THE IMPACT OF CHATBOTS IN THE WRITINGS OF UNDERGRADUATE STUDENTS OF CHRISTIAN RELIGIOUS STUDIES AT FEDERAL COLLEGE OF EDUCATION ZARIA

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Abstract
This study investigates the impact of chatbots on the writing quality and comprehension of Christian Religious Studies (CRS) among undergraduate students at the Federal College of Education, Zaria, Nigeria. As artificial intelligence increasingly permeates higher education, understanding its effects on specialized fields like religious studies is crucial. Through a survey of 30 undergraduate CRS students, the research explored the frequency of chatbot use, perceived impacts on writing quality and concept understanding, and attitudes toward integrating this technology into the curriculum. Results indicate widespread adoption of chatbots among students, with a majority reporting improved understanding of CRS concepts and writing quality. However, concerns emerged regarding potential adverse effects on critical thinking skills. Statistical analysis using a paired t-test revealed a significant impact of chatbots on assignment quality and subject comprehension. The study contributes valuable insights into the complex interplay between AI-assisted learning tools and religious education, highlighting both opportunities and challenges for curriculum development and pedagogical approaches in CRS.

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Introduction

Technology integration has become increasingly prevalent in the rapidly evolving landscape of higher education, transforming traditional teaching and learning methodologies. One such technological advancement is using Chatbots—powered by Artificial Intelligence (AI) and Natural Language Processing (NLP)- to improve writing quality. This study explores the impact of Chatbots on the writing quality and comprehension of Christian Religious Studies (CRS) among the undergraduate students of Federal College of Education, Zaria (FCEZ), a premier teacher training college in Kaduna State, Northwest Nigeria.

Christian Religious Studies occupies a significant place in Nigeria's educational system, reflecting the country's rich religious heritage (Nicholas Idoko Technologies, 2024). As one of the oldest subjects in Nigerian schools, CRS aims to inculcate specific values and knowledge in learners (Kesmen & Mellemut, 2022). However, digital tools, particularly the internet and artificial intelligence, have reshaped how students engage with this traditional subject (Onuoha et al., 2018).

According to Akullah & Dantani (2023), recent research has explored using artificial intelligence in teaching and learning CRS in Nigerian tertiary institutions. Building on

Akullah & Dantani (2023) foundation, this study examines explicitly how Chatbots, a form of AI-powered writing assistance, influence the academic writing practices of CRS undergraduate students at the Federal College of Education, Zaria.

The study is envisioned to bridge the gap between traditional religious education and modern technological advancements. By investigating the effects of Chatbots on undergraduate students' writing skills, comprehension, and overall academic performance in CRS, the work aims to provide valuable insights for educators, policymakers, and students alike. The findings will contribute to the ongoing dialogue about the role of technology in religious education and help shape future pedagogical strategies in the field of Christian Religious Study.

Problem Statement

The rapid integration of technology in education, particularly the emergence of Chatbots powered by artificial intelligence, has significantly altered the landscape of academic writing. While these tools offer potential benefits in improving writing quality and efficiency, their impact on the learning process and academic integrity in specialized fields such as Christian Religious Studies (CRS) remains largely unexplored. At the Federal College of Education Zaria, where CRS is a significant part of the curriculum, there is a pressing need to understand how Chatbots influence students' writing skills, comprehension of religious concepts, and overall academic performance.

The problem is further compounded by the unique nature of CRS, which requires factual knowledge, critical thinking, interpretation, and the ability to articulate complex religious ideas. The use of Chatbots in this context raises questions about the authenticity of student work, the development of essential writing and analytical skills, and the potential over-reliance on technology in a field that traditionally emphasizes personal reflection and interpretation. Additionally, there is a lack of clear guidelines and policies regarding using such tools in academic settings, particularly in religious studies.

This research further addresses these concerns by investigating the positive and negative impacts of Chatbots on CRS students' writing, thereby providing valuable insights for educators, administrators, and policymakers in navigating this technological shift in religious education.

Research Question

The primary research question guiding this study is:

How do Chatbots affect the quality of written assignments and the understanding of Christian religious studies among undergraduate students at the Federal College of Education, Zaria?

