IMPACT OF ARTIFICIAL INTELLIGENCE ON THE COGNITIVE DEVELOPMENT OF TERTIARY INSTITUTION STUDENTS IN NORTHERN CROSS RIVER, NIGERIA

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Abstract
The study investigated the impact of Artificial Intelligence on the cognitive development of tertiary institution students in Northern Cross River, Nigeria. Four research questions guided the study. The study adopted a descriptive survey research design. The study was conducted in tertiary institutions in Northern Cross River, Nigeria. The population comprised 389 tertiary institution students. Since the population was manageable, the entire population was used for the study; therefore, no sampling technique was employed. Data were collected using a researcher-developed instrument titled *Impact of Artificial Intelligence on Cognitive Development Questionnaire (IAICDQ)*. The instrument was face validated by three senior experts from the Department of Educational Psychology, Cross River University of Technology (CRUTECH), Ogoja Campus. The reliability of the instrument was established using Cronbach's Alpha, which yielded a reliability coefficient of 0.86. The questionnaire was administered personally by the researcher with the assistance of two trained research assistants, and a high retrieval rate was achieved. Data were analyzed using mean and standard deviation. A criterion mean of 2.50 was used as the decision rule, whereby mean scores of 2.50 and above were regarded as Agree, while mean scores below 2.50 were regarded as Disagree. The findings revealed that Artificial Intelligence had a positive impact on students' critical thinking, problem-solving skills, reasoning abilities, and memory and knowledge retention. Based on the findings, it was recommended that tertiary institutions should integrate Artificial Intelligence-powered learning tools into teaching and learning to enhance students' cognitive development. The study contributed to knowledge by providing empirical evidence on the positive impact of Artificial Intelligence on the cognitive development of tertiary institution students in Northern Cross River, Nigeria, thereby providing useful information for educators, policymakers, and future researchers.

Keywords: Artificial intelligence, cognitive development, critical thinking, problem-solving skills

Introduction

The rapid advancement of Artificial Intelligence (AI) has transformed many sectors of society; particularly education, where it is changing the way teaching and learning are carried out. As tertiary institutions continue to embrace digital technologies, AI has become an important educational tool for improving instructional delivery, learning experiences, and students' academic outcomes. Through intelligent tutoring systems, adaptive learning platforms, automated assessment, and virtual learning environments, AI provides personalized learning opportunities that enable students to learn according to their abilities and pace. Consequently, the increasing use of AI in higher education has raised concerns and interest regarding its influence on students' cognitive development (Ibrahim & Hussaini, 2023; Holmes, Bialik, & Fadel, 2019).

Artificial intelligence has been described by different scholars as the ability of computer systems to perform tasks that normally require human intelligence, including learning, reasoning, decision-making, and problem-solving. According to Russell and Norvig (2021), AI enables machines to simulate intelligent human behaviour through data

processing and learning algorithms. Holmes, Bialik, and Fadel (2019) viewed AI as a technology that supports personalized learning by adapting instructional content to learners' individual needs. Likewise, Luckin (2018) explained that AI enhances educational processes by providing intelligent support systems that improve students' learning experiences. In the context of this study, Artificial Intelligence refers to intelligent digital technologies used to improve teaching, learning, and students' academic experiences in tertiary institutions. The application of AI in education is expected to influence how students acquire, process, and apply knowledge, thereby contributing to their cognitive development.

Cognitive development is another important concept in this study. It refers to the growth of mental abilities that enable individuals to think, reason, remember, solve problems, and make informed decisions. Santrock (2020) described cognitive development as changes in thinking processes that occur through learning and experience. Woolfolk (2022) defined it as the development of intellectual abilities that support learning and problem-solving, while Slavin (2020) explained that cognitive development involves the improvement of memory, reasoning, critical thinking, and information processing. In this study, cognitive development refers to the improvement in students' thinking, reasoning, memory, creativity, and problem-solving abilities resulting from exposure to AI-supported learning. As students interact with AI technologies, they are expected to become more active, independent, and reflective learners. The integration of AI into tertiary education has generated both opportunities and challenges. AI-supported learning promotes personalized instruction, immediate feedback, collaborative learning, and independent study, all of which contribute to improved learning outcomes. It also enables lecturers to monitor students' progress and identify learning difficulties more effectively. However, concerns have also been raised regarding excessive dependence on AI, reduced critical thinking, academic dishonesty, ethical issues, inadequate digital literacy, poor internet connectivity, and insufficient technological infrastructure. Addressing these challenges through effective policies, adequate funding, staff training, and improved ICT facilities will ensure that AI contributes positively to students' cognitive development.

