

Subject-Based Influence of Artificial Intelligence Chatbots on ... Ayua, G. A., Et. al. (2026)

Subject-Based Influence of Artificial Intelligence Chatbots on Undergraduates' Research Project Writing and Knowledge Acquisition in Benue State University, Markudi

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Abstract

Subject-based influence of artificial intelligence chatbots on undergraduates' research project writing and knowledge acquisition was studied using a descriptive comparative survey research design of the cross-sectional type. Two research questions and two hypotheses were used to guide the study. The population of the study comprised all the 259 final-year undergraduates in the Department of Science and Mathematics Education, Benue State University (now Rev Fr Mosses Orshio Adasu University), Makurdi, Nigeria. From the population, a random sample of 102 final-year undergraduates was drawn and used for the study. Artificial Intelligence Chatbot and Research Questionnaire (AICRQ) and Research Knowledge Acquisition Test (RKAT) were validated by experts and trial tested on 25 students (not part of the main sample studied) and a reliability coefficient of 0.78 and 0.81 were obtained using Cronbach's Alpha. The research questions were answered by mean and standard deviation, while the hypotheses were tested using One-way ANOVA at 0.05 level of significance. The study found that a significant difference in the extent to which science education undergraduates from different course programmes utilize AI chatbots for research project writing with further Tukey Honestly Significant Difference (HSD) statistic. The study also found that a significant mean difference exists in the influence of AI chatbot usage on research knowledge acquisition among science education undergraduates from different course programmes with Tukey HSD statistic. Based on the findings of the study, it was recommended that lecturers in should integrate guided AI chatbots usage into teaching and research supervision processes to enhance undergraduates' research project writing skills and knowledge acquisition.

Keyword: Subject-based Influence, Artificial Intelligence Chatbots, Undergraduates' Research Project Writing, Research Knowledge Acquisition, Science Education

Introduction

The integration of Artificial Intelligence (AI) into education has transformed the way knowledge is created, accessed, and shared across higher institutions globally. AI technologies such as intelligent tutoring systems, machine learning platforms, and conversational chatbots are increasingly becoming part of teaching, learning, and research activities in universities. In recent years, AI chatbots like ChatGPT, Google Gemini, Microsoft Copilot, Meta AI, Grammarly AI, Icit, Scite, Consensus AI, Quilbot, Zotero, Mendeley, Research rabbit, Iris.AI, Perplexity AI, Scholarcy, Poe AI and other conversational agents



Subject-Based Influence of Artificial Intelligence Chatbots on ... Ayua, G. A., Et. al. (2026)

have gained widespread acceptance among students because of their ability to provide instant responses, explanations, summaries, and research guidance (Ayua et al., 2026a, 2026b; Owan et al., 2025). The rapid advancement of these technologies has significantly influenced educational practices, particularly in higher education where students engage in research-oriented academic tasks. Scholars observed that AI-driven tools improve personalized learning, support problem-solving, and enhance students' engagement in academic activities amidst some honesty and integrity concerns which a close watch (Ayua, 2018a; Ayua & Kwagh, 2026; Ayua & Akaabo, 2016; Alemdag, 2023).

Research knowledge acquisition is an essential component of university education where all scholars including undergraduates are expected to develop and apply competencies in scientific inquiry, data analysis, literature review, and research report writing (Chukwuere, 2024). Research knowledge acquisition refers to the process through which students gain understanding, skills, and competencies necessary for conducting academic research effectively in a dynamic world characterised with paradigm shifts which researchers need to keep pace with at all time as knowledge advances (Ayua, 2018b; Ayua & Taangahar, 2024; Popoola & Haliso, 2009). In science education, research knowledge equips undergraduates with the ability to investigate educational problems scientifically and contribute meaningfully to knowledge development. However, Chukwuere (2024) posit that many undergraduates experience challenges in research activities due to inadequate mentoring, poor access to current academic materials, and limited research skills. Consequently, students increasingly rely on technological innovations such as AI chatbots to supplement their research learning experiences and improve academic understanding. Research project writing is an essential component of higher education and academic development of the students. Its aims at exploring research problems, analyse empirical evidence, and present findings systematically using structured academic frameworks and rigorous citation standards (Van Blankenstein et al., 2019). Research project writing refers to the formal, scholarly process of planning, executing, and documenting a systematic investigation aimed at discovering new facts, testing hypotheses, or solving specific theoretical or practical problems. Among the science education students, research project writing is an extended academic analysis that presents original ideas alongside a critical evaluation of existing knowledge to answer a defined research questions or test state hypotheses. This research project writing serves as the primary academic communication channel through which original findings, analytical models, and methodological procedures are presented to the broader scientific community. Research project writing is a painstaking exercise that systematically addresses the solution to an identified problem of study, which is usually guided by an approved format for conducting, writing, and presenting an organized research report under the supervision of an/some academic supervisor(s) (Ayua et al., 2022a, 2022b; Van Blankenstein et al., 2019).

