



## Perceived Impact of AI-Driven Personalized Learning System on Students of Nursing and Midwifery Institutions

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### Abstract

This study investigated the impact of AI-driven personalized learning system on students, with its challenges/ barriers. Four research questions guided the study. The study adopted a descriptive survey design. The population of the study was all the nursing and midwifery students in the case study school in the 2023/2024 academic session. A total of four hundred and twenty-five (425) students formed the population of the study, from which a total of 156 nursing students were randomly sampled from 100, 200, and 300 levels students using a proportionate stratified random sampling technique. An instrument titled “Impact and challenges of use of AI on students’ learning questionnaire (ICASLQ) was used to collect data. The instrument was validated. The instrument was checked for reliability, reliability index of 0.92 was obtained using test-retest reliability. Arithmetic mean and percentages were used to answer the research questions. Students’ responses revealed that AI-powered real-time feedback improves comprehension, allows students to understand their strengths and weaknesses in real-time, facilitates self-reflection and enables students to make necessary improvements and leads to enhanced learning outcomes. The study also revealed that high cost of implementing AI, lack of adequate training for educators and administrators to effectively use AI tools are challenges affecting the application of AI. Some recommendations were made.

**Keywords:** Artificial Intelligence, learning, AI-driven personalized learning.

### Introduction

Technology has evolved and is still evolving. Over time, innovations in different sectors of the universal systems have been really unprecedented. There is no doubt that since the COVID-19 pandemic, innovative ideas have hastened development in office work and education. Since then, online courses and learning have had almost geometric increase. The term ‘artificial intelligence’ (AI) was first coined by John McCarthy at a conference in Dartmouth in 1956 (Aranguana, 2024). AI are machines, agents, and/or computer programs that simulate cognitive functions associated with human minds. Such actions as perceiving patterns, abstract reasoning, learning, communicating and problem-solving are associated with AI. Akinola (2024) had noted that artificial intelligence research tools are becoming increasingly important in academic environments as they offer various benefits, one of such

significant advantage is the ability to access relevant repositories and analyse complex datasets easily.

Owan et al. (2023) stated that artificial intelligence (AI) is a rapidly evolving field of technology that involves the development of intelligent machines that can perform tasks that typically require human intelligence, such as understanding natural language, recognizing patterns, and making decisions based on data. AI is the ability of machines to adapt to new and emerging situations, problem-solving answer questions, create plans, and perform other intelligent functions typically associated with human beings. Furthermore, according to Naqvi (2020) AI refers to the field of computer science that involves creating computer programs capable of imitating intelligent behaviour and ideally enhancing human-like abilities.

Artificial intelligence holds immense potential in transforming teaching and learning in schools. The

integration of artificial intelligence into educational practices has increasingly shown promise in transforming traditional teaching and learning paradigms. The dynamic nature of some professions necessitates a robust and adaptable educational framework that can effectively respond to the evolving needs of students. The education sector faces unique challenges, including the need for a deep understanding of both theoretical knowledge and practical skills. There is a growing consensus that innovative educational tools are required to enhance the learning experience and improve competency among students (Ironside, 2015).

AI technologies have emerged as potent tools in reshaping educational landscapes across various disciplines. AI's ability to personalize learning, automate administrative tasks, and provide real-time feedback presents significant advantages over conventional teaching methods. Adaptive learning systems utilize AI to assess individual students' strengths and weaknesses, tailor content to their specific needs, and provide customized feedback. This individualized approach helps in addressing diverse learning paces and styles, ultimately leading to more effective learning outcomes (Winkler-Schwartz et al., 2019).

AI algorithms can analyze individual students' learning styles, strengths, and weaknesses to create personalized learning paths. This customization ensures that students receive tailored education suited to their needs. For instance, AI-powered adaptive learning platforms like Knewton or DreamBox Learning can adjust the difficulty level of questions based on students' performance, ensuring optimal learning outcomes (Knewton, 2024). AI-powered analytics play a crucial role in monitoring and evaluating students' performance. These systems can track progress, identify learning gaps, and offer actionable insights for educators to tailor their teaching strategies effectively. According to Liaw et al. (2022) Real-time feedback that is facilitated by AI can ensure that students receive immediate responses to their actions, which promotes continuous improvement and a deeper understanding of the learning material.

The application of AI in education holds transformative potential for creating more effective, personalized, and interactive learning environments. By addressing the specific needs of different disciplines, AI can

significantly enhance the educational experience of students and teachers.

