

Influence of AI-based Chatbots on University Students' Post-class Review, Learning Attitudes and Motivation in Nigeria

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Abstract

The rapid integration of artificial intelligence (AI) technologies into educational environments has significantly transformed students' learning experiences, particularly in higher education. Among these innovations, AI-based chatbots have emerged as accessible and interactive tools that support academic engagement beyond the classroom. In the Nigerian context, where digital learning adoption is steadily increasing, university students are increasingly utilizing AI chatbots for post-class review, clarification of concepts, and self-directed learning. This study examined the influence of AI-based chatbots on university students' post-class review practices, learning attitudes, and motivation in North Central Nigeria. A descriptive research design of the survey type was adopted for the study. The target population comprised undergraduate students from selected universities within the region. A structured questionnaire was used as the primary instrument for data collection. The data collected were analyzed using descriptive statistics, including mean scores, standard deviation, and frequency distributions. The findings of the study revealed that AI-based chatbots significantly support students' post-class review by providing immediate feedback, simplifying complex concepts, and enhancing independent learning. The results further indicated a positive relationship between chatbot usage and students' learning attitudes, as students demonstrated increased interest, engagement, and willingness to explore academic content beyond formal lectures. Additionally, the study found that the use of AI chatbots contributes to improved academic motivation, as students reported greater confidence in their understanding of course materials and a heightened sense of academic autonomy. Based on these findings, the study concludes that AI-based chatbots play a crucial role in enhancing post-class learning experiences, fostering positive learning attitudes, and improving motivation among university students in North Central Nigeria. It is therefore recommended that universities integrate AI-driven learning tools into their instructional support systems, provide digital literacy training for students, and establish guidelines for the effective and ethical use of AI technologies in academic settings. Further research is also suggested to explore long-term impacts and potential challenges associated with AI-assisted learning in Nigerian higher education.

Keywords: Artificial Intelligence (AI); AI-based Chatbots; Post-Class Review; Learning Attitudes; Academic Motivation; University Students; North Central Nigeria

I. Introduction

Artificial intelligence (AI) has become an increasingly significant component of contemporary educational systems, particularly with the emergence of generative AI tools and conversational agents capable of producing human-like responses. In higher education, AI-based chatbots such as ChatGPT are transforming how students interact with knowledge, enabling them to access explanations, summaries, and feedback in real time. These tools are increasingly viewed as supplementary learning resources that can extend academic engagement beyond the classroom. However, scholars have emphasized that the educational value of such technologies depends on their integration into pedagogical practices and the ways students utilize them for learning purposes (Dwivedi et al., 2023).

Following the public release of ChatGPT, scholarly attention has intensified regarding its implications for teaching and learning in universities. A recent review by McGrath et al. (2024) highlights that research on AI chatbots in higher education is expanding rapidly, although the field remains conceptually fragmented. The authors note that while some studies present chatbots as transformative tools for enhancing learning, others raise concerns about their potential to disrupt traditional academic practices. Importantly, the review identifies higher education as a critical context

for understanding how students adopt and integrate AI technologies into their academic routines, particularly in activities such as independent study and post-class review.

One of the primary reasons AI chatbots are gaining relevance among university students is their applicability to post-class academic activities. In a large-scale international study involving over 23,000 students, Ravšelj et al. (2024) found that students commonly use ChatGPT for summarizing academic materials, generating ideas, and clarifying difficult concepts. Similarly, Morell-Mengual et al. (2024) reported that students utilize AI chatbots to improve understanding of complex topics, manage study time, and enhance academic performance. These functions align closely with post-class review practices, where students revisit lecture materials and consolidate their understanding outside formal instructional settings.

The effectiveness of AI chatbots in supporting post-class review is further attributed to their interactive and responsive nature. Unlike traditional learning resources, chatbots allow students to engage in dialogue, ask follow-up questions, and receive immediate clarification. A scoping review by Schei et al. (2024) indicates that students perceive AI chatbots as valuable tools for flexible learning, particularly because they provide instant academic support. Additionally, Stöhr et al. (2024) found that students who frequently use ChatGPT tend to exhibit more positive attitudes toward its educational applications, suggesting that familiarity with the technology enhances its perceived usefulness in learning contexts.

Beyond their role in facilitating academic review, AI chatbots have also been linked to students' learning attitudes and motivation. Deng and Yu (2024), in a systematic review and metaanalysis, found that chatbot-supported learning environments can improve students' academic performance, increase motivation, and reduce cognitive load. Similarly, Wang and Fan (2025) reported that AI chatbots have a significant positive effect on learning outcomes and moderate effects on students' perceptions and higher-order thinking. These findings suggest that chatbot use may not only influence what students learn but also how they feel about learning and their willingness to engage in academic tasks.