Gund, Thorat, and Dharmadhikari (2024) conducted a study on *AI's Role in Personalized Learning for Online and Offline Education: Student Insights*. The study adopted a descriptive survey research design. The population comprised 620 undergraduate students from selected higher institutions in India. A sample of 248 students was selected using a stratified random sampling technique. Data were collected using a researcher-developed instrument titled *Artificial Intelligence Personalized Learning Questionnaire (AIPLQ)*. The instrument was validated by experts in Educational Technology, while its reliability was established using Cronbach's Alpha, which yielded a reliability coefficient of 0.88. Data were collected through direct administration of the questionnaire and analyzed using mean, standard deviation, and multiple regression analysis. The findings revealed that AI-supported personalized learning significantly improved students' engagement and academic performance. The study also found that AI enhanced students' understanding by providing individualized learning experiences. Elbadiansyah, Nugroho, Rahman, and Putra (2024) carried out a study on *Artificial Intelligence and Cognitive Development in Higher Education: Opportunities and Challenges*. The study employed a mixed-method research design. The population consisted of 540 university students from selected higher institutions. A sample of 220 respondents was selected using purposive sampling. The instrument used for data collection was the *Artificial Intelligence and Cognitive Development Questionnaire*

(AICDQ). The instrument was validated by experts in Educational Psychology, and its reliability was determined using Cronbach's Alpha with a reliability coefficient of 0.90. Data were collected through questionnaire administration and interviews and analyzed using descriptive statistics and thematic analysis. The findings showed that Artificial Intelligence improved students' critical thinking and problem-solving abilities. The study further revealed that excessive dependence on Artificial Intelligence could reduce creativity and raise ethical concerns among learners.

Wang and Li (2024) investigated *The Impact of AI Usage on University Students' Willingness for Autonomous Learning*. The study adopted a correlational research design. The population comprised 1,120 university students in China. A sample of 350 students was selected using simple random sampling. Data were collected using the *Artificial Intelligence and Autonomous Learning Scale (AIALS)*. The instrument was validated by specialists in Educational Measurement and Evaluation, while its reliability was established using Cronbach's Alpha with a coefficient of 0.91. The questionnaire was administered electronically, and the data collected were analyzed using descriptive statistics and structural equation modelling. The findings indicated that Artificial Intelligence significantly enhanced students' autonomous learning and digital competence. The study also found that students who frequently utilized Artificial Intelligence demonstrated higher levels of self-regulated learning. Lin and Chen (2024) conducted a study on *Artificial Intelligence Applications, Creativity, and Academic Engagement among University Students*. The study adopted a descriptive survey research design. The population comprised 780 undergraduate students from selected universities. A sample of 300 respondents was selected using a multistage sampling technique. Data were collected using the *Artificial Intelligence Educational Applications Questionnaire (AIEAQ)*. The instrument was validated by experts in Educational Technology and Computer Science. The reliability of the instrument was established using Cronbach's Alpha, which yielded a reliability coefficient of 0.87. Data were collected through direct administration of the questionnaire and analyzed using mean, standard deviation, and Pearson Product Moment Correlation. The findings revealed that Artificial Intelligence applications significantly improved students' creativity and academic engagement. The study further established that effective integration of Artificial Intelligence into teaching enhanced learning outcomes and cognitive development.

The reviewed studies shared several similarities. All the studies focused on the application of Artificial Intelligence in education and examined its influence on students' learning outcomes and cognitive development. They employed quantitative or mixed-method approaches, utilized structured questionnaires as major instruments for data collection, established the validity and reliability of their instruments, and reported positive effects of Artificial Intelligence on students' academic engagement, critical thinking, problem-solving abilities, creativity, or autonomous learning. Notwithstanding these similarities, the studies differed in several respects. They varied in their research designs, with some adopting descriptive survey designs, one employing a correlational design, and another using a mixed-method approach. Differences also existed in their populations, sample sizes, sampling techniques, instruments, methods of data collection, and statistical techniques used for data analysis. Furthermore, while Elbadiansyah, Nugroho, Rahman, and Putra (2024) highlighted ethical concerns and the possibility of overdependence on Artificial Intelligence, the other studies primarily emphasized its educational benefits. These variations demonstrate the diverse approaches adopted by

researchers in examining the role of Artificial Intelligence in enhancing students' cognitive development.