Study Objective

The objectives of this study are:

- To assess the impact of Chatbots on undergraduate students' understanding and comprehension of CRS in FCEZ.

A review of related literature

The integration of technology in education, particularly through the use of Chatbots, has been a subject of increasing scholarly interest. According to Oracle Cloud (2024), a "chatbot is a computer program that simulates and processes human conversation (either written or spoken), allowing humans to interact with digital devices as if they were communicating with a real person."

Chatbots come in diverse levels of complexity, ranging from basic programs that

provide straightforward responses to inquiries to advanced digital assistants constantly learning and improving their abilities. The more advanced chatbots can offer personalized experiences by collecting and analyzing information.

Previous research indicates that Chatbots can improve students' writing proficiency by offering instant feedback and suggestions for improvement (Smith, 2018). Moreover, studies have shown that such tools may enhance engagement by allowing for a more interactive learning experience (Jones & Smith, 2019). However, a contrasting perspective warns against over-reliance on technology, suggesting that it may lead to a decline in foundational writing skills and critical thinking (Mahfuzah et al., 2024). Thus, there is a need to contextualize the findings regarding Chatbots within the broader discourse on educational technology and its implications for higher education, particularly in specialized fields such as Christian Religious Studies. A related literature review will provide a comprehensive understanding of how Chatbots function within academic frameworks and their specific impact on writing characteristics pertinent to religious texts.

A study conducted at the Federal College of Education in Zaria, Nigeria, investigated the impact of internet usage on CRS students (Onuoha et al., 2018). The research highlighted the growing integration of technology in religious education and its potential effects on student engagement and learning outcomes. Similarly, the use of AI in education has also gained attention, with Akullah & Dantani (2023) assessing undergraduate students' perceptions of AI usage in teaching and learning Christian Religious Education in tertiary institutions in Abuja, Nigeria. The study indicates a growing interest in understanding how AI tools, including Chatbots, can be incorporated into religious studies curricula. While the study examined students' perceptions of AI usage in teaching and learning, it did not exclusively focus on the impact of the writing and critical thinking of the students.

Furthermore, a study by Labadze et al. (2023) revealed that students increasingly use AI to assist with academic writing tasks. This trend is likely to impact the writing practices of CRS students as well, potentially influencing their academic performance and understanding of religious concepts. On the same note, Kesmen & Mellemut (2022) examined the effects of Christian Religious Studies literacy on academic achievement, highlighting the importance of subject-specific literacy skills in student performance. Thus, one may safely conclude that the integration of Chatbots in CRS education may affect how students develop these literacy skills.

Significantly, while the various studies examined above provide valuable insights into the broader context of technology used in religious education and in some cases, Christian Religious Studies, there is a need for more focused research on the specific impact of Chatbots on the undergraduate CRS students' writing skills and academic performance. A similar study may address how Chatbots influence students' ability to articulate religious concepts, analyze texts, and engage in critical thinking within Christian Religious Studies or an exploration of the potential ethical implications of using Chatbots in academic writing for religious studies. In the latter case, questions about

academic integrity, the development of original thought, and the role of technology in religious education would need to be addressed.

Conclusively, while the potential benefits of Chatbots in enhancing writing skills and subject understanding for CRS students are evident, their impact on the writings of undergraduate students of Christian Religious Studies in the Federal College of Education, Zaria, is necessary. Such a study that balances Chatbots technologies' advantages while preserving the core objectives and values of Christian Religious Studies education is crucial in guiding effective implementation strategies and policies.

Methodology

This study utilized a survey method with an electronic questionnaire based on the previous model studies by Eke (2023); Malmström et al. (2023); Mena-Lucía & Curcher, (2024); Ngo, (2023). The study aimed to explore the perspectives of undergraduate CRS students at FCE, Zaria, on the impact of Chatbots in the writings of undergraduate students of Christian Religious Studies in the Federal College of Education Zaria.

