaningful engagement with the AI technologies. They stressed that students should learn not only how to use AI tools but also how to develop critical thinking skills to assess and use the information generated by AI.

Sub-theme 3.3: Professional Development and Training Needs

Participants consistently emphasized the importance of providing structured training programs and continuous professional

development opportunities to facilitate AI integration. They recommended that both educators and students need exposure to the technologies of AI and practical demonstrations, workshops and continuous support to gain confidence and competence. Participants viewed training initiatives as a means to reduce resistance, increase acceptance, and enable better implementation of AI-supported educational practices.

P5: Training and awareness sessions for health care workers

P3: Everyone should be trained to run AI.

Recent literature, however, strongly supports the need for professional development. Liu and Levy (2026) describe AI literacy as a process of gradual change through educational interventions that move individuals from elementary understanding to sophisticated critical thinking. Similarly, Cukurova et al. (2025) highlight that continued professional development is needed to enable educators to work effectively with AI technologies in educational settings. Moreover, research suggests that training programs can significantly increase confidence, decrease anxiety, and facilitate the effective adoption of AI by faculty and students (Chan & Hu, 2025; Tlili et al., 2025).

P5: Training for all, small pilot projects first, data privacy and clear benefits to build trust.

In summary, professional development was identified as a key enabler to the integration of AI in healthcare simulation education. Participants acknowledged that comprehensive training programs can boost AI literacy, enhance digital skills, and build confidence in the use of AI technologies. These findings highlight the need for institutional investment to support capacity-building efforts to enable sustainable and effective AI adoption.

Theme 4: Ethical Concerns and Acceptance of AI in Healthcare Education

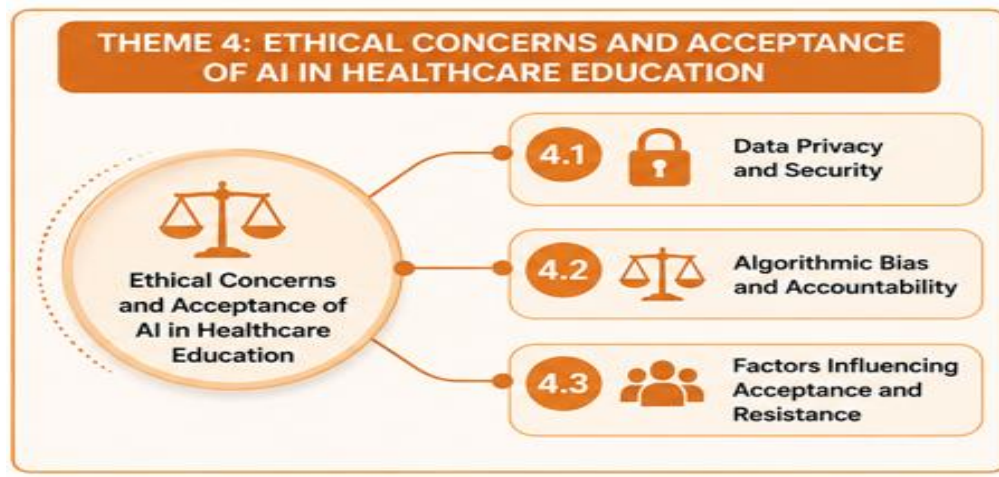


Fig 4: Graphical Representation of Theme 4

Subtheme 4.1: Data Privacy and Security

Participants pointed out data privacy and information security as significant ethical issues in the use of AI in healthcare simulation education. They were concerned about the protection of sensitive information on students and patients, especially when AI systems collect, analyze and store large amounts of data. Although a few participants felt that privacy risks in educational contexts were less significant, the majority agreed that safeguarding confidential information is critical to preserving trust and enabling responsible AI deployment.

P2: Key concerns are data privacy, cybersecurity risks, algorithmic bias, transparency, informed consent and accountability for outcomes generated by AI.

P6: Data privacy and security of patient/student info, bias in AI decisions and accountability—who's responsible if AI gives wrong feedback.

The concerns raised by the participants are in line with the existing literature that highlights data governance and privacy protection as two of the most prominent ethical challenges in the adoption of AI. UNESCO (2025) emphasizes that educational institutions must have policies that guarantee the safe collection, storage, and use of personal data. Likewise, Holmes et al. (2025) stress

that safeguarding sensitive information is essential to ensure user trust and mitigate the risks of AI-powered educational systems. With the increasing integration of AI technologies in healthcare education, institutions must maintain ethical standards and adhere to data protection regulations.

P3: Data privacy could be a problem.

To sum up, for the participants, data privacy and security were key issues in AI-supported healthcare simulation education. From their responses, it is clear that institutions need to develop strict safeguards and ethical policies to protect personal data and promote responsible AI use.

Subtheme 4.2: Algorithms, Bias, and Accountability

Participants also expressed apprehension about the accuracy, fairness and accountability of outputs generated by AI. They questioned: who will be responsible if AI systems make wrong recommendations or biased results? Such problems point to larger ethical issues of transparency and reliability in AI technologies in healthcare and educational settings.

P4: Patient privacy, algorithmic bias, accountability and psychological safety.

P7: Sometimes AI can be misleading.