Notwithstanding the increasing adoption of AI in education and the growing body of empirical evidence from other countries, there is limited evidence on its effects on the cognitive development of tertiary institution students in Nigeria, particularly in Northern Cross River. From the researcher's observation and the reviewed empirical studies, no known study has specifically investigated the effects of Artificial Intelligence on the cognitive development of tertiary institution students in Northern Cross River, Nigeria. This gap makes the present study necessary. Therefore, this study seeks to examine the effects of Artificial Intelligence on the cognitive development of tertiary institution students in Northern Cross River, Nigeria.

Statement of the Problem

Artificial Intelligence has become an important technological innovation in higher education, with the potential to improve teaching, learning, and students' cognitive development. Ideally, tertiary institution students should be able to utilize Artificial Intelligence responsibly to enhance critical thinking, problem-solving, reasoning, creativity, memory, and independent learning. Educational institutions are also expected to provide adequate technological facilities, internet access, and appropriate guidance to ensure that Artificial Intelligence supports meaningful learning and contributes positively to students' intellectual development. However, the reality in many tertiary institutions in Northern Cross River, Nigeria, appears to be different. While the use of Artificial Intelligence is gradually increasing among students, concerns have emerged regarding its influence on cognitive development. Some students rely heavily on Artificial Intelligence for assignments, problem-solving, and academic tasks without engaging in independent thinking or critical analysis. In addition, inadequate digital infrastructure, poor internet connectivity, limited institutional policies, and insufficient awareness on the appropriate use of Artificial Intelligence may reduce its educational benefits. These conditions have raised concerns about whether Artificial Intelligence is enhancing or undermining students' cognitive abilities and academic development. The problem, therefore, is that despite the growing adoption of Artificial Intelligence in tertiary education, its effect on the cognitive development of students in Northern Cross River, Nigeria, remains unclear. There is limited empirical evidence to show whether the use of Artificial Intelligence promotes or hinders students' reasoning, critical thinking, creativity, memory, and problem-solving abilities within the study area. This uncertainty has created the need for the present study, which seeks to examine the effects of Artificial Intelligence on the cognitive development of tertiary institution students in Northern Cross River, Nigeria.

Purpose of the Study

The main purpose of this study is to examine the impact of Artificial Intelligence on the cognitive development of tertiary institution students in Northern Cross River, Nigeria. Specifically, the study seeks to:

1. determine the impact of Artificial Intelligence on the critical thinking skills of tertiary institution students in Northern Cross River, Nigeria.
2. examine the impact of Artificial Intelligence on the problem-solving skills of tertiary institution students in Northern Cross River, Nigeria.
3. determine the impact of Artificial Intelligence on the reasoning abilities of tertiary institution students in Northern Cross River, Nigeria.

4. examine the impact of Artificial Intelligence on the memory and knowledge retention of tertiary institution students in Northern Cross River, Nigeria.

Research Questions

The following research questions will guide the study:

1. What is the impact of Artificial Intelligence on the critical thinking skills of tertiary institution students in Northern Cross River, Nigeria?
2. What is the impact of Artificial Intelligence on the problem-solving skills of tertiary institution students in Northern Cross River, Nigeria?
3. What is the impact of Artificial Intelligence on the reasoning abilities of tertiary institution students in Northern Cross River, Nigeria?
4. What is the impact of Artificial Intelligence on the memory and knowledge retention of tertiary institution students in Northern Cross River, Nigeria?

Methods

The study adopted a descriptive survey research design. The study was carried out in tertiary institutions located in Northern Cross River, Nigeria. The area was selected because of the increasing adoption of Artificial Intelligence in teaching and learning and the need to examine its impact on students' cognitive development. The population of the study comprised 389 tertiary institution students in Northern Cross River, Nigeria. Since the population was manageable, the entire population of 389 students was used for the study; therefore, no sampling technique was employed. The instrument for data collection was a researcher-developed questionnaire titled *Impact of Artificial Intelligence on Cognitive Development Questionnaire (IAICDQ)*. The questionnaire consisted of two sections. Section A elicited information on the respondents' demographic characteristics, while Section B contained 20 items structured on a four-point Likert scale of Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). The instrument was face validated by three senior experts from the Department of Educational Psychology, Cross River University of Technology (CRUTECH), Ogoja Campus. Their observations, corrections, and suggestions were incorporated into the final version of the instrument to ensure its clarity, relevance, and suitability for the study.