Artificial Intelligence chatbots are computer programs intended to simulate human conversation and offer intelligent answers using natural language processing and machine learning algorithms (Yin et al., 2024). These chatbots can answer questions, generate ideas, summarize articles, explain concepts, and assist students during academic and research activities. In educational contexts, AI chatbots have demonstrated noteworthy potential in improving learning outcomes by offering instant response, personalized instruction, and continuous learning support. Recent studies revealed that educational chatbots positively influence students' content knowledge gaining, engagement, and higher-order thinking skills (Xu et al., 2024). The use of AI chatbots in higher education across the globe has become increasingly prominent among undergraduate students involved in research activities (Tian et al., 2024). University scholars in Nigeria are applying chatbots for producing research topics, locating pertinent literature, organizing ideas, paraphrasing content, interpreting statistical outputs, and refining academic writing (Owan et al., 2025). The growing dependence on AI-powered conversational systems is associated with their user-friendliness, suppleness, and ability to provide rapid academic assistance. Chukwuere (2024) noted that generative AI chatbots offer affordable and personalized academic support that enhances undergraduates' engagement in research and learning activities in higher education institutions. Similarly, Akpan et al. (2024) stated that AI chatbots are increasingly used for teaching, learning, academic writing, and research support across multidisciplinary educational fields. Science education undergraduates constitute a unique category of learners because their academic programmes involve intensive research, experimentation, scientific reasoning, and inquiry-based learning. These students are expected to acquire research competencies that will prepare them for effective teaching, scientific investigations, and evidence-based educational practices needed in the 21st century (Ayua, 2019). The integration of AI chatbots into science education research may therefore influence students differently depending on the subject

Subject-Based Influence of Artificial Intelligence Chatbots on ... Ayua, G. A., Et. al. (2026)

specialization or disciplinary orientation (Nnaemeka & Ogunbadejo, 2024). Subject-based influence refers to the extent to which students from different science-related disciplines experience variations in the use and effectiveness of AI chatbots for research knowledge acquisition. Students in Biology Education, Chemistry Education, Computer Science Education, Integrated Science, and Mathematics Education may utilize AI chatbots differently based on the nature of their research tasks and academic requirements. Piaget's (1972) Constructivist Learning Theory is relevant to this study. The theory explains that learners actively construct knowledge through interaction, experience, and exploration rather than receiving information passively. In relation to this study, AI chatbots such as ChatGPT, Google Gemini, Microsoft Copilot, Meta AI, Grammarly AI, Icit, Scite, Consensus AI, Quilbot, Zotero, Mendeley, Research rabbit, Iris.AI, Perplexity AI, Scholarcy, and Poe AI create interactive learning opportunities where science education undergraduates can ask research-related questions, obtain immediate answers, and independently explore academic concepts. Through these interactions, students actively build and refine their research knowledge according to their subject specializations and prior learning experiences. The theory therefore chains the view that AI chatbots can improve subject-based research knowledge acquisition and project writing by encouraging active participation, investigation, and personalized learning among science education undergraduates.

