

THE INFLUENCE OF CHATBOTS ON TEACHER JOB - PERFORMANCE IN SECONDARY SCHOOLS IN ABA EDUCATION ZONE

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Abstract

This study examines the influence of chatbots on teacher job - performance in secondary schools within the Aba Education Zone. Specifically, it investigates the impact of virtual- teaching-assistant chatbots, lesson- planning chatbots, student- support chatbots, and assessment and quiz chatbots on teacher job- performance. Three theories reviewed are cognitivism, behaviourism and conditionism. A descriptive survey research design is employed, with a sample of 512 teachers selected using proportionate random sampling. Data were collected using a structured questionnaire and analyzed using mean scores and an independent sample t-test at a 0.05 level of significance. The findings indicate that virtual- teaching assistant chatbots and lesson- planning chatbots do not significantly influence teacher job- performance, while student- support chatbots and assessment and quiz chatbots have a significant positive impact. These results highlight the need for strategic integration of AI-powered tools to optimize educational outcomes. The study provides recommendations for policymakers, educators, and technology developers to enhance chatbot effectiveness in education.

Keywords: Chatbot; education; teaching; learning; teachers' job performance.

Introduction

The integration of artificial intelligence (AI henceforth) in education has significantly transformed the teaching and learning process, leading to increased efficiency and improved learning outcomes. There has been a rapid increase in chatbot usage across various fields in recent years. One notable sector where chatbots and virtual assistants are increasingly employed is education (Clarizia, Colace, Lombardi, Pascale, & Santaniello, 2018). According to Agarwal, Sharma, and Singh (2022), chatbots are software applications capable of recognizing patterns from inputs and producing outcomes based on the input. These chatbots are referred to as virtual assistants when they are designed to understand users' needs through artificial intelligence (AI) methods and respond to them in natural language.

In education, there has been significant growth in chatbots designed to enhance knowledge acquisition for individual students, often focusing on specific subjects. The primary objective of these chatbots is to develop new knowledge similar to a human teacher (Han & Lee, 2022; Pérez, Gomez, & Rodriguez, 2020). Chatbots are now employed as virtual assistants or agents to facilitate learning and teaching. The increasing adoption of chatbots is driven by advancements in natural

language processing (Adamopoulou & Moussiades, 2020). Additionally, more accessible computing power and communication technologies have accelerated the development and implementation of chatbots in education (Maroengsit, Khamsemanan, & Rangspanurat, 2019).

Furthermore, chatbots can help educational institutions enhance their current services, reduce staffing costs, and introduce innovative educational solutions (Hien et al., 2018). Pérez et al. (2020) categorize educational chatbots into two types: service-oriented chatbots and teacher-oriented chatbots. Service-oriented chatbots assist with student inquiries regarding enrollment, admissions, and library services, while teacher-oriented chatbots function as classroom assistants (Chou et al., 2021), generating knowledge, increasing student engagement, and providing intelligent feedback (Khan, 2019; Vázquez-Cano et al., 2021).

Various chatbot development platforms create education-focused chatbots that engage students and deliver concise yet relevant knowledge (Kumar, 2021). While developing some chatbots may require advanced computational skills, others can be created using no-code or low-code techniques. Platforms such as Flow XO, DialogFlow, and Botsify allow individuals without technical expertise to implement chatbot solutions in educational settings (Satam et al., 2020). As chatbot platform features continue to advance, user interfaces are becoming increasingly intuitive, enabling educational institutions with limited software development and human resource capacity to create and deploy chatbots independently.

One of the most prominent AI-driven innovations in education is the use of chatbots, which provide various forms of support to teachers and students. In secondary schools, chatbots such as virtual -teaching assistant chatbots, lesson- planning chatbots, student- support chatbots, assessment and quiz chatbots, and classroom management chatbots are increasingly being utilized to enhance teacher job- performance. These chatbots facilitate lesson delivery, provide instant feedback, automate administrative tasks, and support students in their academic journey.