The field of education is facing significant challenges in effectively preparing students for the complexities and demands of modern day education. There is often lack of the adaptability and personalized approach necessary to address the diverse learning needs of students. Despite the potential benefits of artificial intelligence (AI) in enhancing educational experiences, its application within education remains underutilized and inadequately explored. There is a critical need for research to evaluate how AI-driven technologies can be effectively integrated into education to address some educational challenges. This study seeks to investigate the potential of AI to provide personalized learning experiences, enhance simulation-based training, and deliver real-time feedback and analytics, thereby improving the overall effectiveness of teaching and learning for students.

### Research Questions

1. How does AI-driven personalized learning systems improve the educational outcomes of students?
2. What is the impact of AI-enhanced simulation and virtual reality on students?
3. What is the impact of AI-powered real-time feedback on students' performance and learning in nursing education?
4. What are the challenges and barriers to the integration of AI technologies in tertiary education, and how can they be addressed?

### Literature Review

#### *Empirical Review*

Regan et al. (2023) conducted a study on the integration and impact of AI-driven chatbots in educational settings and found that a greater percentage of students and teachers reported frequent use of AI chatbots. Also, a greater percentage of students and teachers perceived AI chatbots as effective in providing educational support. A positive correlation was found between the frequency of AI chatbot use and perceived effectiveness in enhancing educational outcomes, indicating that more frequent users found the chatbots more beneficial. The study concluded that AI chatbots are generally well-received by both students and teachers and are perceived as effective tools in enhancing educational outcomes. However, challenges such as technical issues and the need for more personalized responses need to be addressed to maximize their potential.

Mylarczyk and Bryl (2022) explored the integration of AI in curriculum development and found out that a greater percentage of curriculum developers, educators and administrators reported frequent use of AI tools (at least once a month). Again, a greater percentage of curriculum developers, educators and administrators perceived AI tools as effective in enhancing curriculum quality and implementation. A positive correlation was found between the frequency of AI use and perceived improvements in curriculum quality and implementation, indicating that more frequent users found the AI tools more beneficial. The study concluded that AI tools are generally perceived as beneficial in enhancing curriculum development and implementation.

Chen et al. (2021) in a study investigate the impact of AI in education. They found out that a greater percentage of students and teachers reported using AI tools frequently. Also, Students and teachers perceived AI tools as having a positive impact on learning and teaching. The study concluded that AI tools are generally perceived as beneficial in enhancing educational experiences for both students and teachers. However, challenges such as technical issues, data privacy concerns, and the need for adequate training must be addressed to fully realize the potential of AI in education.

Caballero-Hernandez et al. (2020) explored on the application of AI-driven personalized learning systems for nursing education. The study revealed that students using the AI-driven personalized learning system showed a significant improvement in their academic performance. Knowledge retention rates were also higher among students using the AI system. The study concluded that AI-driven personalized learning systems are effective in enhancing academic performance and knowledge retention among nursing students. The

systems are generally well-received, though technical issues and resistance to new methods need to be addressed to maximize their potential as some of the identified challenges.

Koivisto et al. (2018) in a study investigated the effectiveness of AI simulation-based training in education, with educational technology and training as the area of study, focusing on the use of AI-driven simulations for training purposes. The findings revealed 20-25% significant improvements in knowledge and skills post-training, and an improvement in skill demonstration. The study concluded that AI simulation-based training is an effective method for improving knowledge, skills, and confidence among healthcare students and professionals.

### Methodology

The design of the study was a descriptive survey. The area of the study is Alex Ekwueme Federal University Teaching Hospital Abakaliki (AEFUTHA). All the nursing and midwifery students in AEFUTHA in 2023/2024 academic session, numbering 425 students, constituted the population of the study. A total of one hundred and fifty-six students were randomly sampled from 100 level, 200-level and 300-level nursing and midwifery students. A four-point Likert scale questionnaire was developed to collect data from respondents. Copies of the questionnaire were distributed to all the students using google form in various students' social media platforms. All the responses were collected automatically on the Google form through the Google platform. The instrument was validated by two staff nurses and one expert in measurement and evaluation. Test-retest reliability was used to check the reliability of the instrument. Pearson Product Moment reliability Coefficient of 0.92 was obtained for the instrument. Arithmetical mean and percentages were used to analyze the data. Mean of 2.5 was accepted as the cut off mean for decision making.

## Result

The results of the study are presented based on the research questions. Various Tables present the data elicited from corresponding research questions.

**Table :** Mean responses of nursing students on how AI-driven personalized learning systems improve the educational outcomes of students?

