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Perceived Influence of Artificial Intelligence Chatbots on Self-Efficacy and Attitude in Science Education Research among Undergraduate Students in Makurdi, Benue State, Nigeria

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Abstract

Artificial Intelligence (AI) chatbots' perceived influence on science education undergraduates' research self-efficacy and attitude in Makurdi, Nigeria was investigated using a descriptive survey research design. The study was guided by two research questions. The study's sample of 100 was randomly drawn from a population of 259 400-level undergraduates in the Department of Science and Mathematics Education, Rev. Fr. Moses Orshio Adasu University Makurdi, Benue State, Nigeria. A validated and trial-tested Artificial Intelligence Chatbots and Research Questionnaire for Undergraduates (AICRQU) with a Cronbach Alpha reliability index of 0.85 was used for data collection. Data were analysed using mean and standard deviation to answer the research questions. Findings of the study revealed that AI Chatbots usage positively influence science education undergraduates' research self-efficacy by enhancing academic confidence, independent learning, and problem-solving abilities with a high cluster mean of 3.00. The study also found that AI chatbots usage promotes undergraduates' positive attitudes towards research by enhancing research curiosity in learning with a high cluster mean of 3.09. Based on the findings, the study recommended that universities integrate AI chatbot technologies into teaching and research practices, provide AI literacy training for university students, and establish policies to ensure ethical and effective use of AI tools in higher education.

Keywords: Artificial Intelligence Chatbots, Supervisee, Self-Efficacy, Attitude.

Introduction

Science is the factual knowledge about the natural and physical world obtained through methodical and experimental processes. Through the enterprise of science education, students acquire the relevant skills to verify and replicate scientific facts (Ayua et al., 2025). One of the ways through which science students acquire the relevant skills, problem-solving abilities and competencies is through research. With the advancement of modern technology, research in science education has undergone a significant paradigm shift in methodology from the traditional methods to technology driven methods. According to Ayua and Taangahar (2024) university research should be of global standard and keep pace with the paradigm shift. Artificial Intelligence (AI) is a cutting-edge technology that is reshaping the global landscape in all areas of human endeavour. According to Luckin et al. (2016) the most practical applications of AI is the Artificial Intelligence Chabot. These AI tools are designed to simulate human conversation using text or voice interactions, providing information in a conversational manner (Labadze et al., 2023). Adamopoulou and Moussiades (2020) see Chatbots as Artificial Intelligence that fosters communication between computers and humans. In educational environments, AI chatbots are used to: personalize learning experience through dialogue-based interactions, support self-regulated learning by providing

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immediate feedback, foster student autonomy and encourage self-correction (Guo et al., 2022; Molenaar, 2022). While AI Chatbots do not replace human insight, they enhance communication, provide consistency and could enhance research competency of undergraduate supervisees. Undergraduate research supervision is a structured process aimed at providing oversight, knowledge and competency to guide students through research task (Davys & Beddoe, 2020; Corey et al., 2020). Supervision of undergraduate research project requires project supervisor(s) to offer professional guidance, provide feedback, monitor research progress, and to be a source of encouragement aimed at fostering academic research independence in the learner (Ayua et al., 2022b). Thus, supervision is not just about oversight but a dynamic partnership designed to foster growth, independence and academic excellence. However, with evolving AI Chatbots capable of providing feedback, knowledge and intellectual stimulation, the traditional responsibilities of supervisors have been altered (Nkosi, 2026). Since these systems work round the clock, they could become a useful resource for undergraduate supervisees. A Supervisee is a student who is under the guidance of an academic supervisor during a research project. Ayua et al. (2022a) see research project as an honest academic activity that involves the collection of relevant data with the intention of becoming thoroughly informed about an engaging topic for the purpose of making valid contribution to knowledge and preferring solutions to the identified problem(s) in order to make this world a better place for a meaningful living. Undergraduate research is a creative endeavour that develop students' critical and creative thinking abilities though the application of science process skills thereby enhancing their self-dependence. Supervisees are responsible for carrying out the research process with increasing independence while also depending on their supervisors for mentorship, feedback and academic support. Recently, emerging technologies like Artificial Intelligence (AI) have started playing a role in supporting supervisees in tasks such as literature reviews, citations, writing structure and explaining complex research concepts (Parsakia, 2023). AI Chatbots could reduce dependency of supervisees on their supervisors by acting as a round the clock standby resource tool thereby improving undergraduates' self-efficacy in undertaking research tasks.