Motivation and learning attitudes are particularly important in university education, where students are expected to engage in self-directed learning. Research indicates that students' intention to use AI tools is influenced by perceived usefulness, ease of use, and social factors. In the Nigerian context, Ojo (2024) found that these factors significantly predict students' adoption of ChatGPT for academic purposes, with behavioural intention serving as a key mediator. This suggests that students who perceive AI chatbots as beneficial are more likely to integrate them into their learning routines, thereby influencing their attitudes toward learning and their overall motivation.

Despite these potential benefits, the use of AI chatbots in education is not without challenges. Several studies have raised concerns about issues such as inaccurate information, overreliance on AI tools, and the potential decline in critical thinking and writing skills. Ravšelj et al. (2024) reported that students expressed concerns about academic dishonesty and the reliability of chatbot-generated content. Similarly, Morell-Mengual et al. (2024) noted that while students appreciate the efficiency of chatbots, they are also wary of becoming overly dependent on them. Fošner and Aver (2024) further found that many students believe excessive use of AI tools may negatively impact creativity and analytical thinking.

In Nigeria, the growing adoption of AI technologies in higher education has created a need for context-specific research. While studies such as Ojo (2024) indicate that Nigerian students are increasingly embracing AI chatbots, the broader educational implications of this trend remain underexplored. Factors such as digital infrastructure, institutional policies, and varying levels of digital literacy may influence how students use AI tools and the extent to which these tools affect learning outcomes. In North Central Nigeria, empirical evidence on the role of AI chatbots in students' academic practices is particularly limited, despite indications that students are actively engaging with these technologies.

Given these gaps, there is a clear need for empirical investigation into how AI-based chatbots influence university students' post-class review, learning attitudes, and motivation within the Nigerian context. While existing studies provide valuable insights into adoption patterns and general

perceptions, few have examined these variables collectively in a specific regional context such as North Central Nigeria. This study therefore adopts a descriptive survey approach to generate context-relevant evidence on the educational impact of AI chatbots, thereby contributing to the growing body of literature on technology-enhanced learning in developing countries.

A. Purpose of the Study

The aim of this study is to examine the influence of AI-based chatbots on university students' post-class review, learning attitudes, and motivation in North Central Nigeria, with a view to determining how chatbot-supported learning shapes students' academic engagement beyond the classroom, their disposition toward learning, and their drive to participate in academic activities.

The study specifically seeks to:

1. determine the influence of AI-based chatbots on students' post-class review in terms of summarizing academic materials, clarifying complex concepts, and generating study ideas;
2. examine the influence of AI-based chatbots on students' learning attitudes in terms of interest in learning, engagement with course content, and willingness to explore academic materials independently;
3. assess the influence of AI-based chatbots on students' motivation in terms of academic confidence, self-directed learning, and persistence in academic tasks;
4. evaluate the overall relationship between AI-based chatbot usage and students' post-class review, learning attitudes, and motivation.

B. Research Questions

The following research questions will guide the study:

1. What is the influence of AI-based chatbots on students' post-class review in terms of summarizing academic materials, clarifying complex concepts, and generating study ideas?
2. What is the influence of AI-based chatbots on students' learning attitudes in terms of interest in learning, engagement with course content, and willingness to explore academic materials independently?
3. What is the influence of AI-based chatbots on students' motivation in terms of academic confidence, self-directed learning, and persistence in academic tasks?
4. What is the relationship between AI-based chatbot usage and students' post-class review, learning attitudes, and motivation?

C. Research Hypotheses

The following null hypotheses will be tested in this study:

H₀₁: AI-based chatbots have no significant influence on students' post-class review in terms of summarizing academic materials, clarifying complex concepts, and generating study ideas.

H₀₂: AI-based chatbots have no significant influence on students' learning attitudes in terms of interest in learning, engagement with course content, and willingness to explore academic materials independently.

H₀₃: AI-based chatbots have no significant influence on students' motivation in terms of academic confidence, self-directed learning, and persistence in academic tasks.

H₀₄: There is no significant relationship between AI-based chatbot usage and students' post-class review, learning attitudes, and motivation.

II. Literature Review

A. Concept of AI-Based Chatbots in Education

Artificial intelligence (AI)-based chatbots are computer programs designed to simulate humanlike conversation using natural language processing and machine learning algorithms. In educational contexts, these systems function as intelligent tutoring tools capable of responding to students' queries, generating explanations, and providing feedback in real time. The emergence of generative AI models such as ChatGPT has significantly enhanced the capabilities of chatbots,

enabling them to produce contextually relevant and coherent responses across a wide range of academic subjects. These developments have positioned AI chatbots as potentially transformative tools in higher education, particularly in supporting personalized and on-demand learning (Dwivedi et al., 2023).

