

KNOWLEDGE AND PERCEPTION OF ARTIFICIAL INTELLIGENCE (AI) AS AN EMERGING TOOL FOR HEALTH LEARNING AMONG SECONDARY SCHOOL STUDENTS IN BENIN METROPOLIS

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Abstract

This study investigated the knowledge and perception of Artificial Intelligence (AI) as an emerging tool for health learning among secondary school students in Benin Metropolis, Edo State, Nigeria. The study employed a descriptive survey design to gather data from a sample of 395 students drawn through a multistage sampling technique from both public and private secondary schools. A structured instrument titled Artificial Intelligence (AI) and Health Learning Knowledge Questionnaire (AIHLKQ) was used for data collection. Data were analyzed using descriptive statistics to answer the research questions raised while inferential statistics of Chi-square was used to test the formulated hypotheses at a 0.05 level of significance. Findings revealed that students exhibited a high level of knowledge but a neutral perception toward AI as a tool for health learning. Results also indicated that both age and class level significantly influenced students' knowledge and perception of AI. The study concludes that, although AI Knowledge is increasing, practical application in health learning remains limited. It recommends curriculum inclusion, teacher capacity building, digital literacy programs, and infrastructural support to promote the use of AI in secondary school health education.

Keywords: Artificial intelligence (AI), knowledge, Perception, Health learning, Secondary school students, Benin metropolis.

Introduction

Technological advancement in the 21st century has significantly transformed human interactions, communication, and learning. Among the notable technological breakthroughs, Artificial Intelligence (AI) stands out as one of the most impactful innovations shaping global development. Artificial intelligence encompasses systems or machines that perform tasks requiring human intelligence such as reasoning, learning, perception, and decision-making (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2022). Within the educational and health sectors, AI is increasingly being explored as a transformative tool for improving efficiency, access, and quality of learning (World Health Organization [WHO], 2023). The integration of AI in health learning can enhance students' understanding of complex health issues, promote self-directed learning, and prepare them for future health-related challenges (Nguyen, Park, & Lee, 2023). However, in many developing countries such as Nigeria, the application of AI in health education remains limited and poorly understood, especially among secondary school students who represent a crucial demographic in the digital transformation era (Ogunyemi & Ajayi, 2022).

The use of AI in education, particularly in health learning, has gained attention as schools seek innovative ways to make teaching more interactive and student-centered. Artificial Intelligence (AI) tools such as chatbots, adaptive learning platforms, and virtual simulations can create individualized learning experiences that help students better grasp health concepts (Izquierdo-Condoy, Arias-Intriago, Montero & Ortiz-Prado, 2025). For example, AI-driven applications can assist learners in understanding topics such as nutrition, reproductive health, and disease prevention through visual and interactive content. Nevertheless, effective use of such technologies depends largely on the knowledge level of the learners (Bamidele & Oyetunde, 2024). Students' knowledge of AI determines their ability to recognize its relevance, use it responsibly, and benefit from its potential.

The knowledge dimension of this study explores how informed secondary school students are about the concept of Artificial Intelligence (AI) and its application to health learning. As Bamidele and Oyetunde (2024) explained, digital literacy and awareness among Nigerian adolescents are influenced by access to technology, curriculum exposure, and social media use. Students who possess a foundational knowledge of AI are more likely to adopt new learning technologies and integrate them into their academic lives (Bamidele et al., 2024). In the context of health education, such knowledge can facilitate better engagement with AI-supported programs that promote preventive behaviors and healthy lifestyles.

Beyond knowledge, perception plays a critical role in determining whether students embrace or resist emerging technologies. Perception refers to the attitudes, beliefs, and emotions individuals hold toward a phenomenon (Bewersdorff, Zhai, RobertsNerdel, 2023). In the context of AI, perception shapes how learners interpret the usefulness, risks, and ethical implications of adopting intelligent systems in education. Students with positive perceptions of AI are likely to engage more actively with AI-powered tools and view them as facilitators of learning. Conversely, misconceptions or fear such as the belief that AI might replace teachers or invade privacy can create resistance and reduce adoption (Adegbite & Onifade, 2023). According to Bewersdorff et al. (2023), perception is influenced by cultural context, prior experiences, and exposure to technology. Among Nigerian secondary school students, limited exposure may lead to low confidence or unclear attitudes toward AI use in health learning. Hence, exploring their perception provides a deeper understanding of their readiness to engage with digital innovations.