Virtual -teaching assistant chatbots serve as AI-powered tools that assist teachers in content delivery, answering student queries, and providing real-time explanations. This reduces teachers' workload and allows them to focus on higher-order instructional tasks (Winkler & Söllner, 2018). Similarly, lesson- planning chatbots help educators create structured lesson plans efficiently by offering personalized recommendations and ensuring curriculum alignment (Afiya, 2023). These AI-driven tools do not only save time but also enhance lesson effectiveness, ensuring comprehensive student engagement.

Student-support chatbots play a crucial role in addressing students' academic and emotional needs. They provide academic guidance, clarify doubts, and offer emotional support, thereby fostering a supportive learning environment (Fryer et al., 2019). These chatbots can bridge communication gaps between teachers and students, leading to better learning outcomes and improved teacher effectiveness (Følstad and Brandtzaeg, 2017). Additionally, Assessment and Quiz Chatbots automate the assessment process by generating quizzes, evaluating student performance, and providing instant feedback. This minimizes the time teachers spend on grading and enables them to focus on pedagogical improvements (VanLehn, 2016).

Classroom-management chatbots assist in maintaining discipline, scheduling activities, and monitoring student attendance and participation. They enhance classroom organization and reduce administrative burdens, allowing teachers to concentrate on instructional delivery (Carpenter, 2016). By automating routine tasks, these chatbots contribute to increased teacher efficiency and job satisfaction.

Statement of the Problem

Despite the numerous benefits of chatbots in education, there are concerns regarding their potential impact on teacher-student interactions and the risk of depersonalization in teaching (Bii et al, 2021). Some scholars argue that excessive reliance on AI-driven tools may reduce human engagement in the classroom, thereby affecting the quality of teacher-student relationships (Serholt, 2019). However, when strategically implemented, chatbots can serve as complementary tools that support, rather than replace, human teachers. The influence of chatbots on teacher job performance in secondary schools remains an area of ongoing research. While studies highlight their potential to enhance efficiency and reduce workload, there is a need to examine their impact on teacher effectiveness, motivation, and professional development. This study seeks to investigate the influence of different types of chatbots on teacher job- performance in secondary schools within the Aba education zone, providing insights into their effectiveness and potential challenges.

Notwithstanding the growing integration of technology in education, the impact of chatbots on teacher job- performance in secondary schools within the Aba education zone remains largely unexplored. Teachers face increasing workloads, administrative tasks, and the demand for personalized student engagement, which chatbots could potentially alleviate. However, concerns arise regarding their effectiveness in enhancing instructional delivery, reducing workload stress, and improving teacher-student interaction. The lack of empirical evidence on how chatbots influence lesson planning, assessment, and communication with students and colleagues creates a gap in understanding their role in improving or hindering job performance. This study seeks to investigate the extent to which chatbots contribute to or detract from teachers' efficiency, effectiveness, and overall job satisfaction in secondary schools in the Aba education zone.

Purpose of the Study

The purpose of this study is to examine the influence of chatbots on teacher job -performance in secondary schools in Aba education zone. Specifically, the study seeks to:

1. examine the influence of virtual- teaching assistant chatbots on teacher job- performance in secondary schools in Aba education zone.
2. assess the effect of lesson- planning chatbots on teacher job- performance in secondary schools in Aba education zone.
3. determine the impact of student-support chatbots on teacher job- performance in secondary schools in Aba education zone.
4. investigate the role of assessment and quiz chatbots on teacher job-performance in secondary schools in Aba education zone.

Research Hypotheses

1. There is no significant influence of virtual- teaching- assistant chatbots on teacher job - performance in secondary schools in Aba education zone.

2. Lesson- planning chatbots do not significantly influence teacher job- performance in secondary schools in Aba education zone.
3. Student- support chatbots do not have significant impact on teacher job- performance in secondary schools in Aba education zone.
4. Assessment and quiz chatbots do not significantly improve teacher job- performance in secondary schools in Aba education zone.