In university settings, AI-based chatbots are increasingly being integrated into students' learning processes as supplementary academic tools. Unlike traditional digital resources, chatbots offer interactive and adaptive learning experiences, allowing students to engage in dialogue, ask followup questions, and receive tailored explanations. This interactivity distinguishes chatbots from static learning materials such as textbooks and lecture notes, as it enables a more dynamic form of knowledge construction. Studies have shown that students frequently use AI chatbots for tasks such as summarizing content, generating ideas, and clarifying difficult concepts, thereby enhancing their independent learning practices (Ravšelj et al., 2024).

The growing adoption of AI chatbots in education is also linked to their accessibility and ease of use. Most AI chatbots are available through web-based platforms or mobile applications, making them readily accessible to students at any time and location. This accessibility is particularly important in contexts where access to academic support may be limited outside classroom hours. Furthermore, the conversational nature of chatbots reduces the barriers associated with seeking help, as students can interact with these tools without fear of judgement or embarrassment. As a result, AI chatbots are increasingly viewed as supportive learning companions that complement traditional instructional methods (Schei et al., 2024).

Despite their potential benefits, the use of AI chatbots in education has raised several concerns. One major issue is the accuracy and reliability of the information provided by these systems, as AI-generated responses may sometimes be incomplete or misleading. Additionally, there are concerns about students becoming overly dependent on chatbots, which could undermine the development of critical thinking and problem-solving skills. Ethical considerations, including academic integrity and plagiarism, have also been highlighted, as students may misuse AI tools to generate assignments without proper understanding. These challenges underscore the need for guided and responsible use of AI chatbots in educational settings (Dwivedi et al., 2023).

In essence, AI-based chatbots represent a significant innovation in educational technology, offering new opportunities for enhancing learning experiences in higher education. Their ability to provide immediate, personalized, and interactive support makes them particularly valuable for post-class learning activities. However, their effectiveness depends on how they are integrated into students' learning practices and the extent to which students use them as tools for understanding rather than shortcuts for task completion. Consequently, there is a need for empirical studies to examine their actual impact on students' learning behaviours, attitudes, and motivation, particularly in specific contexts such as Nigerian universities.

B. Concept of Post-Class Review among University Students

Post-class review refers to the set of academic activities that students engage in after formal classroom instruction in order to consolidate, reinforce, and deepen their understanding of course content. These activities typically include revisiting lecture notes, summarizing key points, clarifying difficult concepts, and practicing learned material. In higher education, post-class review is considered a critical component of effective learning, as it enables students to transform initial exposure to information into long-term understanding and retention. The importance of postclass review is grounded in cognitive learning theories, which emphasize repetition, elaboration, and active engagement as essential processes for meaningful learning.

Effective post-class review involves more than passive rereading of notes; it requires active cognitive engagement with the material. Strategies such as summarization, self-explanation, and retrieval practice have been shown to enhance comprehension and memory retention. When students summarize information in their own words or attempt to explain concepts, they are more likely to identify gaps in their understanding and reinforce their knowledge. Similarly, generating questions and

testing oneself on learned material can improve recall and deepen conceptual understanding. These strategies highlight the active nature of post-class review as a process of knowledge reconstruction rather than mere repetition.

In recent years, digital technologies have increasingly shaped how students conduct post-class reviews. Online resources, educational platforms, and now AI-based chatbots provide students with additional tools for revisiting and understanding course content. AI chatbots, in particular, offer new possibilities for post-class review by enabling students to interact with learning material in a conversational manner. Students can ask for simplified explanations, request examples, or generate summaries, thereby making the review process more interactive and responsive to individual learning needs (Morell-Mengual et al., 2024).

However, the effectiveness of post-class review depends on the quality of the strategies employed by students. While tools such as AI chatbots can facilitate review, they do not automatically guarantee meaningful learning. If students rely on chatbots for quick answers without engaging critically with the material, the benefits of post-class review may be limited. Conversely, when students use these tools to support active learning strategies, such as questioning and elaboration, the review process can become more effective. This highlights the importance of understanding not only whether students use AI tools, but how they use them in the context of post-class learning.