Another essential consideration in this study is the role of age in influencing knowledge and perception of AI. Age differences often reflect variations in cognitive maturity, digital experience, and adaptability to new technologies (Ibrahim, Musa, & Yakubu, 2023). Older students may have higher exposure to technological tools and thus demonstrate better understanding and confidence in using AI applications compared to younger ones (Ibrahim et al., 2023). Moreover, younger adolescents may still be developing critical thinking skills required to evaluate and apply AI-based learning tools effectively. In the context of Benin Metropolis, where technological resources are unevenly

distributed across schools, the relationship between students' age and their awareness and perception of AI as a tool for health learning deserves systematic exploration.

Similarly, students' class level serves as a benchmark for their academic maturity and exposure to curricular content. As Adebayo and Ojo (2023) noted, senior secondary students are typically more exposed to information and communication technology (ICT)-based subjects, which may increase their awareness and understanding of AI. Junior students, however, might have limited exposure due to curricular design and resource constraints (Adebayo et al., 2023). Class level may also influence perception, as advanced students are often more confident and open-minded toward new technologies. Examining these relationships helps in understanding whether academic progression correlates with improved digital literacy and positive attitudes toward AI as an emerging health education tool.

Taken together, knowledge and perception of AI among secondary school students are key indicators of how ready the younger generation is for digital transformation in education. Understanding how these constructs vary with age and class level provides valuable insights for curriculum planners, educators, and policymakers. The Benin Metropolis, being an educational hub in southern Nigeria, presents a suitable setting for such investigation due to its diversity of schools and students. This study therefore aims to explore the knowledge and perception of Artificial Intelligence (AI) as an emerging tool for health learning among secondary school students in Benin Metropolis.

Statement of the Problem

The integration of Artificial Intelligence (AI) into education represents one of the most transformative shifts in modern learning environments. Across the world, schools are increasingly adopting AI-driven systems to enhance teaching efficiency, personalize instruction, and foster students' engagement with digital knowledge (UNESCO, 2022). Within the domain of health education, AI tools such as intelligent tutoring systems, health chatbots, and interactive simulations have been identified as promising means of improving students' understanding of health concepts and promoting lifelong healthy behaviours (Nguyen, Park, & Lee, 2023). Despite these global advancements, to the best of the researcher's knowledge there is limited empirical evidence on the extent to which Nigerian secondary school students are aware of or perceive the relevance of AI in health learning contexts. This gap is particularly concerning because adolescence is a formative period during which knowledge and perceptions about technology significantly shape future learning behaviours (Ogunyemi & Ajayi, 2022).

This absence of local empirical data poses a challenge to policymakers, educators, and curriculum developers seeking to align Nigeria's educational system with the ongoing digital revolution (Eke, 2024). Hence, this study seeks to fill this critical gap by exploring the knowledge and perception of Artificial Intelligence (AI) as an emerging tool for health learning among secondary school students in Benin Metropolis, with a particular focus on how age and class level relate to these dimensions. Findings from this investigation are expected to inform future strategies aimed at integrating AI-based

learning into health education, fostering digital literacy, and promoting technology-driven learning among adolescents in Nigeria.

Research Questions

The following research questions were raised to guide the study:

- i. What is the level of knowledge of artificial intelligence (AI) as an emerging tool for health learning among secondary school students in Benin Metropolis?
- ii. What is the perception of secondary school students in Benin Metropolis toward the use of Artificial Intelligence (AI) as an emerging tool for health learning?
- iii. Does students' age influence their knowledge of Artificial Intelligence (AI) as an emerging tool for health learning?
- iv. Does students' age influence their perception of Artificial Intelligence (AI) as an emerging tool for health learning?
- v. Does students' class level influence their knowledge of Artificial Intelligence (AI) as an emerging tool for health learning?
- vi. Does students' class level influence their perception of Artificial Intelligence (AI) as an emerging tool for health learning?

Research Hypotheses

The following hypotheses were formulated and tested at 0.05 alpha level of significance

- H₀₁: There is no significant relationship between students' age and their knowledge of Artificial Intelligence (AI) as an emerging tool for health learning.
- H₀₂: There is no significant relationship between students' age and their perception of Artificial Intelligence (AI) as an emerging tool for health learning.
- H₀₃: There is no significant relationship between students' class level and their knowledge of Artificial Intelligence (AI) as an emerging tool for health learning.
- H₀₄: There is no significant relationship between students' class level and their perception of Artificial Intelligence (AI) as an emerging tool for health learning.