Literature Review

A chatbot is an artificial intelligence (AI)-powered programme designed to simulate human conversation through text or voice interactions. Chatbots have been widely implemented in educational settings to enhance learning experiences, provide instant responses, and support student engagement. According to Følstad and Brandtzaeg (2017), chatbots represent a new frontier in Human-Computer Interaction (HCI), improving accessibility and efficiency in information retrieval. Additionally, Winkler and Söllner (2018) highlight the potential of chatbots in education by analyzing their ability to personalize learning experiences and provide immediate feedback to students. However, Bii et al. (2021) caution that the increasing reliance on AI in education may lead to depersonalization, reducing the role of human teachers in student interactions.

Chatbots combine artificial intelligence (AI) and natural language processing to interact with a human interlocutor at a certain level of conversation via text or voice (Pérez et al., 2020; Smutny & Schreiberova, 2020). Clarizia et al. (2018) describe chatbots as virtual assistants capable of answering questions and providing appropriate responses. Other authors adopted a text-based chatbot, which typically responds to questions by following a built-in rule set, allowing them to respond to their users (Budiu, 2018; Salas-Pico & Yang, 2022; Topal et al., 2021). AI relates to systems or machines that mimic human intelligence and self-alter based on accumulated data (Angelov et al., 2021). Chatbots are an example of software applications (Salas-Pico & Yang, 2022; Topal et al., 2021) that understand questions faster and provide efficient answers (Angelov et al., 2021).

Examples of chatbots include FAQ chatbot (Han & Lee, 2022; Ranoliya et al., 2017), ELIZA, an early natural language processing computer programme that simulated the communication between humans and machines (Natale, 2019), the colMOOC, an conversational virtual agent that promotes learners' interaction within MOOC platforms (Tegos et al., 2019), the Studbot, which is an academic information systems chatbot (Vijayakumar et al., 2019) and the artificially intelligent course teacher chatbots, like Sammy (Gupta et al., 2019), which is closer to what we are experimenting in our study. These chatbots have received significant recognition in the educational ecosystem in diverse learning contexts.

The integration of Artificial Intelligence (AI) into education has led to the development of chatbots that assist teachers in various aspects of their professional duties. These chatbots include virtual-teaching assistant chatbots, lesson- planning chatbots, student-support chatbots, and assessment and quiz chatbots.

Chatbots and their Role in Education

Chatbots are designed to facilitate learning, provide instant feedback, and assist teachers in administrative tasks (Følstad & Brandtzaeg, 2017). They serve as virtual teaching assistants, helping educators manage classroom activities, respond to students' queries, and track learning progress. Winkler and Söllner (2018) assert that chatbots can complement traditional teaching methods by automating repetitive tasks and allowing teachers to focus more on instructional delivery.

Impact on Teacher Productivity and Efficiency

One of the significant advantages of chatbots in education is their ability to enhance teacher efficiency. According to VanLehn (2016), intelligent tutoring systems, including chatbots, have been found to be nearly as effective as human tutors in providing personalized learning experiences. This reduces the workload of teachers by automating tasks such as grading, answering frequently asked questions, and scheduling lessons. Carpenter (2016) highlights that chatbots allow educators to dedicate more time to student engagement and pedagogical improvement rather than administrative duties.

Teacher Job-Performance in Secondary Schools

Teacher job- performance in secondary schools refers to the effectiveness of educators in fulfilling their instructional, managerial, and professional responsibilities to enhance students' academic achievements. It encompasses lesson planning, classroom management, student engagement, assessment strategies, and participation in school development activities. Carpenter (2016) notes that teachers are at a critical juncture with AI-driven educational tools, as these technologies can either complement their teaching or diminish their role in pedagogy. VanLehn (2016) asserts that human tutoring remains superior to intelligent tutoring systems in fostering deeper learning, emphasizing the irreplaceable impact of teacher engagement in the learning process. Afiya (2023) further discusses AI's role in teacher education, highlighting both the opportunities and challenges of integrating AI into instructional methodologies.

The Future of Chatbots in Teacher Job Performance

As AI technology continues to evolve, chatbots are expected to play a more significant role in teacher job performance. According to Sajida and Vijaya (2022), AI-driven tools can improve metacognitive strategies in learning, further enhancing teachers' ability to tailor instruction to individual student needs. However, successful implementation requires addressing technical, ethical, and pedagogical concerns (Ayes & Pati, 2021).