In the Nigerian university context, post-class review is particularly important due to factors such as large class sizes, limited access to lecturers outside class hours, and varying levels of academic support. Students often rely on self-directed learning to bridge gaps in understanding, making postclass review a central aspect of their academic success. The introduction of AI-based chatbots into this context presents both opportunities and challenges, as these tools may enhance students' ability to review material independently while also raising concerns about dependency and superficial learning. Therefore, examining the role of AI chatbots in post-class review is essential for understanding their broader impact on students' academic practices.

C. Concept of Learning Attitudes and Motivation

Learning attitudes and motivation are critical psychological factors that influence students' engagement, persistence, and overall academic success. Learning attitude refers to students' disposition toward learning, including their interest, enthusiasm, and willingness to engage with academic tasks. Motivation, on the other hand, relates to the internal and external factors that drive students to initiate, sustain, and complete learning activities. Together, these constructs shape how students approach their studies and determine the extent to which they invest effort in academic tasks. Learning attitudes are often reflected in students' level of interest in course content, their engagement during learning activities, and their willingness to explore topics beyond the classroom. Positive learning attitudes are associated with active participation, curiosity, and a proactive approach to learning, while negative attitudes may result in disengagement and lack of effort. Research has shown that students who exhibit positive learning attitudes are more likely to adopt effective learning strategies and achieve better academic outcomes. These attitudes are influenced by various factors, including teaching methods, learning environments, and the availability of supportive learning tools. Motivation in learning is commonly categorized into intrinsic and extrinsic forms. Intrinsic motivation arises from internal satisfaction and interest in the learning process, while extrinsic motivation is driven by external rewards such as grades or recognition. In higher education, intrinsic motivation is particularly important, as it encourages students to engage deeply with learning materials and pursue knowledge for its own sake. AI-based chatbots may influence both forms of motivation by making learning more accessible and engaging, thereby enhancing students' interest and confidence in their academic abilities (Deng & Yu, 2024).

The relationship between technology and learning motivation has been widely studied, with evidence suggesting that interactive and personalized learning tools can enhance students' motivation. AI chatbots, by providing immediate feedback and tailored support, may increase students' sense of competence and autonomy, which are key drivers of motivation. However, the impact of these tools

on motivation is not always straightforward, as excessive reliance on AI may reduce students' effort and self-regulation. Therefore, understanding how AI chatbots influence motivation requires careful consideration of both their positive and negative effects (Wang & Fan, 2025).

In the context of Nigerian universities, learning attitudes and motivation are influenced by a range of socio-economic and institutional factors, including access to learning resources, quality of instruction, and academic support systems. The introduction of AI-based chatbots into this environment has the potential to reshape students' learning experiences by providing additional support for independent study. However, the extent to which these tools enhance or hinder learning attitudes and motivation remains an empirical question. This underscores the importance of investigating how AI chatbots interact with psychological factors of learning within specific contexts such as North Central Nigeria.

III. Methodology

This study adopted a descriptive research design of the survey type to examine the influence of AI-based chatbots on university students' post-class review, learning attitudes, and motivation in North Central Nigeria. The design was considered appropriate because it enables the researcher to collect data from a relatively large population and describe existing conditions without manipulating any variables. The population of the study comprised undergraduate students in selected universities within North Central Nigeria. A multi-stage sampling procedure was employed, involving the purposive selection of universities followed by stratified and simple random sampling techniques to ensure adequate representation of students across faculties and levels of study. A sample size considered statistically adequate for generalization was drawn from the population.

Data for the study were collected using a structured questionnaire developed by the researcher, titled *AI-Based Chatbots and Students' Learning Questionnaire (ABCSLQ)*. The instrument was designed to capture information on students' use of AI-based chatbots and their influence on postclass review (summarizing academic materials, clarifying complex concepts, and generating study ideas), learning attitudes (interest, engagement, and willingness to explore), and motivation (academic confidence, self-directed learning, and persistence). The questionnaire was structured on a Likert-type scale and subjected to face and content validation by experts in educational technology and measurement and evaluation. A pilot study was conducted to determine the reliability of the instrument, and the internal consistency was established using Cronbach's alpha coefficient, yielding a value considered acceptable for research purposes.

The data collected were analyzed using both descriptive and inferential statistical techniques. Descriptive statistics such as mean, standard deviation, and frequency counts were used to answer the research questions, while inferential statistics, including Pearson Product Moment Correlation and multiple regression analysis, were employed to test the null hypotheses at a 0.05 level of significance. The choice of these analytical techniques was guided by the nature of the variables and the objectives of the study. Ethical considerations were duly observed, including obtaining informed consent from respondents, ensuring confidentiality of responses, and guaranteeing that participation in the study was voluntary.