Participants' concerns are consistent with emerging literature on ethical AI implementation. Algorithmic bias, according to Holmes et al. (2025), can lead to unfair or inaccurate outcomes, particularly when AI models are trained on insufficient or unrepresentative data. Likewise, Miao et al. (2025) argue that transparency, explainability, and human oversight are necessary to make AI-supported decisions fair, accountable, and trustworthy. In healthcare simulation education, wrong or biased feedback from AI could influence learning outcomes and students' clinical decision-making processes.

P3: Who is responsible if AI gives bad feedback?

Participants were generally in agreement that accountability and algorithmic fairness are key aspects of AI technologies implementation. Responses indicate that human oversight needs to remain central to AI-supported educational activities to ensure reliability, fairness and ethical practice.

Subtheme 4.3. Factors Influencing Acceptance and Resistance

Participants expressed a variety of responses to the application of AI technologies in healthcare education. Most saw AI as a valuable, innovative educational tool, but a minority expressed reservations due to lack of knowledge, training, concerns about accuracy and fears about AI replacing some human roles. Participants reported that acceptance is influenced by perceived usefulness, ease of use, confidence in technology and availability of training opportunities.

P6: Mixed responses, adoption is a function of perceived usefulness and ease of use while resistance is often due to lack of training, trust or fear of technology replacing human roles.

P7: Most are curious but mixed. Ease of use, training and clear benefits increases acceptance. Resistance comes from fear of losing their job, lack of skills, and distrust of AI accuracy.

The diverse perspectives provided by participants reflect the results of recent research on the use of

AI in higher education. In this regard, Chan and Hu (2025) found that users are more willing to accept AI technologies when educational benefits are evident and there is adequate support and training. Tlili et al. (2025) similarly reported that resistance to AI is often due to a lack of digital competence, uncertainty about ethical implications, and concerns about the impact of AI on professional roles. The emphasis on training and awareness of participants suggests that educational interventions could be crucial to improve acceptance and reduce resistance.

P1: Faculty respond cautiously, supportive of AI for automating administrative duties but cautious about plagiarism, additional workload, and issues of academic integrity.

In summary, the results indicated that acceptance and resistance were interrelated factors affecting the adoption of AI in healthcare simulation education. Participants generally acknowledged the benefits of AI, but stressed that trust, training, transparency, and continued institutional support are essential for successful implementation. Addressing these factors could promote greater acceptance and help to responsibly integrate AI technologies into healthcare education.

Conclusion:

The findings of this study indicate that healthcare educators generally hold positive perceptions regarding the integration of Artificial Intelligence (AI) into healthcare simulation education. Participants recognized AI as a valuable educational tool capable of enhancing simulation realism, supporting personalized learning, improving clinical decision-making, and providing immediate feedback to learners. These perceived benefits highlight the potential of AI to strengthen healthcare training and contribute to the development of competent healthcare professionals. However, the findings also revealed several barriers that may impede successful implementation, including inadequate technological infrastructure, software limitations, unreliable internet connectivity, financial constraints, and insufficient institutional

resources. These challenges suggest that the educational benefits of AI cannot be fully realized without adequate organizational support and strategic investment. Furthermore, the study emphasizes that faculty readiness is a critical determinant of successful AI integration. Participants highlighted the importance of AI literacy, digital competencies, practical training, and continuous professional development for both educators and students. Ethical concerns, particularly those related to data privacy, security, algorithmic bias, and accountability, were also identified as significant considerations requiring careful attention. The findings suggest that effective integration of AI into healthcare simulation education requires a comprehensive approach involving capacity building, technological infrastructure development, ethical governance frameworks, and institutional commitment. By addressing these educational, technological, financial, and ethical factors, healthcare institutions can foster the responsible and sustainable adoption of AI technologies, ultimately enhancing the quality of healthcare education and preparing future healthcare professionals for increasingly technology-driven clinical environments.

Recommendations:

1. Educational institutions should develop structured training programs that enhance AI literacy, digital competencies, ethical awareness, and practical skills among both faculty members and students. Regular workshops, hands-on simulation sessions, and continuous professional development activities can improve confidence and readiness for AI integration in healthcare simulation education.
2. Healthcare educational institutions should invest in reliable technological infrastructure, including high-speed internet connectivity, AI-compatible software, simulation technologies, and dedicated technical support services. Adequate infrastructure is essential to ensure the effective and sustainable

implementation of AI-supported simulation learning environments.

3. Institutions and policymakers should allocate sufficient funding for the acquisition, implementation, maintenance, and evaluation of AI technologies. Financial support should also be provided for faculty training, software licensing, equipment upgrades, and long-term sustainability initiatives to facilitate successful AI adoption.

4. Clear institutional policies and ethical guidelines should be established to address issues related to data privacy, cybersecurity, algorithmic bias, transparency, accountability, and responsible AI use. These frameworks should ensure that AI technologies are implemented in a manner that protects users' rights while maintaining educational integrity and trust.

5. Educational institutions should initiate pilot AI-based simulation projects before large-scale implementation. Continuous monitoring and evaluation of these initiatives can help identify challenges, assess educational effectiveness, gather stakeholder feedback, and generate evidence-based strategies for improving AI integration in healthcare simulation education.

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