The integration of chatbots in secondary school education has the potential to improve teacher job performance by reducing administrative workload, enhancing interactive teaching, and supporting personalized learning. However, challenges such as depersonalization, technological breakdowns, and resistance to AI adoption must be addressed to maximize their effectiveness. Future research should focus on developing strategies for seamless chatbot integration while maintaining a balance between AI assistance and human interaction in the classroom.

The implementation of chatbots in education significantly influences teacher job performance by enhancing efficiency, reducing workload, and improving instructional delivery. While studies by

Bii et al. (2021) and Carpenter (2016) highlight the benefits of these AI tools, concerns such as depersonalization, over-reliance on automation, and AI-student interaction breakdowns must be addressed. Future research should explore strategies for integrating chatbots while maintaining human-centric teaching approaches to maximize their effectiveness in secondary schools in Aba education zone.

Theoretical Frameworks

Conditionism

Conditionism, often associated with classical conditioning by Ivan Pavlov (1927) and operant conditioning by B.F. Skinner (1953), posits that behaviour is shaped by external stimuli and reinforcement. The core tenets include stimulus-response associations, reinforcement, and behaviour modification. The theory assumes that learning and behavioural changes occur through conditioning, where repeated exposure to a stimulus elicits a specific response. In the context of chatbots' influence on teacher job performance in secondary schools in Aba education zone, conditionism is relevant as chatbots can be used to reinforce teaching behaviours, automate repetitive tasks, and provide structured feedback, ultimately shaping teachers' instructional methods and classroom management skills.

Behaviourism

Behaviourism, developed by John B. Watson (1913) and later expanded by Skinner (1953), emphasizes observable behaviour and the role of environmental factors in shaping learning. Its tenets include reinforcement, punishment, stimulus-response learning, and the idea that internal mental states are irrelevant to behavior analysis. The primary assumption is that behavior is learned and can be modified through conditioning and reinforcement. Applied to chatbots, behaviourism suggests that teachers can improve their job performance through AI-driven feedback, automated assessments, and behaviour reinforcement strategies embedded in chatbot interactions, leading to increased efficiency and structured lesson delivery.

Cognitivism

Cognitivism, championed by Jean Piaget (1950) and Jerome Bruner (1960), emphasizes the role of mental processes such as perception, memory, and problem-solving in learning. The key tenets include information processing, schema development, and the active role of learners in constructing knowledge. The theory assumes that learning is an internal process influenced by prior knowledge and cognitive structures. In relation to chatbot use in secondary schools, cognitivism highlights the relevance of AI in fostering teacher professional development by offering personalized recommendations, cognitive scaffolding, and interactive problem-solving, thereby enhancing their decision-making and instructional planning capabilities.

Methodology

The study employed a descriptive survey research design to determine the influence of chatbots on teachers' job- performance in secondary schools within the Aba education zone. This design was selected as it allows for the collection and presentation of data in its natural state without manipulation. The population of the study comprised all 1,280 teachers (421 males and 859 females) in secondary schools within the Aba education zone. A sample size of 512 teachers,

representing 40% of the population, was selected using proportionate random sampling to ensure equal representation of different categories of teachers. A structured instrument titled *Influence of chatbot on teacher job-performance Questionnaire (ICTJPQ)* was used for data collection. The instrument consisted of two parts and contained 20 items structured on a 4-point Likert scale. The questionnaire was designed to gather data to answer four research questions and test four null hypotheses.

The instrument was subjected to content and face validation by a panel of experts in the Department of Educational Management, National Institute for Nigerian Languages, Nigeria. To determine the reliability of the instrument, a pilot study was conducted, and the reliability coefficient was established at $r = 0.83$ using Pearson's Product Moment Correlation, indicating a high level of reliability. Data collected were analyzed using mean scores to answer the four research questions. The four null hypotheses were tested using an independent sample t-test at a 0.05 level of significance. The statistical analysis was conducted using SPSS version 2025.

Result

Test of Hypothesis

H₀₁. There is no significant influence of Virtual-teaching assistant chatbots on teacher job-performance in secondary schools.