Empirically, Abbas et al. (2024) studied the causes and consequences of generative AI usage among undergraduates in Pakistan higher education institutions. The findings revealed that scholars extensively used AI chatbots for creating ideas, summarizing academic content, and improving academic writing due to academic workload and the need for quality performance. The study further exhibited that AI chatbot usage positively influenced scholars' academic engagement and learning efficiency (Abbas et al. 2024). However, the study did not specifically focus on science education undergraduates nor examine AI chatbot utilization based on course of study, thereby creating a gap for the present study which focuses on subject-based influence among science education undergraduates in Makurdi. Elshaer et al. (2024) studied the moderating effects of gender and study discipline on university scholars' acceptance and use of ChatGPT in higher education in Egypt and Saudi Arabia. The findings indicated that study discipline meaningfully influenced undergraduates' acceptance and use of AI chatbots, as students in science and technology related disciplines demonstrated higher utilization levels than students in non-scientific fields. The researchers concluded that disciplinary orientation affects students' perception and utilization of AI technologies in higher education. Nevertheless, the study focused mainly on students' acceptance and general usage of ChatGPT rather than specifically examining the extent of AI chatbot utilization for research project writing among science education undergraduates. Jo (2024) did a study in South Korea on ChatGPT usage in higher education to establish factors influencing students' acceptance and application of AI chatbots for academic purposes. The study revealed that university students frequently utilized AI chatbots for academic writing, assignment support, idea generation, and research-related learning activities. The findings further showed that AI chatbots boosted scholars' self-learning aptitudes and academic engagement across various disciplines. However, despite its relevance to AI chatbot utilization in education, the study did not specifically focus on science education undergraduates or investigate differences in AI chatbot utilization based on course of study for research project writing. Furthermore, the study was conducted outside the Nigerian educational context, limiting its direct applicability. Despite the growing educational benefits of AI chatbots, concerns persist regarding the extent to which these technologies sincerely augment research knowledge acquisition among science education undergraduates (Nnaemeka & Ogunbadejo, 2024). Many scholars appear to rely heavily on AI-generated responses without critically evaluating the accuracy, originality, and scientific validity of the information gotten. However, despite the increasing use of AI chatbots among Nigerian university students, there is limited empirical indication on the subject-based influence of artificial intelligence chatbots on undergraduates' research project writing and knowledge acquisition particularly in Makurdi. Some studies have focused broadly on AI usage, academic performance, or general perceptions of chatbot technologies without specifically examining how subject specialization influences students' acquisition of research knowledge and project writing through AI chatbots. Consequently, the delinquent of this study is the insufficient empirical understanding of how subject specialization influences the use of AI chatbots and their contribution to research knowledge acquisition and project writing among science education undergraduates in a state university in Makurdi. This gap in knowledge has created uncertainty regarding whether AI chatbot technologies effectively support research learning equally across different science education subject areas.

Objectives of the Study



Subject-Based Influence of Artificial Intelligence Chatbots on ... Ayua, G. A., Et. al. (2026)

Consequently, subject-based influence of artificial intelligence chatbots on undergraduates' research project writing and knowledge acquisition was studied with the following specific objectives:

1. To determine the extent to which the AI chatbots are utilized by science education undergraduates for research project writing based on course of study.
2. To find out the influence of AI chatbots usage on research knowledge acquisition among science education undergraduates based on course of study.

Research Questions

The following research questions were used to guide the study.

1. What is the extent to which the AI chatbots are utilized by science education undergraduates for research project writing based on course of study.
2. What is the influence of AI chatbots usage on research knowledge acquisition of science education undergraduates based on course of study.

Null Hypotheses

The following hypotheses were used to guide this study:

1. There is no significant mean difference in the extent to which AI chatbots are utilized by science education undergraduates for research project writing based on course of study.
2. There is no significant mean difference in the influence of AI chatbots usage on research knowledge acquisition of science education undergraduates based on course of study.