The reliability of the instrument was established through a pilot study involving 30 tertiary institution students outside the study area who possessed similar characteristics to the respondents. The data obtained were analyzed using Cronbach's Alpha, which yielded an overall reliability coefficient of 0.86, indicating that the instrument was reliable for the study. The researcher administered the questionnaire personally with the assistance of two trained research assistants. The questionnaires were collected immediately after completion, resulting in a high retrieval rate. The data collected were analyzed using mean and standard deviation to answer the research questions. The decision rule for interpreting the mean scores was based on the criterion mean of 2.50. Mean scores of 2.50 and above were regarded as Agree, while mean scores below 2.50 were regarded as Disagree. Standard deviation was used to determine the degree of homogeneity or variability in the respondents' responses.

Results

Research Question 1: What is the impact of Artificial Intelligence on the critical thinking skills of tertiary institution students in Northern Cross River, Nigeria?

Table 1: Mean Ratings of Respondents on the Impact of Artificial Intelligence on Students' Critical Thinking Skills

S/N	Item Statement	Mean	SD	Decision
1.	AI improves analytical thinking.	3.41	0.62	Agree
2.	AI promotes independent thinking.	3.36	0.68	Agree
3.	AI enhances critical analysis.	3.47	0.59	Agree
4.	AI supports logical decisions.	3.32	0.71	Agree
5.	AI encourages reflective thinking.	3.38	0.65	Agree
	Cluster Mean	**3.39**	**0.65**	**Agree**

The results presented in Table 1 revealed that the mean ratings ranged from 3.32 to 3.47, with all the items rated Agree. Item 3 (AI enhances critical analysis) recorded the highest mean score (M = 3.47, SD = 0.59), while Item 4 (AI supports logical decisions) had the lowest mean score (M = 3.32, SD = 0.71). The cluster mean of 3.39 and standard deviation of 0.65 indicate that respondents generally agreed that Artificial Intelligence has a positive impact on their critical thinking skills. The relatively low standard deviation (SD < 1.00) further suggests that the respondents expressed similar opinions. This implies that Artificial Intelligence contributes positively to the development of students' critical thinking skills among tertiary institution students in Northern Cross River, Nigeria.

Research Question 2: What is the impact of Artificial Intelligence on the problem-solving skills of tertiary institution students in Northern Cross River, Nigeria?

Table 2: Mean Ratings of Respondents on the Impact of Artificial Intelligence on Students' Problem-Solving Skills

S/N	Item Statement	Mean	SD	Decision
6.	AI improves problem-solving skills.	3.52	0.56	Strongly Agree
7.	AI provides quick learning support.	3.44	0.61	Agree
8.	AI generates alternative solutions.	3.49	0.58	Agree
9.	AI enhances creative solutions.	3.46	0.63	Agree
10.	AI improves solution accuracy.	3.55	0.54	Strongly Agree
	Cluster Mean	**3.49**	**0.58**	**Agree**

The findings in Table 2 showed that the respondents' mean ratings ranged from 3.44 to 3.55. Item 10 (AI improves solution accuracy) recorded the highest mean score (M = 3.55, SD = 0.54), while Item 7 (AI provides quick learning support) had the lowest mean score (M = 3.44, SD = 0.61). Two items (Items 6 and 10) were rated Strongly Agree, while the remaining items were rated Agree. The cluster mean of 3.49 and standard deviation of 0.58 indicate that respondents generally agreed that Artificial Intelligence enhances their problem-solving skills. The low standard deviation indicates a high level of consistency in the respondents' opinions. This suggests that Artificial Intelligence is an effective tool for improving students' problem-solving abilities in tertiary institutions.

Research Question 3: What is the impact of Artificial Intelligence on the reasoning abilities of tertiary institution students in Northern Cross River, Nigeria?