Question item	SA	A	D	SD	Total score	Mean	Decision
1) AI-driven personalized learning systems have significantly improved my understanding of educational concepts	156 (36.7%)	178 (41.8%)	81 (19.1%)	10 (2.4%)	425	3.3	Agree
2) The individualized feedback provided by AI-driven learning systems helps me to better understand my strengths and weaknesses	155 (36.5%)	221 (51.9%)	49 (11.5%)	----	425	3.25	Agree
3) Personalized learning system can help students focus on areas where they need more support, thereby improving overall learning outcomes where curriculum is vast and diverse.	226 53.2%)	166 (39%)	27 (6.4%)	5 (1.2%)	425	3.45	Agree
4) Personalized and adaptive learning ensures that students are neither bored nor overwhelmed, as the difficulty level adjusts according to their proficiency.	169 (39.7%)	213 (50%)	35 (8.3%)	8 (1.9%)	425	3.27	Agree

Table 1 in item 1, 78.5% of the students agreed that AI-driven personalized learning improved their understanding of educational concept, while 21.5% of the students disagreed. In item 2, 88.4% believed/agreed that individualized feedback provided by AI- driven learning systems help them to better understand their strengths and weaknesses and 11.6% disagreed. Item 3 reveals that 92.2% agreed that to be focused on areas where one needs more support as a student, AI- personalized learning system is helpful but

7.8% of the student disagreed. In item 4, 89.7% agreed that Personalized and adaptive learning helps one to adjust from difficulty level without boredom nor being overwhelmed while 10.2% of the students disagreed. This means that a good number of the students are aware of Artificial Intelligence and believe that it is effective for teaching and learning. This was concluded because the average score of the mean items are all above 2.5.

**Table 2: Responses of students on the impacts of AI-enhanced simulation and virtual reality on students?**

S/N	Question Item	SA	A	D	SD	Total score	Mean	Decision
5	Simulation and virtual reality allow Hands-on -practice by providing opportunities to practice clinical skills and procedures in a realistic setting.	196 (46%)	204 (48%)	22 (5%)	5 (1%)	425	3.4	Agree
6	Simulation ensures that all students have access to the same learning experiences, which can be difficult to achieve in clinical placements.	169 (39.7%)	215 (50.6%)	38 (8.9%)	3 (0.64%)	425	3.3	Agree

7	Simulation and virtual reality encourage the development of critical thinking and decision-making skills by presenting complex, dynamic scenarios.	196 (46.1%)	190 (44.8%)	35 (8.3%)	3 (0.8%)	425	3.4	Agree
8	Simulation provides a safe learning environment and allow students to make mistakes and learn from them without risk to actual patients.	207 (48.7%)	180 (42.3%)	30 (7.0%)	9 (2%)	425	3.4	Agree

Table 2: Items 5- 8, showed that 94%, 90.3%, 90.9% and 91% of the students respectively agreed that Simulation and Virtual reality provides opportunity to practice and carryout procedures in a realistic setting, exposes them to same learning experiences which can

be difficult in the clinical setting, encourages the development of critical thinking and decision making, and allows them to make mistakes and learn from them by providing a safe learning environment. About 33.68% of the students disagreed.

*Table 3: Responses on the impact of AI -Powered real- time feedback on students' performance and learning in nursing/tertiary education?*

S/N	Question Item	SA	A	D	SD	Total score	Mean	Decision
9	Automated grading systems powered by AI algorithms can assess and provide immediate feedback on assignments, quizzes, and exams enhancing comprehension.	210 (49.3%)	198 (46.7%)	11 (2.5%)	6 (1.5%)	425	3.4	Agree
10	Real-time feedback allows students to understand their strengths and weaknesses in real-time	158 (37.1%)	231 (54.4%)	32 (7.6%)	4 (0.9%)	425	3.3	Agree
11	The timely feedback facilitates self-reflection and enables students to make necessary improvements.	204 (48%)	204 (48%)	11 (2.5%)	6 (1.5%)	425	3.4	Agree
12	Timely feedback leads to enhanced learning outcome.	207 (48.7%)	204 (48%)	11 (2.5%)	3 (0.8%)	425	3.4	Agree

Table 3: Items 9, 10, 11, and 12 revealed that AI – powered real-time feedback improves comprehension, allows students to understand their strengths and weaknesses in real-time, facilitates self-reflection and

enables students to make necessary improvements and leads to enhanced learning outcome. About 95% of the students agreed with it but about 4.69% disagreed.



Table 4: Responses on the challenges and barriers to the integration of AI technologies in nursing education, and how can they be addressed?