Research Methodology

The study used a descriptive comparative survey research design of the cross-sectional type. This design was deemed fitting because the study sought to describe and compare the extent of utilization of AI chatbots and their influence on research knowledge acquisition among science education undergraduates from different courses without manipulation of variables. The survey design was suitable because it allowed the researcher to gather quantitative data from a relatively large sample and make comparisons across groups (Creswell & Creswell, 2018). The population of the study was all the 259 Final-year undergraduates in the Department of Science and Mathematics Education, Faculty of Education, Rev. Fr. Moses Orshio Adasu University (formerly Benue State University), Makurdi, Nigeria. A sample of 102 was drawn using a simple random sampling. Artificial Intelligence Chatbot and Research Questionnaire (AICRQ) and Research Knowledge Acquisition Test (RKAT); developed by the researchers were used for the data collection. Section A of the data collecting instruments collected Biodata. Meanwhile, Section B of the 5-point Likert scale AICRQ with response options ranging from Very High (4) High (3) Moderate (2) Low (1), and Never (0) had 15 items which elicited data on the extent of AI Chatbots utilized by science education undergraduates in research project writing. Whereas, Section B of the RKAT had 40 multiple choice (A-D) items which drew data on the influence of AI Chatbots on research knowledge acquisition among science education undergraduates. Both the AICRQ and RKAT were validated by experts and trial tested on 25 undergraduates which were not part of the actual sample studied so as to guide against priming. Data generated from the trial testing of AICRQ and RKAT were subjected to Cronbach's Alpha and Kuder-Richason-20 which yielded reliability coefficients of 0.78 and 0.87 respectively and was deemed reliable for use in the study. The research questions were answered using mean and standard deviation, while the hypotheses were tested by One-way ANOVA at 0.05 level of significance with Tukey HSD (Tukey's Honestly Significant Difference) post-hoc Statistic to figure out exactly which groups are different from each other among the five groups of disciplines.

Presentation of Results

The results of the study were presented in the order of research questions and hypotheses as follows:

Research Question One: What is the extent to which the AI chatbots are utilized by science education undergraduates for research project writing based on course of study.

Table 1: Mean and Standard Deviation on the Extent of AI Chatbots Utilization for Research Project Writing Based on Course of Study.

Course Programme	n	Mean	Std. Deviation	Remarks
BSc Biology Education	26	3.18	0.49	High
BSc Chemistry Education	37	1.55	0.61	Moderate

Subject-Based Influence of Artificial Intelligence Chatbots on ... Ayua, G. A., Et. al. (2026)

BSc Mathematics Education	7	0.71	0.03	Low
BSc Computer Science Education	8	0.67	0.00	Low
BSc Integrated Science Education	24	0.43	0.17	Never
Total	102			

Key: Very High (3.50 – 4.00), High (2.50 – 3.49), Moderate (1.50 - 2.49), Low (0.50 - 1.49), and Never (0.00 – 0.49)

Table 1 shows the mean and standard deviation on the extent to which AI chatbots are utilized by science education undergraduates for research project writing based on course of study. The result revealed that students in BSc Biology Education had the highest utilization of AI chatbots with a mean score of 3.18 and a standard deviation of 0.49, which was rated as High (H). Similarly, BSc Chemistry Education students had a mean score of 1.55 with a standard deviation of 0.61, indicating a Moderate (M) extent of utilization. On the other hand, BSc Mathematics Education students recorded a mean score of 0.71 with a standard deviation of 0.03, while BSc Computer Science Education students had a mean score of 0.67 and a standard deviation of 0.00. both were rated as Low (L) extent. Furthermore, BSc Integrated Science Education students had the lowest mean score of 0.43 with a standard deviation of 0.17, which was rated as Never (N) implying zero extent. Overall, the findings suggest that the extent of AI chatbot utilization for research project writing varies across course programmes among science education undergraduates.

Research Question Two: What is the influence of AI chatbots usage on research knowledge acquisition of science education undergraduates based on course of study.

Table 2: Mean and Standard Deviation on the influence of AI chatbots usage on research knowledge acquisition of science education undergraduates based on course of study.