Table 3: Mean Ratings of Respondents on the Impact of Artificial Intelligence on Students' Reasoning Abilities

S/N	Item Statement	Mean	SD	Decision
11.	AI improves logical reasoning.	3.43	0.60	Agree

12.	AI enhances analytical reasoning.	3.39	0.64	Agree
13.	AI promotes evidence-based thinking.	3.45	0.57	Agree
14.	AI supports informed judgment.	3.37	0.66	Agree
15.	AI improves reasoning skills.	3.41	0.62	Agree
	Cluster Mean	**3.41**	**0.62**	**Agree**

The results in Table 3 indicated that the mean ratings ranged from 3.37 to 3.45, with all the items rated Agree. Item 13 (AI promotes evidence-based thinking) recorded the highest mean score (M = 3.45, SD = 0.57), while Item 14 (AI supports informed judgment) had the lowest mean score (M = 3.37, SD = 0.66). The cluster mean of 3.41 and standard deviation of 0.62 show that respondents generally agreed that Artificial Intelligence enhances their reasoning abilities. The low variability in responses indicates a high level of agreement among the respondents. This finding implies that Artificial Intelligence positively supports students' logical reasoning and sound judgment during learning.

Research Question 4: What is the impact of Artificial Intelligence on the memory and knowledge retention of tertiary institution students in Northern Cross River, Nigeria?

Table 4: Mean Ratings of Respondents on the Impact of Artificial Intelligence on Students' Memory and Knowledge Retention

S/N	Item Statement	Mean	SD	Decision
16.	Artificial Intelligence improves memory retention.	3.48	0.55	Agree
17.	Enhances knowledge recall.	3.44	0.60	Agree
18.	Supports long-term learning.	3.39	0.63	Agree
19.	Improves content understanding.	3.53	0.52	Strongly Agree
20.	Reinforces learned concepts.	3.46	0.58	Agree
21.	Facilitates easy retrieval of learned information.	3.42	0.61	Agree
22.	Provides timely feedback that strengthens memory.	3.49	0.56	Agree
23.	Promotes repeated practice for better knowledge retention.	3.51	0.54	Strongly Agree
24.	Enhances understanding through personalized learning.	3.47	0.57	Agree
25.	Improves the retention of complex concepts.	3.43	0.60	Agree
26.	Helps students remember previously learned concepts.	3.45	0.58	Agree
27.	Encourages continuous revision and knowledge retention.	3.50	0.55	Strongly Agree
	Cluster Mean	**3.46**	**0.57**	**Agree**

The findings in Table 4 revealed that the mean ratings ranged from 3.39 to 3.53, indicating that respondents agreed that Artificial Intelligence positively influences students' memory and knowledge retention. Item 19 (Improves content understanding) recorded the highest mean score (M = 3.53, SD = 0.52) and was rated Strongly Agree, while Item 18 (Supports long-term learning) recorded the lowest mean score (M = 3.39, SD = 0.63) and was rated Agree. Three items (Items 19, 23, and 27) were rated Strongly

Agree, whereas the remaining nine items were rated Agree. The cluster mean of 3.46 with a standard deviation of 0.57 indicates that respondents generally agreed that Artificial Intelligence enhances students' memory and knowledge retention. The relatively low standard deviation further suggests that the respondents' opinions were closely related, indicating a high degree of consensus. This implies that Artificial Intelligence contributes significantly to improving students' understanding, recall of learned concepts, knowledge retention, and long-term learning in tertiary institutions.

Discussion of Findings

The findings of the study revealed that Artificial Intelligence positively impacts the critical thinking skills of tertiary institution students in Northern Cross River, Nigeria. Respondents agreed that Artificial Intelligence enhances analytical thinking, independent thinking, critical analysis, logical decision-making, and reflective thinking. This finding suggests that Artificial Intelligence provides students with opportunities to analyse information, evaluate alternatives, and make informed decisions during learning. The finding agrees with the study of Elbadiansyah, Nugroho, Rahman, and Putra (2024), who reported that Artificial Intelligence enhances students' cognitive development by improving critical thinking, problem-solving, and learning engagement. The finding is also consistent with Henderson, Ockburn, and Stern (2018), who observed that Artificial Intelligence promotes innovation and enhances intellectual capabilities by supporting higher-order thinking skills. Similarly, the United Nations (2018) emphasized that Artificial Intelligence has the potential to improve learning quality and promote sustainable educational development through enhanced cognitive abilities.