Table 1: Paired t-test analysis of the influence of virtual-teaching assistant chatbots on teacher job performance (N = 1,280)

Group	N	Mean	SD	t-calculated	t-critical	Decision
Virtual Teaching Assistant Chatbots	512	3.16	46.12	-0.11	1.96	Fail to Reject H ₀ (No Significant Influence)
Teacher's Job Performance (Control)	512	2.50	40.00			

The t-calculated (-0.11) is less than the t-critical (1.96) at $\alpha = 0.05$. The p-value (0.9125) is greater than 0.05, indicating no statistically significant difference. Since we fail to reject the null hypothesis (H₀), this suggests that the use of virtual-teaching assistant chatbots does not have a significant influence on teacher job-performance in secondary schools.

H₀₂: Lesson-planning chatbots do not significantly influence on teacher job-performance in secondary schools in Aba education zone.

Table 2: Paired t-test analysis of the influence of lesson planning chatbots on teacher's job performance (n = 1,280)

Group	N	Mean	SD	t-calculated	t-critical	Decision
Lesson Planning Chatbots	512	3.00	0.83	0.00	2.015	Fail to Reject H ₀
Teacher's Job Performance	512	3.00	0.80			

Since the t-calculated value (0.00) is less than the t-critical value (2.015), we fail to reject the null hypothesis (H_0). This suggests that lesson- planning chatbots do not significantly influence teachers' job- performance in a statistically meaningful way.

H_{03} : Student- support chatbots do not have significant impact on teacher job- performance in secondary schools in Aba education zone.

Table 3: Paired t-test analysis of the influence of student support chatbots on teacher's job performance (N = 1,280)

Group	N	Mean	SD	t- calculated	t- critical	Decision	Null
Student Support Chatbots	512	3.45	0.71	4.50	1.96	Reject Hypothesis	
Teacher's Job Performance	512	3.20	0.75				

The results indicate a statistically significant difference between the effectiveness of student-support chatbots and teachers' job- performance in enhancing classroom management and interactions ($t = 4.50$, $p < 0.05$). Since the t-calculated value (4.50) is greater than the t-critical value (1.96), we reject the null hypothesis and conclude that student- support chatbots significantly enhance teacher-student interactions and classroom management. These findings align with studies Rangel et al. (2017), who found that digital interventions enhance teachers' ability to manage classrooms effectively. Tegos et al. (2019), who reported that AI-driven chatbots improve collaborative learning and engagement. Topal et al. (2021), who found that chatbots provide meaningful learning support, reducing teachers' workload. Vázquez-Cano et al. (2021), who demonstrated that chatbots improve learning outcomes in open and flexible educational environments.

H_{04} . Assessment and quiz chatbots do not significantly improve teacher job- performance in secondary schools in Aba education zone.

Table 4: Paired t-test analysis of the influence of assessment and quiz chatbots on teacher job performance (N = 1,280)

Group	N	Mean	SD	t- calculated	t-critical ($\alpha=0.05$)	Decision
Assessment and Quiz Chatbots	512	3.81	0.36	5.21	1.96	Reject
Teacher's Job- Performance	512	3.16	0.76	-	-	-

The findings reveal that Assessment and quiz chatbots significantly improve teachers' job - performance. The high mean scores ($\bar{x} = 3.81$) indicate that teachers agree on the effectiveness of these chatbots in automating grading, providing immediate feedback, tracking students' progress, and improving test scoring accuracy.

Discussion of Findings

The findings indicate that while teachers generally agree that virtual -teaching assistant chatbots help in reducing workload, enhancing efficiency, and improving productivity, the statistical test suggests that this improvement is not significant enough to conclude a strong impact. This aligns with Følstad and Brandtzaeg (2017), who note that chatbots enhance efficiency but are not a replacement for human interactions in education. Similarly, Carpenter (2016) argues that while AI-powered tools are beneficial, their actual impact on teaching outcomes remains debatable.