Course Programme	N	Mean	Std. Deviation
BSc Biology Education	26	37.85	2.93
BSc Chemistry Education	37	30.80	.94
BSc Mathematics Education	7	24.57	1.31
BSc Computer Science Education	8	22.50	.46
BSc Integrated Science Education	24	19.04	3.63
Total	102		

The results in Table 2 display that BSc Biology Education undergraduates recorded the highest mean score ($M = 37.85$, $SD = 2.93$), signifying that AI chatbot usage had the greatest influence on their research knowledge acquisition. This was followed by BSc Chemistry Education students ($M = 30.80$, $SD = 0.94$). BSc Mathematics Education students had a mean score of 24.57 ($SD = 1.31$), whereas BSc Computer Science Education students recorded a mean score of 22.50 ($SD = 0.46$). BSc Integrated Science Education students had the lowest mean score ($M = 19.04$, $SD = 3.63$), suggesting the least influence of AI chatbot usage on research knowledge acquisition among the five course programmes. In terms of variability, BSc Integrated Science Education undergraduates had the highest standard deviation ($SD = 3.63$), indicating greater variation in responses within the group, whereas BSc Computer Science Education students had the lowest standard deviation ($SD = 0.46$), reflecting better steadiness in their responses.

Hypothesis One There is no significant mean difference in the extent to which AI chatbots are utilized by science education undergraduates for research project writing based on course of study.

Table 3: One-way ANOVA Statistics of the extent to which AI chatbots are utilized by science education undergraduates for research project writing based on course of study.

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	110.756	4	27.689	134.856	.000
Within Groups	19.916	97	.205		
Total	130.672	101			

Table 3 presents the One-way ANOVA statistics on the significant mean difference in the extent to which AI chatbots are utilized by science education undergraduates for research project writing based on course of study. The result showed that the between-group mean square was 27.689, while the within-group mean square was 0.205. The calculated F-value of 134.856 with a significance value of 0.000 was obtained at 4 and 97 degrees of freedom. Since the significance value of 0.000 is less than the alpha level of 0.05, the null hypothesis which states that there is no significant mean difference in the extent to which AI chatbots are utilized by science education undergraduates for research project writing based on course of study was rejected. This implies that a significant difference exists in the extent to which science education

Subject-Based Influence of Artificial Intelligence Chatbots on ... Ayua, G. A., Et. al. (2026)

undergraduates from different course programmes utilize AI chatbots for research project writing. However, the ANOVA result does not indicate which specific courses differ from one another. To determine the particular groups with significant differences, a post hoc multiple comparison test; Tukey's HSD applied and the result is presented in Table 4.

Table 4: *Tukey HSD Multiple Comparisons of extent to which AI chatbots are utilized by science education undergraduates for research project writing based on course of study.*

(I) Course Programme	(J) Course Programme	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
BSc Biology Education	BSc Chemistry Education	1.63326*	.11596	.000	1.3109	1.9556
	BSc Mathematics Education	2.47033*	.19295	.000	1.9340	3.0067
	BSc Computer Science Education	2.51795*	.18320	.000	2.0087	3.0272
	BSc Integrated Science Education	2.75684*	.12827	.000	2.4003	3.1134
BSc Chemistry Education	BSc Biology Education	-1.63326*	.11596	.000	-1.9556	-1.3109
	BSc Mathematics Education	.83707*	.18676	.000	.3179	1.3562
	BSc Computer Science Education	.88468*	.17668	.000	.3936	1.3758
	BSc Integrated Science Education	1.12357*	.11876	.000	.7934	1.4537
BSc Mathematics Education	BSc Biology Education	-2.47033*	.19295	.000	-3.0067	-1.9340
	BSc Chemistry Education	-.83707*	.18676	.000	-1.3562	-.3179
	BSc Computer Science Education	.04762	.23451	1.000	-.6043	.6995
	BSc Integrated Science Education	.28651	.19465	.583	-.2546	.8276
BSc Computer Science Education	BSc Biology Education	-2.51795*	.18320	.000	-3.0272	-2.0087
	BSc Chemistry Education	-.88468*	.17668	.000	-1.3758	-.3936
	BSc Mathematics Education	-.04762	.23451	1.000	-.6995	.6043
	BSc Integrated Science Education	.23889	.18499	.697	-.2753	.7531
BSc Integrated Science Education	BSc Biology Education	-2.75684*	.12827	.000	-3.1134	-2.4003
	BSc Chemistry Education	-1.12357*	.11876	.000	-1.4537	-.7934
	BSc Mathematics Education	-.28651	.19465	.583	-.8276	.2546
	BSc Computer Science Education	-.23889	.18499	.697	-.7531	.2753

*. The mean difference is significant at the 0.05 level.