IV. RESULTS

A. Participants

Table 1: Percentage Distribution of Respondents based on Demographic Characteristics of Undergraduate Students (N = 120)

Variable	Category	Frequency	Percentage (%)
Gender	Male	54	45.0
	Female	66	55.0
Institution	Federal Universities	62	51.7
	State Universities	58	48.3
Age Group	18–22 years	72	60.0

	23–27 years	40	33.3
	Above 27 years	8	6.7
Level of Study	100–200 Level	68	56.7
	300–400 Level	52	43.3
Chatbot Usage Frequency	Frequent Use	64	53.3
	Occasional Use	42	35.0
	Rare Use	14	11.7
Total		120	100.0

Source: Field Survey, 2026

The demographic information of the 120 respondents shows a well-balanced distribution across key variables relevant to the study. In terms of gender, the sample comprises 55.0% female students and 45.0% male students, indicating a slightly higher representation of female participants. This distribution suggests that both genders are adequately represented, thereby providing a reliable basis for examining variations in post-class review, learning attitudes, and motivation across gender groups. With respect to institutional distribution, 51.7% of the respondents were drawn from federal universities, while 48.3% were from state universities in North Central Nigeria. This near-equal representation enhances the generalizability of the findings, as it captures perspectives from different institutional settings with varying academic structures and access to digital learning resources, including AI-based chatbots.

The age distribution reveals that the majority of respondents (60.0%) fall within the 18–22 years age bracket, followed by 33.3% within the 23–27 years range, while only 6.7% are above 27 years.

This indicates that the study largely reflects the experiences of younger undergraduate students who are more likely to engage actively with emerging digital technologies such as AI-based chatbots. In terms of level of study, 56.7% of the respondents are in the lower academic levels (100–200 level), while 43.3% are in the upper levels (300–400 level). This distribution suggests that the sample captures students at different stages of their academic journey, thereby providing diverse insights into how AI-based chatbots influence learning behaviours across levels of study.

Finally, the analysis of chatbot usage frequency shows that 53.3% of the respondents reported frequent use of AI-based chatbots for academic purposes, 35.0% indicated occasional use, while 11.7% reported rare use. This finding demonstrates a high level of adoption of AI-based chatbots among university students in the study area and underscores the relevance of examining their influence on post-class review, learning attitudes, and motivation.

B. Answering of Research Questions

The following research questions would be answered in this study:

Research Question One:

What is the influence of AI-based chatbots on students' post-class review in terms of summarizing academic materials, clarifying complex concepts, and generating study ideas?

Table 2: Analysis of the Influence of AI-Based Chatbots on Students' Post-Class Review

S/N	Influence of AI-Based Chatbots on Students' Post-Class Review	Mean	SD	Remark
1.	AI chatbots help students summarize academic materials effectively after lectures.	3.34	0.82	Agreed
2.	AI chatbots assist in clarifying complex concepts encountered during lectures.	3.28	0.90	Agreed
3.	AI chatbots enable students to generate study ideas and examples for better understanding.	3.21	0.85	Agreed
4.	AI chatbots enhance students' ability to review lecture notes independently.	3.18	0.88	Agreed
5.	AI chatbots provide instant feedback that supports post-class learning.	3.30	0.80	Agreed

Weighted Mean	3.26	Agreed
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Key: Disagreed = 1.0–2.49; Agreed = 2.50–5.00

Table 2 shows that AI-based chatbots have a significant influence on students' post-class review activities. Students agreed that AI chatbots help in summarizing academic materials effectively (mean = 3.34) and clarifying complex concepts encountered during lectures (mean = 3.28). They also indicated that chatbots support the generation of study ideas and examples (mean = 3.21). Furthermore, respondents agreed that AI chatbots enhance independent review of lecture notes and provide instant feedback that supports learning (means = 3.18 and 3.30 respectively). The weighted mean of 3.26 indicates a general agreement that AI-based chatbots positively influence students' post-class review.

Research Question Two:

What is the influence of AI-based chatbots on students' learning attitudes in terms of interest in learning, engagement with course content, and willingness to explore academic materials independently?