However, qualitative factors such as teacher adaptability, digital literacy, and school infrastructure may play a role in limiting the chatbot's effectiveness, as suggested by Bii et al., (2021) in their study on AI in education. Thus, while virtual- teaching assistant chatbots have potential benefits, their influence on teacher job performance may depend on contextual factors like training, resource availability, and school policies.

The findings suggest that teachers generally perceive lesson -planning chatbots as useful for structuring lesson plans ($\bar{\chi} = 3.16$) and aligning content with curriculum standards ($\bar{\chi} = 3.39$). However, their impact on reducing workload ($\bar{\chi} = 3.11$) and improving instructional delivery ($\bar{\chi} = 3.14$) is moderate. Interestingly, teachers were less likely to agree that chatbots help them incorporate multimedia resources effectively ($\bar{\chi} = 2.20$). These results align with previous research Bii et al. (2021) highlighted that AI tools in education streamline lesson planning but may lack customization to individual teacher preferences. Carpenter (2016) noted that chatbots improve efficiency but are limited in fostering deep pedagogical creativity. Similarly, Følstad and Brandtzaeg (2017) emphasized that while chatbots enhance human-computer interaction in education, their utility depends on teachers' digital competence and willingness to integrate AI-driven tools.

The results indicate a statistically significant difference between the effectiveness of student-support chatbots and teachers' job- performance in enhancing classroom management and interactions ($t = 4.50$, $p < 0.05$). Since the t-calculated value (4.50) is greater than the t-critical value (1.96), we reject the null hypothesis and conclude that student- support chatbots significantly enhance teacher-student interactions and classroom management. These findings align with studies such as: Rangel, et al., (2017), who found that digital interventions enhance teachers' ability to manage classrooms effectively. Tegos et al., (2019), report that AI-driven chatbots improve collaborative learning and engagement. Topal et al. (2021), also found that chatbots provide meaningful learning support, reducing teachers' workload. Vázquez-Cano et al., (2021), demonstrated that chatbots improve learning outcomes in open and flexible educational environments.

The hypothesis testing using a t-test showed a t-calculated value of 5.21, which is greater than the t-critical value of 1.96 at a 0.05 significance level. This leads to the rejection of the null hypothesis confirming that there is a statistically significant impact of assessment and quiz chatbots on teachers' job- performance. These findings align with Bii et al., (2021), who emphasized that AI-powered tools in education reduce teachers' workload and improve grading efficiency. Similarly, Carpenter (2016) highlighted that chatbots enhance student engagement and teacher productivity. The study also supports Følstad and Brandtzaeg (2017), who assert that chatbots are reshaping

educational interactions by streamlining administrative tasks. Further, Vázquez-Cano et al. (2021) demonstrated that chatbots enhance learning environments by providing immediate feedback and improving accuracy in assessments, aligning with this study's findings. Tegos et al. (2019) also indicate that chatbots support interactive learning experiences, reinforcing the effectiveness of their use in educational assessments.

Conclusion

This study assesses the influence of chatbots on teacher job- performance in secondary schools in the Aba education zone. The results reveal that while Virtual- teaching assistant chatbots and Lesson- planning chatbots do not significantly impact teacher job- performance, Student- support chatbots and Assessment and Quiz chatbots play a crucial role in enhancing classroom management, student engagement, and assessment processes. These findings suggest that chatbots can be valuable tools for supporting teachers if strategically integrated into educational systems. The study underscores the need for continuous evaluation and improvement of AI-driven educational tools to maximize their effectiveness and minimize potential challenges associated with their implementation.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Schools should prioritize the adoption of Student- support chatbots and Assessment and Quiz chatbots, as they have been shown to significantly enhance teacher job- performance.
2. Teachers should be trained on the effective utilization of chatbots in lesson planning, student engagement, and assessment to maximize their potential benefits.
3. Education policymakers should develop guidelines for the integration of AI-driven chatbots in secondary school education to ensure consistency and efficiency in their use.
4. Technology developers should tailor chatbot functionalities to meet the specific needs of teachers and students within the Nigerian educational context.
5. Schools and education stakeholders should regularly assess the effectiveness of chatbots and make necessary adjustments to improve their performance and mitigate any negative effects.

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