The result in Table 4 presents the Tukey HSD multiple comparison analysis of the extent to which AI chatbots are utilized by science education undergraduates for research project writing based on course of study. The result revealed that there was a significant mean difference between BSc Biology Education and BSc Chemistry Education students (Mean Difference = 1.63326, $p = .000$), BSc Mathematics Education students (Mean Difference = 2.47033, $p = .000$), BSc Computer Science Education students (Mean Difference = 2.51795, $p = .000$), and BSc Integrated Science Education students (Mean Difference = 2.75684, $p = .000$). The Tukey HSD analysis confirms that the significant difference observed in the ANOVA was primarily due to differences among nearly all the course programmes. The only exception was between BSc Mathematics Education with BSc Computer Science Education and BSc Integrated Science Education, whose mean did not differ significantly. Therefore, the significant differences in AI chatbot utilization mainly existed between Biology and Chemistry Education students compared to the other course programmes, while Mathematics Education, Computer Science Education, and Integrated Science Education students did not differ significantly in their extent of AI chatbot utilization for research project writing.

Hypothesis Two: There is no significant mean difference in the influence of AI chatbots usage on research knowledge acquisition of science education undergraduates based on course of study.

Table 5: *One-way ANOVA Statistics of the influence in AI chatbots usage on research knowledge acquisition of science education undergraduates based on course of study.*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5003.088	4	1250.772	216.541	.000
Within Groups	560.287	97	5.776		
Total	5563.375	101			

The one-way ANOVA results presented in Table 5 show that the between-group sum of squares is 5003.088 with 4 degrees of freedom, while the within-group sum of squares is 560.287 with 97 degrees of freedom. The analysis produced an F-

Subject-Based Influence of Artificial Intelligence Chatbots on ... Ayua, G. A., Et. al. (2026)

value of 216.541 with a significance (p) value of .000 ($p < .05$). Since the obtained p-value (.000) is less than the 0.05 level of significance, the null hypothesis was rejected. This indicates that there is a statistically significant mean difference in the influence of AI chatbot usage on research knowledge acquisition among science education undergraduates based on their course of study. However, the ANOVA result does not indicate which specific courses differ from one another. To determine the particular groups with significant differences, a post hoc multiple comparison test (Tukey's HSD) applied and the results is as shown in Table 6.

Table 6: Tukey HSD Multiple Comparisons of the influence in AI chatbots usage on research knowledge acquisition of science education undergraduates based on course of study.

(I) Course Programme	(J) Course Programme	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
BSc Biology Education	BSc Chemistry Education	7.049*	.615	.000	5.34	8.76
	BSc Mathematics Education	13.275*	1.023	.000	10.43	16.12
	BSc Computer Science Education	15.346*	.972	.000	12.65	18.05
	BSc Integrated Science Education	18.804*	.680	.000	16.91	20.70
BSc Chemistry Education	BSc Biology Education	-7.049*	.615	.000	-8.76	-5.34
	BSc Mathematics Education	6.226*	.991	.000	3.47	8.98
	BSc Computer Science Education	8.297*	.937	.000	5.69	10.90
	BSc Integrated Science Education	11.756*	.630	.000	10.00	13.51
BSc Mathematics Education	BSc Biology Education	-13.275*	1.023	.000	-16.12	-10.43
	BSc Chemistry Education	-6.226*	.991	.000	-8.98	-3.47
	BSc Computer Science Education	2.071	1.244	.460	-1.39	5.53
	BSc Integrated Science Education	5.530*	1.032	.000	2.66	8.40
BSc Computer Science Education	BSc Biology Education	-15.346*	.972	.000	-18.05	-12.65
	BSc Chemistry Education	-8.297*	.937	.000	-10.90	-5.69
	BSc Mathematics Education	-2.071	1.244	.460	-5.53	1.39
	BSc Integrated Science Education	3.458*	.981	.006	.73	6.19
BSc Integrated Science Education	BSc Biology Education	-18.804*	.680	.000	-20.70	-16.91
	BSc Chemistry Education	-11.756*	.630	.000	-13.51	-10.00
	BSc Mathematics Education	-5.530*	1.032	.000	-8.40	-2.66
	BSc Computer Science Education	-3.458*	.981	.006	-6.19	-.73