Self-efficacy is a persons' belief in their ability to achieve specific goals. Anierobi et al. (2025) sees self-efficacy as a students' belief in their ability to successfully perform and complete academic tasks such as studying for exams, solving problems or managing course work. Ayua et al. (2025) posits that the goal of science education is to develop science learners capable of independent living in the ever-dynamic globe. Research studies have shown a link between students' use of AI tools such as AI chatbots and Self-efficacy. According to Parsakia (2023), frequent and satisfying interactions with chatbots can enhance Self-efficacy. Similarly, Zhang et al. (2022) posited that AI-based educational chatbots paradigms could improve learners' emotional confidence and Self-efficacy through dialogue templates and improve their attitude. Attitude is a learned predisposition to evaluate things or react to some ideas, persons or situations in certain ways either consciously or unconsciously (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2022). According to Ayua et al. (2022a) students' negative or neutral attitude towards undergraduate project could threaten the quality of research. Studies have shown that students' attitudes toward subjects such as science are shaped by their experiences, social environment and the tools used for instruction including technological aids like Artificial Intelligence chatbots (Kim et al., 2021). In recent years, integrating technology particularly AI-based tools into the educational system has been shown to positively shift student attitudes by making learning more accessible, personalized and engaging (Nketsiah & Boateng, 2023). Therefore, understanding and addressing students' attitudes is critical for designing educational interventions that promote sustained interest and success. This study is anchored on Banduras' (1986) Social Cognitive Theory. This theory posits that learning and behaviour (Self-efficacy and attitude) are the result of continuous interaction between three key factors: personal factors (cognitive ability), behaviour (actions or decisions) and the environment (which includes technological learning tools like AI Chatbots). Bandura emphasized that Self-efficacy and positive attitude is influenced by experiences of success, verbal encouragement and modelling. In this study AI Chatbots form a supportive academic environment. When students get timely feedback and helpful guidance from Chatbots, it could build their confidence in handling research tasks which could influence their attitude towards such tasks. Empirical studies on Artificial Intelligence and Self-efficacy have revealed positive results in different areas of human endeavour. Tolorunleke (2025) examined the awareness and use of ChatGPT as a co-pilot for research purposes among students in Tertiary institutions in Kogi State and found that, although ChatGPT was widely recognized among undergraduates, its potential as an effective research tool was underutilized. Anierobi et al. (2025) examined Artificial intelligence utilization as a determinant of academic self-efficacy, engagement and satisfaction of university students at Nnamdi Azikiwe

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University, Awka, Anambra state Nigeria and found that the use of Artificial intelligence tools by undergraduates positively correlated with academic self-efficacy. Similarly, Tanveer et al. (2024) examined the impact of AI based chatbots on academic Self-efficacy and self-regulation among university students in Rawalpindi and Islamabad, Pakistan and also found that students who engaged more with AI chatbots exited greater confidence in their academic abilities. On Artificial intelligence and students' attitude, Morell-Mengual et al. (2025) examined characteristics, motivations and attitudes of students using ChatGPT and other language Model-Based chatbots in higher education and found that students had varying attitude to the use of AI chatbots based on personal and academic factors. Alan and Kirbag-Zengin (2025), investigated on the effect of Artificial Intelligence-Based E-learning environment on students' attitude towards science course. The study revealed Artificial Intelligence positively affected students' attitude towards science course. Similarly, Adeosun (2025) examined students' attitude on the use of Artificial Intelligence in learning in the faculty of education, University of Benin, Benin city, Nigeria and found that students exhibited a highly positive attitude to the application of AI in education. While these studies relate to Artificial intelligence, self-efficacy and attitude, they did not explore the use of Artificial Intelligence chatbots in science education undergraduate research in terms of self-efficacy and attitude of students.

The problem of this study is the inadequacy of empirical research on the influence on Artificial Intelligence chatbots on students' self-efficacy and attitude in research. The integration of Artificial Intelligence (AI) chatbots in science education has been praised for its potential to enhance learning, personalize educational experiences, and support supervisees in research-related tasks (Parsakia, 2023). However, despite these promising capabilities, the actual influence of AI chatbots on supervisees' self-efficacy and attitudes towards research tasks remains inconsistent and underexplored, especially among undergraduates in science education. Previous studies have attempted to investigate the role of AI-based tools in higher education learning contexts, yet they fell short in examining the interplay between AI chatbots and the self-efficacy and attitude of supervisees towards research tasks (Anierobi et al., 2025; Tanveer et al., 2024). Similarly, Zawacki-Richter et al. (2019) explored AI's general implications in education but did not address its specific role in shaping supervisees' confidence and disposition toward academic research. These gaps in literature highlight a persistent challenge. This study therefore seeks to bridge this knowledge gap by examining the perceived influence of AI chatbots on science education undergraduates' self-efficacy and attitudes in research within a structured supervisory context.