S/N	Question item	SA	A	D	SD	Total score	Mean	Decision
13	The high cost of implementing AI technologies is a significant barrier to their integration into tertiary education curriculum.	204 (48%)	190 (44.8%)	27 (6.4%)	3 (0.8%)	425	3.4	Agree
14	Lack of adequate training for Educators and administrators to effectively use AI tools.	177 (41.6%)	213 (50%)	30 (7%)	6 (1.4%)	425	3.3	Agree
15	There is a potential risk of over-reliance on AI technologies, leading to a passive learning experience for students.	166 (39.1%)	198 (46.7%)	54 (12.8%)	6 (1.4%)	425	3.2	Agree
16	Issues such as data privacy, security, and algorithmic bias need to be carefully addressed to ensure ethical and responsible use of user data.	201 (47.4%)	213 (50%)	8 (1.9%)	3 (0.7%)	425	3.4	Agree

Table 4: showed that 92.8% of the students agreed that the high cost of implementing AI technologies is a significant barrier to integration of AI into their curriculum in item 13 and 7.02% disagreed. In item 14, 8.4% of the students disagreed that Lack of adequate training for Educators and Administrators to effectively use AI tools constitutes a barrier to its application for effective teaching and learning in education but 91.6% of the students agreed. In item 15, 85.8% of the students agreed that over – reliance on AI technologies will lead to passive learning experience for students but 14.2% of them disagreed. 97.4% of the respondents agreed that issues such as data privacy, security need to be carefully addressed to ensure ethical and responsible use of user data to address barriers and challenges it imposes but 2.6% of the respondents disagreed.

### Discussion:

*AI-driven personalized learning systems and the educational outcomes of students.*

The finding shows that AI-driven personalized learning improved students' understanding and helped them to better understand their strengths and weaknesses thereby making them to stay focused which goes to agree with Chassignol et al. (2018) and Winkler-Schwartz et al. (2019) that AI-driven adaptive learning platforms can tailor educational content to the

needs and learning pace of each student, improving engagement and knowledge retention, and utilizes AI to assess individual student's strengths and weaknesses.

*Impact of AI-enhanced simulation and virtual reality on students*

The finding shows that simulation and virtual reality provides opportunity to practice clinical skills and procedures in a realistic setting, exposes students to same learning experiences, encourages critical thinking and decision-making skills and allows them to make mistakes and learn from them in a very safe environment. This agrees with the findings of Cook et al. (2013) and Foronda et al. (2020) that simulation-based learning, enhanced by AI, provides students with a safe and controlled environment to practice clinical skills without the risk of harming patients and that AI-powered simulations can create realistic clinical scenarios for students, enhancing their practical skills and decision-making abilities.

*The impact of AI -Powered real- time feedback on students' performance and learning in nursing education?*

The students agreed that real-time feedback improves their comprehension, allows them to understand their strengths and weaknesses in real-time, facilitates self-reflection and enables students to make necessary improvements, leads to enhanced learning outcome

using AI Algorithm. This is in line with Renz et al. (2018) and Liaw et al. (2022) findings that AI can analyze student performance data to predict academic outcomes and identify students at risk of underperforming, enabling timely intervention. Also, that real-time feedback facilitated by AI ensures that students receive immediate responses to their actions, promoting continuous improvement and a deeper understanding of the material. It also aligns with Luckin et al. (2016) that AI-based tutoring systems can provide instant feedback and guidance, helping students to learn more efficiently and effectively.

*The challenges and barriers to the integration of AI technologies in nursing education, and how can they be addressed*

The students agreed that high cost of implementing AI, lack of adequate training for educators and administrators to effectively use AI tools, a potential risk of over-reliance on AI technologies, leading to a passive learning experience for students and finally issues such as data privacy, security, and algorithmic bias are some of the challenges affecting the application of Artificial Intelligence in their institution. Chen et al. (2021) and Mylnarczyk and Bryl (2022) had data privacy concern as one of their major challenges.

## Conclusion

The integration of AI in education holds promise for enhancing teaching and learning outcomes. AI tools are generally perceived as beneficial in enhancing educational experiences for both students and teachers. AI holds significant promise for enhancing nursing education, though more rigorous, large-scale studies are needed and careful consideration of ethical, technological, and training challenges is essential to ensure successful implementation. However, challenges such as technical issues, data privacy concerns, and the need for adequate training must be addressed to fully realize the potential of AI in education. AI also has the potential to transform how future nurses are trained making the learning the learning process more personalized, efficient and effective but requires careful consideration of ethical, legal and practical challenges to ensure it enhances, rather than detracts from the educational experience.

## Recommendations

- (1) There should be an allocation of resources for continuous development and support of AI technology in educational settings to address

identified challenges and enhance user experience.

- (2) Institutions are to implement strong data privacy measures to protect users' information and build trust in AI applications.
- (3) There should be the development of comprehensive training programmes for both teachers and students to maximize the effective use of AI tools in education.

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