Table 3: Analysis of the Influence of AI-Based Chatbots on Students' Learning Attitudes

S/N	Influence of AI-Based Chatbots on Students' Learning Attitudes	Mean	SD	Remark
1.	AI chatbots increase students' interest in learning academic content.	3.22	0.86	Agreed
2.	AI chatbots enhance students' engagement with course materials.	3.27	0.84	Agreed
3.	AI chatbots encourage students to explore academic topics beyond classroom teaching.	3.19	0.91	Agreed
4.	AI chatbots make learning more interactive and enjoyable for students.	3.31	0.79	Agreed
5.	AI chatbots improve students' positive disposition toward learning tasks.	3.25	0.83	Agreed
	Weighted Mean	3.25		Agreed

Key: Disagreed = 1.0–2.49; Agreed = 2.50–5.00

Table 3 shows that AI-based chatbots positively influence students' learning attitudes. Students agreed that AI chatbots increase their interest in learning (mean = 3.22) and enhance engagement with course materials (mean = 3.27). They also agreed that chatbots encourage exploration of academic topics beyond the classroom (mean = 3.19). In addition, respondents indicated that chatbots make learning more interactive and enjoyable (mean = 3.31) and improve their overall disposition toward learning tasks (mean = 3.25). The weighted mean of 3.25 indicates a general agreement that AI-based chatbots positively influence students' learning attitudes.

Research Question Three:

What is the influence of AI-based chatbots on students' motivation in terms of academic confidence, self-directed learning, and persistence in academic tasks?

Table 4: Analysis of the Influence of AI-Based Chatbots on Students' Motivation

S/N	Influence of AI-Based Chatbots on Students' Motivation	Mean	SD	Remark
1.	AI chatbots improve students' academic confidence in understanding course content.	3.29	0.81	Agreed
2.	AI chatbots promote self-directed learning among students.	3.33	0.78	Agreed
3.	AI chatbots encourage students to persist in completing academic tasks.	3.18	0.87	Agreed
4.	AI chatbots motivate students to study independently outside classroom hours.	3.26	0.82	Agreed
5.	AI chatbots increase students' willingness to engage in continuous learning.	3.21	0.85	Agreed

Weighted Mean

3.25

Agreed

Key: Disagreed = 1.0–2.49; Agreed = 2.50–5.00

Table 4 shows that AI-based chatbots have a positive influence on students' motivation. Students agreed that AI chatbots improve their academic confidence (mean = 3.29) and promote self-directed learning (mean = 3.33). They also indicated that chatbots encourage persistence in academic tasks (mean = 3.18). Furthermore, respondents agreed that AI chatbots motivate them to study independently and engage in continuous learning (means = 3.26 and 3.21 respectively). The weighted mean of 3.25 indicates a general agreement that AI-based chatbots positively influence students' motivation.

C. Hypotheses Testing

The following research hypotheses were tested in this study:

Hypothesis One

H₀₁: AI-based chatbots have no significant influence on students' post-class review in terms of summarising academic materials, clarifying complex concepts, and generating study ideas.

Table 5: Regression Analysis of the Influence of AI-Based Chatbots on Students' Post-Class Review

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	.681	.464	.450	.412	33.987	.000

Source: Field Survey, 2026

Table 5 shows the regression analysis of the influence of AI-based chatbots on students' post-class review. The result revealed a correlation coefficient (R) of .681, indicating a moderate positive relationship between AI-based chatbot usage and students' post-class review. The R Square value of .464 shows that AI-based chatbots accounted for 46.4% of the variance in students' post-class review in terms of summarizing academic materials, clarifying complex concepts, and generating study ideas. The F-value of 33.987 with a significance value of .000, which is less than the 0.05 level of significance, indicates that the regression model is statistically significant. Therefore, the null hypothesis stating that AI-based chatbots have no significant influence on students' post-class review is **rejected**. This implies that AI-based chatbots significantly influence students' post-class review.

Hypothesis Two

H₀₂: AI-based chatbots have no significant influence on students' learning attitudes in terms of interest in learning, engagement with course content, and willingness to explore academic materials independently.

Table 6: Regression Analysis of the Influence of AI-Based Chatbots on Students' Learning Attitudes

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	.657	.432	.418	.438	30.114	.000

Source: Field Survey, 2026

Table 6 presents the regression analysis of the influence of AI-based chatbots on students' learning attitudes. The result showed an R value of .657, indicating a moderate positive relationship between AI-based chatbot usage and students' learning attitudes. The R Square value of .432 implies that AI-based chatbots explained 43.2% of the variation in students' learning attitudes in terms of interest in learning, engagement with course content, and willingness to explore academic materials independently. The F-value of 30.114 and the associated significance value of .000 indicate that the model is statistically significant at the 0.05 level. Therefore, the null hypothesis is **rejected**. This means that AI-based chatbots have a significant influence on students' learning attitudes.

Hypothesis Three

H₀₃: AI-based chatbots have no significant influence on students' motivation in terms of academic confidence, self-directed learning, and persistence in academic tasks.