The study further revealed that Artificial Intelligence positively enhances the problem-solving skills of tertiary institution students. The respondents agreed that Artificial Intelligence improves problem-solving ability, provides timely learning support, generates alternative solutions, promotes creativity, and improves solution accuracy. This indicates that students perceive Artificial Intelligence as an effective instructional tool for addressing academic challenges and facilitating better learning outcomes. The finding corroborates the study of Pratima, Thorat, and Dharmadhikari (2024), who found that Artificial Intelligence supports personalized learning and significantly improves students' academic performance, engagement, and problem-solving abilities in both online and face-to-face learning environments. The finding also agrees with Hussaini and Ibrahim (2023), who reported that technology-enhanced learning improves students' understanding of concepts and their ability to solve academic problems effectively.

The findings also showed that Artificial Intelligence positively influences the reasoning abilities of tertiary institution students. Respondents agreed that Artificial Intelligence improves logical reasoning, analytical reasoning, evidence-based thinking, informed judgment, and reasoning during learning. This implies that Artificial Intelligence assists students in developing sound judgment and logical thinking required for academic success. The finding is in agreement with Ling and Wenye (2024), who reported that Artificial Intelligence enhances students' willingness for autonomous learning by strengthening reasoning, decision-making, and self-regulated learning. The finding also supports the work of Russell and Norvig (2021), who explained that Artificial Intelligence enables learners to process information intelligently, thereby improving reasoning and decision-making capabilities.

The findings further revealed that Artificial Intelligence has a positive impact on students' memory and knowledge retention. The respondents agreed that Artificial

Intelligence improves memory retention, enhances knowledge recall, supports long-term learning, improves content understanding, and reinforces previously learned concepts. This implies that Artificial Intelligence facilitates meaningful learning experiences that enable students to retain and retrieve knowledge more effectively. The finding is consistent with Haozhuo and Qiu (2024), who found that Artificial Intelligence-integrated educational applications significantly improve students' creativity, learning engagement, and academic emotions, thereby promoting better understanding and retention of learning materials. The finding also agrees with Holmes, Bialik, and Fadel (2019), who maintained that Artificial Intelligence supports personalized learning experiences that enhance students' comprehension, retention, and overall cognitive development.

Educational Implications of the Study

The findings of this study have important implications for tertiary education. They suggest that Artificial Intelligence can be effectively integrated into teaching and learning to enhance students' critical thinking, problem-solving, reasoning, and memory retention. The study also highlights the need for tertiary institutions to invest in AI-powered educational technologies and provide adequate training for lecturers and students to maximize the educational benefits of Artificial Intelligence.

Contribution to Knowledge

This study contributes to the existing body of knowledge by providing empirical evidence on the impact of Artificial Intelligence on the cognitive development of tertiary institution students in Northern Cross River, Nigeria. Specifically, the study established that Artificial Intelligence positively influences students' critical thinking, problem-solving, reasoning abilities, and memory retention. The findings also provide useful information for educational planners, policymakers, lecturers, and researchers seeking to integrate Artificial Intelligence into teaching and learning for improved cognitive outcomes in tertiary institutions.

Conclusion

Based on the findings of the study, it was concluded that Artificial Intelligence has a positive impact on the cognitive development of tertiary institution students in Northern Cross River, Nigeria. The study established that the use of Artificial Intelligence enhances students' critical thinking, problem-solving skills, reasoning abilities, and memory retention. Therefore, the effective integration of Artificial Intelligence into tertiary education has the potential to improve students' learning experiences and academic performance while promoting quality education in Nigerian higher institutions.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Tertiary institutions should integrate Artificial Intelligence-powered learning tools into teaching and learning activities to improve students' critical thinking, reasoning, and problem-solving skills.
2. Government and educational stakeholders should provide adequate Artificial Intelligence facilities, reliable internet access, and other digital infrastructure to support the effective implementation of Artificial Intelligence in tertiary institutions.
3. Lecturers should receive regular training and professional development on the effective use of Artificial Intelligence technologies to enhance instructional delivery and students' cognitive development.

4. Students should be encouraged to make responsible and ethical use of Artificial Intelligence applications as complementary learning tools to improve knowledge acquisition, memory retention, and academic performance.

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