Purpose of the Study

The purpose of this study was to investigate the knowledge and perception of Artificial Intelligence (AI) as an emerging tool for health learning. Furthermore, the study seeks to investigate the influence of demographic variables such as student's age and class levels on their knowledge and perception of Artificial Intelligence (AI) as an emerging tool for health learning.

Methodology

This study employed a descriptive survey research design to examine the knowledge and perception of artificial intelligence (AI) as an emerging tool for health learning among

secondary school students in Benin Metropolis. The population consisted of all students enrolled in public and private secondary schools within Benin Metropolis, Edo State. This group was chosen because secondary school students represent a technologically exposed generation that can provide relevant insight into emerging digital innovations in education. The population consisted of all secondary school (JSS1–SSS3) students enrolled in public secondary schools within Egor, Ikpoba-Okha, and Oredo Local Government Areas of Benin Metropolis, Edo State. According to enrolment data obtained from the Edo State Ministry of Education (2025), a total of 24,666 secondary students were distributed across 46 secondary schools in the three LGAs (Egor: 12 schools, 5,270 students; Ikpoba-Okha: 21 schools, 11,421 students; Oredo: 13 schools, 7,975 students). The sample size was determined using Taro Yamane's formula (1967) for finite populations, expressed as:

$$n = N / [1 + N(e)^2]$$

Where n represents the sample size, N represents the population size (24,666), and e represents the margin of error (0.05) at a 95% confidence level. Substituting the values:

$$n = 24,666 / [1 + 24,666(0.05)^2]$$

$$n = 24,666 / [1 + 24,666(0.0025)]$$

$$n = 24,666 / [1 + 61.665]$$

$$n = 24,666 / 62.665$$

$$n = 393.62 \approx 394$$

This yielded a sample size of approximately 394 students.

A multistage sampling technique was used to select respondents. In the first stage, six schools were randomly selected from the three LGAs using simple random sampling (proportionate to the number of schools per LGA: two schools from Egor, three from Ikpoba-Okha, and one from Oredo). In the second stage, respondents were selected from each sampled school using proportionate stratified sampling based on each school's share of the total secondary enrolment, ensuring representation from JSS1–SSS3 classes. In the final stage, systematic random sampling was used to select individual respondents from class registers within each selected school to achieve the target sample size of 394.

Data were collected using a structured questionnaire titled Artificial Intelligence (AI) and Health Learning Knowledge Questionnaire (AIHLKQ), developed by the researcher. The instrument consisted of three sections addressing demographic information, knowledge of AI in health learning, and perception of its educational relevance. Knowledge items included ten (10) multiple choice items, (correct answer = 1, incorrect answers = 0), respondents who scored between 0–3 were reported to possess low knowledge; 4–6, moderate knowledge, while respondents who scored between 7–10 possess high knowledge of Artificial Intelligence as a tool for health learning. While Perception items included ten (10) (Strongly Agree = 4, Agree = 3, Disagree = 2 Strongly Disagree = 1 [reversed for negative items]) likert scale items, respondents who scored

between 0-20 possess negative perception, 21-30; Neutral Perception while those who scored between 31-40 possess positive perception about Artificial Intelligence as a tool for health Learning. The questionnaire was validated by three (3) experts in Health Education while reliability testing using Cronbach's Alpha yielded a coefficient of 0.86, confirming good internal consistency. Collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics such as frequencies, percentages, were used to answer the research questions, while Chi-square analysis was used to test the null hypotheses at a 0.05 level of significance.

Results

Table 1: Demographic Data of Respondents

Age Range	Frequency	Percentage
12-14 years old	124	31.4
15-17	147	37.2
18 and above	123	31.4
Total	394	100
Class	Frequency	Percentage
JSS 1-3	177	44.8
SSS 1-3	217	55.2
Total	394	100

Table 1 represents the demographic data of respondents, the table shows that the total number of respondents is three hundred and ninety five (395). On Age, it shows that 123 (31.4%) respondents are 12-14 years old, 147 (37.2%) respondents are between the ages of 15-17, while 124 (31.4%) are 18 years old and above. On the class level of respondents, it shows that 177 (44.8%) are in JSS 1-3, while 217 (55.2%) are in SSS 1-3.