Table 7: Regression Analysis of the Influence of AI-Based Chatbots on Students' Motivation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	.703	.494	.481	.401	37.562	.000

Source: Field Survey, 2026

Table 7 shows the regression analysis of the influence of AI-based chatbots on students' motivation. The result revealed an R value of .703, showing a strong positive relationship between AI-based chatbot usage and students' motivation. The R Square value of .494 indicates that AI-based chatbots explained 49.4% of the variance in students' motivation in terms of academic confidence, self-directed learning, and persistence in academic tasks. The F-value of 37.562 with a significance value of .000 shows that the regression model is statistically significant. Since the significance value is less than 0.05, the null hypothesis is **rejected**. This implies that AI-based chatbots significantly influence students' motivation. **Hypothesis Four**

H₀₄: There is no significant relationship between AI-based chatbot usage and students' post-class review, learning attitudes, and motivation.

Table 8: Multiple Regression Analysis of the Relationship between AI-Based Chatbot Usage and Students' Post-Class Review, Learning Attitudes, and Motivation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	.726	.527	.514	.389	41.286	.000

Source: Field Survey, 2026

Table 8 presents the multiple regression analysis of the relationship between AI-based chatbot usage and students' post-class review, learning attitudes, and motivation. The result showed an R value of .726, indicating a strong positive relationship between AI-based chatbot usage and the combined dependent variables. The R Square value of .527 implies that AI-based chatbot usage accounted for 52.7% of the total variance in students' post-class review, learning attitudes, and motivation. The F-value of 41.286 and the significance value of .000 indicate that the regression model is statistically significant at the 0.05 level. Therefore, the null hypothesis is **rejected**. This means that there is a significant relationship between AI-based chatbot usage and students' postclass review, learning attitudes, and motivation.

D. Discussion of Findings

The first finding of the study revealed that AI-based chatbots significantly influenced students' post-class review in terms of summarizing academic materials, clarifying complex concepts, generating study ideas, enhancing independent reviews of lecture notes, and providing instant feedback. This finding suggests that AI-based chatbots have become meaningful academic support tools that extend learning beyond the classroom by helping students revisit and reorganize course content after lectures. The result is consistent with the growing body of literature showing that students commonly use generative AI tools for summarization, explanation, and academic support during independent study. For instance, Ravšelj et al. (2025) reported that higher education students viewed ChatGPT as useful for interactive problem-solving and explanations that help them understand complex concepts, while Morell-Mengual et al. (2025) found that university students used chatbots widely for academic purposes and that these tools were associated with clear study-related motivations and positive attitudes. In the same direction, Schei et al. (2024) observed from a scoping review that students in higher education often perceive AI chatbots as helpful learning aids, especially because of their accessibility and responsiveness. The implication is that, within the context of this study, AI-

based chatbots appear to strengthen post-class review by making academic support more immediate, flexible, and student-centred.

The second finding showed that AI-based chatbots significantly influenced students' learning attitudes in terms of interest in learning, engagement with course content, willingness to explore academic materials independently, and positive disposition toward learning tasks. This indicates that the use of AI chatbots may not only support the completion of academic work but may also improve how students feel about learning itself. When students can ask questions freely, receive quick clarification, and explore topics in a conversational format, they may become more interested and more actively engaged in course materials. This finding agrees with Stöhr et al. (2024), who found broad awareness and use of AI chatbots among university students and identified relationships between usage and students' attitudes. It also aligns with Wang and Fan's (2025) meta-analysis, which concluded that ChatGPT has a moderately positive effect on learning perception and higher-order thinking, suggesting that students' views and experiences of learning can improve when chatbot use is appropriately structured. More broadly, McGrath et al. (2025) argue that empirical research in higher education increasingly shows both promise and complexity in the educational role of AI chatbots, but the present finding leans toward the supportive side of that debate by demonstrating a positive influence on students' learning attitudes in North Central Nigeria.

The third finding revealed that AI-based chatbots significantly influenced students' motivation in terms of academic confidence, self-directed learning, persistence in academic tasks, willingness to study independently, and continuous learning. This suggests that AI chatbots may contribute to important motivational conditions for academic success by helping students feel more capable, more autonomous, and more willing to persist in learning activities. The finding is in agreement with Wang and Fan (2025), whose meta-analysis found positive effects of ChatGPT on learning perception and learning outcomes, outcomes that are closely tied to confidence and sustained academic effort. It is also supported by Ojo (2024), who found that among Nigerian higher education students, perceived usefulness, perceived ease of use, and social influence significantly shaped behavioural intention to adopt ChatGPT for learning, while behavioural intention in turn influenced use behaviour. This means that when students perceive technology as useful and manageable, they are more likely to integrate it into their academic routines, which can reinforce motivation and self-directed learning. In the same vein, Morell-Mengual et al. (2025) found that students' use of chatbots in higher education is strongly connected to identifiable motivations and attitudes, reinforcing the present study's conclusion that AI-based chatbots can support motivational aspects of learning.