*. The mean difference is significant at the 0.05 level.

As shown in Table 6, the Tukey HSD post hoc multiple comparison test, which was conducted following the significant one-way ANOVA result in Table 5 to identify the specific course groups that differed in the influence of AI chatbot usage on research knowledge acquisition. The results indicate that almost all pairwise comparisons among the five course programmes were statistically significant ($p < .05$), except for the comparison between BSc Mathematics Education and BSc Computer Science Education. Specifically, students in BSc Biology Education differed significantly from those in BSc Chemistry Education (MD = 7.049, $p = .000$), BSc Mathematics Education (MD = 13.275, $p = .000$), BSc Computer Science Education (MD = 15.346, $p = .000$), and BSc Integrated Science Education (MD = 18.804, $p = .000$). The Tukey HSD post hoc analysis approves that the significant difference observed in the ANOVA was mainly due to differences among nearly all the subject areas. The only exemption was between BSc Mathematics Education and BSc Computer Science Education, where the means did not differ significantly. These results suggest that the influence of AI chatbot usage on research knowledge acquisition varies across science education programmes, with Mathematics Education and Computer Science Education exhibiting similar levels of influence, while the other programmes differ significantly from one another.

Discussion of Findings

The findings of this study exposed that AI chatbot usage has a significant influence on research project writing skills and research knowledge acquisition among science education scholars, with prominent differences based on subject area. This line up with the discoveries of Abbas et al. (2024), who reported that university undergraduates widely use AI chatbots for academic writing, idea generation, and summarization due to heavy academic workload, and that such usage positively



Subject-Based Influence of Artificial Intelligence Chatbots on ... Ayua, G. A., Et. al. (2026)

boosts their academic engagement and learning effectiveness. Jo (2024) established that AI chatbots significantly support undergraduates' research project writing, knowledge acquisition, and independent learning across different subject areas. This study verifies these findings by displaying that AI chatbot usage powerfully influences research knowledge acquisition among science education undergraduates. The result of this study showing significant differences across courses of study is unswerving with Elshaer et al. (2024), Tian et al. (2024), and Qu et al. (2024), who all reported that disciplinary background significantly influences undergraduates' acceptance and use of AI chatbots. Elshaer et al. (2024) found that learners in science and technology-related subjects tend to use AI chatbots more than those in non-scientific fields, while Tian et al. (2024) and Qu et al. (2024) equally established that learners in science, engineering, and applied subjects demonstrate advanced engagement with AI tools for research and learning activities. This study extends these findings by specifically displaying that even within science education subjects, there are significant variations in AI chatbot utilization and its influence on research knowledge acquisition based on course of study.

Conclusion

Based on the findings of this study, it was concluded that AI chatbot usage has a significant influence on research project writing and research knowledge acquisition among science education undergraduates in Nigerian universities.

Recommendations

Based on the findings of the study, the following recommendations are advanced:

1. Lecturers in science education departments should integrate guided AI chatbot usage into teaching and research supervision processes to enhance students' research project writing skills and knowledge acquisition.
2. Universities should organize workshops and training programmes to improve students' digital literacy skills, ensuring that undergraduates across all courses of study can effectively and ethically utilize AI chatbots for academic writing and research activities.
3. Special consideration should be given to undergraduates in Mathematics, Computer Science, and Integrated Science Education, where lower levels of AI chatbot utilization were observed, to encourage balanced adoption across all science education programmes.

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