Purpose of the Study

The purpose of this study is to examine the extent to which the use of AI chatbots influences supervisees' self-efficacy and attitude in science education research. The specific objectives are to:

1. To find out the perceived influence of AI chatbots usage on 400-level science education undergraduates' self-efficacy in research project writing.
2. To establish the perceived influence of AI chatbots usage on 400-level science education undergraduates' attitude towards research project writing.

Research Questions

1. What is the perceived influence of AI chatbots usage on 400-level science education undergraduates' self-efficacy in research project writing?
2. What is the perceived influence of AI chatbots usage on 400-level science education undergraduates' attitude towards research project writing?

Methodology

This study employed a descriptive survey design. This design was considered appropriate as it allows for the collection of data on the current state of affairs without manipulating variables (Achor et al., 2018). The study was carried out at Rev. Fr. Moses Orshio Adasu University, Makurdi, Benue State, Nigeria (formerly Benue State University). The population of the study comprised 259 400-level undergraduates in the 2024/2025 academic year from the department of Science and Mathematics Education (Directorate of Information and Communication Technology [ICT], Rev. Fr. Moses Orshio Adasu University, Makurdi). A sample of 100 respondents was selected using simple random sampling. Instrument for data collection was a questionnaire titled: Artificial Intelligence Chatbots and Research Questionnaire for Undergraduates (AICRQU) developed by the researcher and validated by two experts in science education. The AICRQU was trial tested and test scores collected were computed using Cronbach's Alpha to obtain a reliability of 0.85. Items in all sections of the

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instrument were structured on a four-point Likert scale: Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, and Strongly Disagree (SD) = 1. The data collected was analysed using descriptive statistical tools of Mean and standard deviation to answer the research questions. A mean score of 2.50 was set as the decision rule implying agreement with the items.

Presentation of Results

Results are presented in tables in order of research questions.

Research Question One: What is the perceived influence of AI chatbots usage on 400-level science education undergraduates' self-efficacy in research project writing?

Table 1: Perceived influence of AI chatbots usage on 400-level science education undergraduates' self-efficacy in research project writing

S/N	Items	SA	A	D	SD	mean	Std.	Remark
1	Using AI chatbots makes me more confident in completing my research tasks.	47	42	9	2	3.34	.728	Accepted
2	AI chatbots help me organize my research project effectively.	34	47	11	8	3.07	.879	Accepted
3	I rely less on my supervisor for routine guidance because of AI chatbots.	24	40	28	8	2.80	.899	Accepted
4	AI chatbots improve my ability to solve research-related problems.	29	42	14	15	2.85	1.009	Accepted
5	AI chatbots increase my overall confidence in conducting research independently.	26	45	15	14	2.83	.975	Accepted
6	AI chatbots help me understand difficult research concepts more clearly.	31	44	16	9	2.97	.915	Accepted
7	AI chatbots improve my ability to structure my research work.	25	50	21	4	2.96	.790	Accepted
8	AI chatbots enable me to generate relevant ideas for my research writing.	37	45	16	2	3.17	.766	Accepted
9	I feel more capable of carrying out literature review tasks with the help of AI chatbots.	22	50	18	10	2.84	.884	Accepted
10	AI chatbots help me identify mistakes for correction in my research work.	26	46	14	14	2.84	.972	Accepted
11	Using AI chatbots strengthen my confidence in analysing research data.	25	26	9	10	2.96	.864	Accepted
12	AI chatbots help me manage my research time more effectively.	51	36	7	6	3.32	.851	Accepted
13	I feel more independent in completing my research tasks when I use AI chatbots.	32	51	7	10	3.05	.892	Accepted
	Cluster					**3.00**	**0.88**	Accepted

Table 1 presents the mean and standard deviation scores on supervisees' perceptions of how AI Chatbot usage influences their self-efficacy in research projects. Based on the decision rule of 2.50 and above as accepted, all items were accepted, indicating overall agreement among the students. The cluster mean of 3.00 with a standard deviation of 0.88 shows that supervisees strongly perceive AI Chatbots as having a positive influence on their self-efficacy in research projects. The cluster mean above 3.00 reflects a high level of positive perception, while the standard deviation shows a moderate level of consistency in responses.