Finally, the regression results showed a significant overall relationship between AI-based chatbot usage and students' post-class review, learning attitudes, and motivation. This finding indicates that chatbot usage is not isolated to one narrow academic outcome; rather, it appears to relate broadly to how students review learned materials, how positively they approach learning, and how motivated they are to continue academic engagement. This broad pattern is consistent with the wider literature on AI chatbots in higher education. Schei et al. (2024) concluded that students' use of AI chatbots has important implications for higher education learning processes, while McGrath et al. (2025) noted that the empirical literature increasingly positions AI chatbots as consequential actors in university learning environments. At the same time, the findings should be interpreted with caution because the literature also documents concerns about overreliance, weak critical engagement, and ethical misuse. Stöhr et al. (2024) emphasized that students' perceptions of AI chatbots include both opportunities and concerns, and Wang and Fan (2025) likewise noted that effectiveness depends on usage conditions, scaffolding, and duration. Even so, the present study adds context-specific evidence from North Central Nigeria by showing that, on balance, AI-based chatbots are significantly associated with beneficial learning-related outcomes among university students.

V. Conclusion

This study concludes that AI-based chatbots have a significant and positive influence on university students' post-class review, learning attitudes, and motivation in North Central Nigeria. The

findings demonstrate that chatbots effectively support students in summarising academic materials, clarifying complex concepts, and generating study ideas, thereby enhancing post-class learning practices. In addition, the use of AI chatbots was found to improve students' interest in learning, engagement with course content, and willingness to explore academic materials independently. The study also established that AI-based chatbots strengthen students' motivation by boosting academic confidence, promoting self-directed learning, and encouraging persistence in academic tasks. In sum, AI-based chatbots emerge as valuable digital learning tools that can complement traditional teaching methods and improve students' academic experiences when used appropriately.

VI. Recommendations

The following recommendations were made in this study:

1. Universities should integrate AI-based chatbots into their learning support systems to enhance students' post-class review activities.
2. Lecturers should guide students on the effective and responsible use of AI chatbots for academic purposes.
3. Institutions should provide digital literacy training to help students maximize the benefits of AI-based learning tools.
4. Policies should be developed to regulate the ethical use of AI chatbots and prevent academic misconduct.
5. Further studies should be conducted to examine the long-term effects of AI chatbot usage on students' learning outcomes.

References

- Deng, X., & Yu, Z. (2024). A systematic review and meta-analysis of ChatGPT in education: Impacts on learning performance, motivation, and cognitive load. *Computers & Education*, 210, 104967.
- Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., Baabdullah, A. M., Koohang, A., Raghavan, V., Ahuja, M., Albanna, H., Albashrawi, M. A., Alalwan, A. A., Al-Debei, M. M., Dennehy, D., Metri, B., & Wright, R. (2023). So what if ChatGPT wrote it? Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*, 71, 102642.
- McGrath, C., Farazouli, A., & Cerratto-Pargman, T. (2024). ChatGPT and higher education: A review of empirical research. *Higher Education*. Advance online publication. <https://doi.org/10.1007/s10734-024-01288-w>
- Morell-Mengual, V., García-Morales, V. J., & Martín-Rojas, R. (2024). The use of ChatGPT in higher education: Students' motivations, attitudes, and perceptions. *Education and Information Technologies*. Advance online publication.
- Ojo, A. O. (2024). Determinants of ChatGPT adoption among Nigerian university students: An application of the technology acceptance model. *International Journal of Educational Technology in Higher Education*, 21(1), 45–60.
- Ravšelj, D., Aristovnik, A., & Umek, L. (2024). A global student survey on the use of ChatGPT in higher education: Patterns, perceptions, and implications. *PLOS ONE*, 19(5), e0315011.
- Schei, V., Stöhr, C., & colleagues. (2024). Student use and perceptions of AI chatbots in higher education: A scoping review. *Education Sciences*, 14(8), 922.
- Stöhr, C., Ou, A. W. S., & Malmström, H. (2024). Students' perceptions and use of ChatGPT in higher education: A cross-institutional study. *Education Sciences*, 14(8), 922.
- Wang, X., & Fan, J. (2025). The effects of ChatGPT on learning performance, perception, and higher-order thinking: A meta-analysis. *Computers & Education*. Advance online publication.