Table 2: Descriptive Statistics on knowledge of Artificial Intelligence (AI) as an emerging tool for health learning

	Frequency	Percentage
low	68	17.2
moderate	138	34.9
high	188	47.8
Total	394	100.0

(0-3 low; 4-6 moderate; 7-10 high)

Table 2 shows the level of knowledge of Artificial Intelligence (AI) as an emerging tool for health learning. Based on the table above, it was revealed that 68 (17.2%) respondents possess a low level of knowledge, 138 (34.9%) respondents possess a moderate level of knowledge, while 188 (47.8%) respondents possess a high level of knowledge. Thus, the majority of students in Benin Metropolis possess a high level of knowledge of Artificial Intelligence (AI) as an emerging tool for health learning.

Table 3: Descriptive Statistics on Perception of Artificial Intelligence (AI) as an emerging tool for health learning

		Frequency	Percentage
Perception	Negative	45	11.4
	Neutral	188	47.8
	Positive	161	40.8
	Total	395	100.0

(0-20 Negative; 21-30 Neutral; 31-40 Positive)

Table 3 above represents the Perception of Artificial Intelligence (AI) as an emerging tool in health learning. From the table above, it was revealed that 45 (11.4%) of respondents possess a negative perception, 188 (47.8%) respondents possess a neutral perception while 161 (40.8%) respondents possess a positive perception. Thus the findings revealed that the majority of students in Benin Metropolis possess a neutral perception of Artificial Intelligence (AI) as an emerging tool for health learning.

Table 4: Chi Square (X^2) Summary on the relationship between students' age and their knowledge of Artificial Intelligence (AI) as an emerging tool for health learning.

		Knowledge level			Chi-square	df	Sig.
		Low	Moderate	High			
Age	12-14	29	47	48	15.909 ^a	4	0.003
	15-17	30	47	69			
	18 and	09	44	71			
	Above						
Total		68	138	188			

$X^2 = 15.909^a$; df = 4; $P < 0.05$

Table 4 shows that the majority of students between the ages of 12-14 possess a moderate level of knowledge of Artificial Intelligence (AI) as an emerging tool for health learning, the majority of student between the ages of 15-17 possess a high level of knowledge, while the majority of student age 18 and above possess a high level knowledge of Artificial Intelligence (AI) as an emerging tool for health learning. Furthermore, Chi square analysis indicated that the X^2 value is = 15.909^a; df = 4; $P < 0.05$. Thus the null hypothesis which stated that "There is no significant relationship between students' age and their knowledge of Artificial Intelligence (AI) as an emerging tool for health learning" is therefore rejected, this shows that age significantly influences students' knowledge on Artificial Intelligence (AI) as an emerging tool for health learning.

Table 5: Chi Square (X^2) Summary on the relationship between students' age and their Perception of Artificial Intelligence (AI) as an emerging tool for health learning.

		Perception			Chi-square	df	Sig.
		Negative	Neutral	Positive			
Age	12-14	43	51	20	228.644 ^a	4	0.000
	15-17	02	117	37			
	18 and Above	00	20	104			
	Total	45	188	161			

$X^2 = 228.644^a$; df = 4; $P < 0.05$

Table 5 shows that the majority of students (51) between the ages of 12-14 possess a negative perception of Artificial Intelligence (AI) as an emerging tool for health learning, the majority of students (118) between the ages of 15-17 possess a neutral perception, while the majority of student (104) aged 18 and above possess a positive perception of Artificial Intelligence (AI) as an emerging tool for health learning. Furthermore, Chi square analysis indicated that the X^2 value is = 228.644^a; df = 4; $P < 0.05$. Thus the null hypothesis which stated that "There is no significant relationship between students' age and their perception of Artificial Intelligence (AI) as an emerging tool for health learning" is therefore rejected, this shows that age significantly influences students' perception of Artificial Intelligence (AI) as an emerging tool for health learning.

Table 6: Chi Square (X^2) Summary on the relationship between students' class level and their knowledge of Artificial Intelligence (AI) as an emerging tool for health learning.