Thirty undergraduate students participated in the survey, with 17 at 300 and 13 at 400 levels. A set of 10 closed-ended online questionnaire questions was developed and administered through the Google Form survey platform. The survey link was shared with students via their WhatsApp group. Students were encouraged to respond voluntarily and without coercion. Data obtained were analyzed using an interpretive approach, incorporating simple descriptive statistics and an inferential statistic (t-test) to determine the significant difference between the groups sampled and how they are related. Students' responses to each question were assigned percentage values, and themes were developed to interpret the results and generate corresponding findings.

Research significance and limitations

The findings of this study highlight how Chatbots and technology have hitherto been incorporated into the teaching and learning processes in religious studies. The potential significance of the study consists of the following:

- providing information to teachers, curriculum designers, and educational technology suppliers about the effectiveness of Chatbots in enhancing writing and topic comprehension.
- helping to create specialized and useful writing assistance resources for use in learning environments
- highlighting the difficulties and possibilities for additional study and the use of NLP and Chatbots in interdisciplinary education.

It is, however, important to note that the outlined findings may not be as broadly applicable given that the study's focus is restricted to Federal College of Education, Zaria undergraduate students studying Christian religious studies. Hence, it is understood that response bias and social desirability bias may be introduced when qualitative data is derived only from the self-reports of students and instructors. Other limitations consist of the following:

- Time restrictions made it more difficult to gather comprehensive data and track the long-term impacts of chatbot usage among and beyond the restricted population of the study.
- The study does not evaluate pupils' access to technology or their level of technical expertise with Chatbot.

Result

Table 1. *Use and effect of Chatbots among the undergraduate CRS Students.*

S/N	Question	5	4	3	2	1
1	On a scale of 1-5, how frequently do you use Chatbots for your Christian Religious Studies assignments?	10 (33.33%)	8 (26.66%)	4 (13.33%)	6 (20.00%)	2 (6.66%)
2	Has your understanding of Christian Religious Studies concepts improved since using Chatbots?	17 (56.66%)	6 (20.00%)	3 (10.00%)	2 (6.66%)	2 (6.66%)
3	Has the use of Chatbots affected your critical thinking skills concerning Christian Religious Studies?	9 (30.00%)	6 (20.00%)	7 (23.33%)	5 (16.66%)	3 (10.00%)
4	Should Chatbots be officially integrated into the Christian Religious Studies curriculum?	21 (70.00%)	5 (16.66%)	2 (6.66%)	1 (3.33%)	1 (3.33%)
5	Has your reliance on Chatbots changed your approach to studying and researching Christian Religious Studies topics?	18 (60.00%)	7 (23.33%)	2 (6.66%)	2 (6.66%)	1 (3.33%)
6	Chatbots serve as a complement or a replacement for traditional learning methods in Christian Religious Studies?	5 (16.66%)	8 (26.66%)	7 (23.33%)	3 (10.00%)	7 (23.33%)
7	Chatbots significantly impact the quality of written assignments in Christian Religious Studies.	10 (33.33%)	8 (26.66%)	4 (13.33%)	6 (20.00%)	2 (6.66%)
8	Do you believe Chatbots improve your understanding of Christian Religious Studies concepts?:	17 (56.66%)	6 (20.00%)	3 (10.00%)	2 (6.66%)	2 (6.66%)
9	Using Chatbots in academic writing always leads to better grades in Christian Religious Studies.	9 (30.00%)	6 (20.00%)	7 (23.33%)	5 (16.66%)	3 (10.00%)
10	The use of Chatbots in academic writing may potentially diminish critical thinking skills.	21 (70.00%)	5 (16.66%)	2 (6.66%)	1 (3.33%)	1 (3.33%)

Source: survey, 2024

Discussion

Generally, the survey's results demonstrate that every undergraduate student of the CRS department in the College uses Chatbots, albeit at varied levels. The results show that Chatbots have significantly impacted undergraduate CRS students' academic performance and learning experiences. In the responses to the question on the frequency of Chatbots usage for Christian Religious Studies assignments, the majority of students surveyed (33.33%) reported using chatbots frequently (rating of 5 out of 5) for their CRS assignments. In comparison, 26.66% simply used them often (rating of 4). This suggests that chatbots have become a common tool that students use in their studies of CRS. The response confirmed a common trend in many empirical research, as in the works of Han et al. (2023), and

Pantelić et al., (2023) on students' usage of Chatbots in their academic engagements.