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Research Questions Two: What is the perceived influence of AI chatbots usage on 400-level science education undergraduates' attitude towards research project writing?

Table 2: Perceived influence of AI chatbots usage on 400-level science education undergraduates' attitude towards research project writing

S/N	Items	SA	A	D	SD	Mean	Std.	Remark
1	AI chatbots make research tasks more enjoyable to me.	27	56	13	4	3.06	.750	Accepted
2	I feel more motivated to work on my research when using AI chatbots.	25	55	15	5	3.00	.778	Accepted
3	AI chatbots reduce my anxiety about completing research tasks.	35	39	23	3	3.06	.839	Accepted
4	I feel stress relieved using AI chatbots in searching for academic materials for research project writing.	26	46	21	7	2.91	.866	Accepted
5	I am more willing to engage actively in research because of AI Chatbots quick feedback.	31	39	26	4	2.97	.858	Accepted
6	AI chatbots make me learn new research skills, conveniently.	38	52	7	3	3.25	.716	Accepted
7	Using AI chatbots encourage me to explore research topics more deeply.	42	44	12	2	3.26	.747	Accepted
8	AI chatbots make the research process less frustrating for me.	43	41	12	4	3.23	.815	Accepted
9	I feel more enthusiastic about completing my research when I use AI chatbots.	36	36	20	8	3.00	.943	Accepted
10	AI chatbots encourage me to participate more actively in research discussions.	34	42	22	2	3.08	.800	Accepted
11	Using AI Chatbots makes me feel more positive about academic research.	39	39	16	6	3.11	.886	Accepted
12	AI chatbots help me develop a stronger commitment to finishing my research project.	31	42	19	8	2.96	.909	Accepted
13	I feel more comfortable asking research-related questions when using AI chatbots than my supervisor.	36	47	13	4	3.15	.796	Accepted
14	AI chatbots make me more curious about discovering new information for my research.	45	44	9	2	3.32	.723	Accepted
15	The use of AI chatbots makes research supervision more engaging for me.	27	52	16	5	3.01	.798	Accepted
	Cluster					**3.09**	**.814**	**Accepted**

Table 2 presents the mean and standard deviation scores of supervisees' perceptions of the influence of AI chatbots on their attitudes toward research projects writing. Using the decision rule of 2.50 and above as accepted, all the items were accepted, indicating general agreement among the students. The cluster mean of 3.09 with a standard deviation of 0.814 indicates that supervisees strongly perceive AI chatbots as having a positive influence on their attitudes toward research projects. The cluster mean above 3.00 reflects a high level of positive perception, while the standard deviation shows a moderate level of consistency in responses.

Discussion of Findings

The findings of this study revealed that AI chatbots significantly enhanced undergraduates' self-efficacy in research work. The study showed that interaction with AI chatbots enhances students' academic confidence, problem-solving ability and perceived competence in research tasks. This finding strongly corroborates Anierobi (2025) and Tanveer et al. (2024) who reported a positive relationship between AI utilization and academic self-efficacy among university students. The implication is that chatbots encourage autonomous learning enabling students to practice concepts repeatedly, receive feedback instantly and refine understanding without fear of evaluation pressure. The study also revealed that supervisees perceived AI chatbots as fostering positive learning attitudes including increased interest, motivation and openness toward technology-supported science education and research. Students reportedly develop favourable dispositions toward research tasks due to accessibility, responsiveness and personalized support provided by AI chatbots. This finding corroborates the findings of Kirban-Zengin (2025) and Morell-Mengual et al. (2025) who also found that use of AI positively influenced students' attitude towards science learning.

Conclusion

Based on the findings of the study, it was concluded that AI chatbots enhances 400-level science education undergraduates' self-efficacy in and positive attitude towards research project writing.

Recommendations

Based on the findings, the following were recommended:

1. Integration of AI chatbots into Teaching: Universities should formally integrate AI chatbots into science education teaching and research activities as supportive learning tools.
2. Guided usage policies: Educational authorities should develop policies that encourage responsible AI use while preventing academic dishonesty and overdependence.
3. Supervisor professional development: Supervisors should be trained on how to incorporate AI tools into research supervision to enhance students' academic development.

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