		Knowledge level			Chi-square	df	Sig.
		Low	Moderate	High			
Class	JSS 1-3	61	95	21	174.432 ^a	2	0.000
	SSS 1-3	07	43	167			
Total		68	138	188			

$X^2 = 174.432^a$; df = 2; $P < 0.05$

Table 6 shows that the majority of students (95) in JSS 1-2 possess a moderate level of knowledge of Artificial Intelligence (AI) as an emerging tool for health learning, the majority of student (167) in senior class level, SSS 1-2 possess a high level of knowledge of Artificial Intelligence (AI) as an emerging tool for health learning. Furthermore, Chi square analysis indicated that the X^2 value is = 174.432^a; df = 2; $P < 0.05$. Thus the null hypothesis which stated that "There is no significant relationship between students' class level and their knowledge of Artificial Intelligence (AI) as an emerging tool for health learning" is therefore rejected, this shows that class level significantly influences students' knowledge on Artificial Intelligence (AI) as an emerging tool for health learning.

Table 7: Chi Square (X^2) Summary on the relationship between students' class level and their knowledge of Artificial Intelligence (AI) as an emerging tool for health learning.

		Perception			Chi-square	df	Sig.
		Negative	Neutral	Positive			
Class	JSS 1-3	32	113	32	70.207 ^a	2	0.000
	SSS 1-3	13	75	129			
Total		45	188	161			

$X^2 = 70.207^a$; $df = 2$; $P < 0.05$

Table 7 shows that the majority of students (113) in JSS class levels possess a neutral perception while the majority of students (129) in SSS class levels possess a positive perception of Artificial Intelligence (AI) as an emerging tool for health learning. Furthermore, Chi square analysis indicated that the X^2 value is = 70.207^a; $df = 2$; $P < 0.05$. Thus the null hypothesis which stated that "There is no significant relationship between students' class level and their perception of Artificial Intelligence (AI) as an emerging tool for health learning" is therefore rejected, this shows that class level significantly influences students' perception of Artificial Intelligence (AI) as an emerging tool for health learning.

Discussion

The findings of this study revealed that secondary school students in Benin Metropolis possess a relatively high level of knowledge of Artificial Intelligence (AI) as an emerging tool for health learning. This suggests that digital exposure and increasing awareness of technology-driven education have begun to influence how adolescents understand emerging innovations. This outcome aligns with the assertions of Bamidele and Oyetunde (2024), who emphasized that exposure to digital tools and online learning platforms significantly improves adolescents' understanding of AI-related concepts.

Furthermore, the study found that most students exhibited a neutral perception of AI in health learning. This indicates that while students recognize the relevance of AI, many remain uncertain about its full potential or may lack practical experience with its educational applications. Similar observations were made by Adegbite and Onifade (2023), who noted that students' attitudes toward AI often depend on institutional support, access to technology, and prior exposure. The neutral perception observed suggests a need for stronger integration of AI-based tools within school curricular to build confidence and positive engagement among learners.

The results also revealed a significant relationship between students' age and both their knowledge and perception of AI. Older students demonstrated higher knowledge levels and more positive attitudes compared to younger ones. This finding supports Ibrahim, Musa, and Yakubu (2023), who reported that age influences cognitive development, digital literacy, and the ability to navigate technological learning environments. Similarly, the class level of students significantly influenced their knowledge and perception of AI. Senior secondary students showed higher knowledge and more favorable attitudes than junior students, likely due to greater curriculum exposure and technological experience, as suggested by Adebayo and Ojo (2023).

Overall, these results highlight the importance of digital inclusion, structured technology integration, and teacher support in enhancing students' readiness for AI-driven health learning. The findings emphasize that both cognitive maturity and academic exposure play vital roles in shaping adolescents' technological awareness and perception

Conclusion

The study concludes that secondary school students in Benin Metropolis generally possess a high level of knowledge but a neutral perception of Artificial Intelligence (AI) as an emerging tool for health learning. It further establishes that both age and class level significantly influence students' knowledge and perception, with older and higher-level students demonstrating more Knowledge and positive Perception. Based on the findings, the following recommendations were made;

- i. The Ministry of Education should integrate age and class specific Artificial Intelligence (AI) concepts and applications into secondary school health education curricular to promote early digital literacy and practical engagement with emerging learning tools.
- ii. The Ministry of Education should organize Continuous professional development programs should be organized for teachers to enhance their competence in using AI-assisted instructional materials, particularly in delivering health-related content.
- iii. Schools should establish AI and digital learning clubs to expose students to hands-on experiences with AI tools and foster positive attitudes toward technology-driven education.
- iv. Educational policymakers and school administrators should provide adequate technological infrastructure, such as internet access and AI-enabled learning platforms, to facilitate effective adoption and utilization of AI in secondary school learning environments.

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