On question two, concerning the extent to which the students' understanding of Christian Religious Studies concepts has improved since their using chatbots, over half of the students (56.66%) strongly agreed that using chatbots has improved their understanding of CRS concepts, with another 20% further agreeing. This demonstrates chatbots' educational value in enhancing students' comprehension of the subject matter.

The responses on the impact of chatbots on critical thinking skills were more mixed. 30% of students strongly agreed that chatbots have positively affected their critical thinking in CRS, while 20% agreed. However, 23.33% were neutral, and 16.66% and 10% disagreed or strongly disagreed. The result suggests that the effect of chatbots on critical thinking is an area that requires further investigation. The result resonates with Han et al. (2023) studies that measured students' learning experiences in massive open online courses with knowledge-based chatbots.

In sync with Li et al. (2023) result on *Curriculum-Driven Edubot* research, a significant majority of students (70%) strongly supported the official integration of chatbots into the CRS curriculum, indicating their belief in the value and potential of this technology to enhance their learning experience. Nevertheless, most students (60%) strongly agreed that using chatbots has changed their approach to studying and researching CRS topics, with another 23.33% agreeing. This suggests that Chatbots have influenced how these students engage with and explore the subject. Hence, in comparing whether Chatbots should complement or replace traditional learning methods, the responses were more divided: 16.66% strongly agreed that they are a complement, 26.66% agreed, 23.33% were neutral, 10% disagreed, and 23.33% strongly disagreed. Ultimately, the result indicates that students have varying perspectives on the role of Chatbots in conventional learning approaches.

Similar to the findings on frequency of use, 33.33% of students strongly agreed that chatbots significantly impact the quality of their written assignments in CRS, with another 26.66% agreeing. This aligns with the students' perceived benefits of using chatbots for their CRS studies. Similarly, the survey results also show that 56.66% of students strongly believed that chatbots improve their understanding of CRS concepts, with an additional 20% agreeing. This further supports the educational value of chatbots in the CRS context. However, the responses were more mixed regarding the impact of chatbots on grades and critical thinking skills. 30% strongly agreed that chatbots lead to better grades in CRS, while 20% agreed. But 23.33% were neutral, and 16.66% and 10% disagreed or strongly disagreed. This suggests that the relationship between chatbot use, and academic performance is not straightforward and may require further investigation.

As with the study on the *Effect of Chatbots and AI on the Self-Efficacy, Self-Esteem, Problem-Solving and Critical Thinking of Students conducted* by Parsakia (2023), a majority of students (70%) strongly agreed that using chatbots in academic writing may potentially diminish critical thinking skills, with an additional 16.66% agreeing. This highlights the students' awareness of the potential drawbacks of over-reliance on chatbots and the need to maintain a balance between the use of technology and the development of critical thinking abilities.

Overall, the survey results indicate that undergraduate CRS students at the Federal College of Education, Zaria, Nigeria, have widely embraced chatbots in their studies, perceiving them as beneficial in improving their understanding of CRS concepts and enhancing their academic performance. However, there are also concerns about the potential impact on critical thinking skills, suggesting the need for a more nuanced approach to integrating chatbots into the CRS curriculum.

Student t-test

$$t = \frac{d}{s_d / \sqrt{n}}$$

where:

- d is the mean of the differences,
- s_d is the standard deviation of the differences,
- n is the number of pairs.

Using an independent t-test (a parametric test) as indicated above, the null hypothesis that "Chatbots do not affect the quality of written assignments and the understanding of Christian religious studies among undergraduate students at Federal College of Education, Zaria," was tested.

Results obtained from the group surveyed are categorised into Group A and Group B, where the former consists of students well adapted to Chatbot usage and the lesser users in Group B.

A	B
8	18
4	23
8	15
2	26
3	25
10	13
4	23
3	26
5	22
3	24
50	**215**

The difference between each pair of values (A and B) is calculated thus:

Differences: (18-8 = 10), (23-4 = 19), (15-8 = 7), (26-2 = 24), (25-3 = 22), (13-10 = 3), (23-4 = 19), (26-3 = 23), (22-5 = 17), (24-3 = 21)

with Mean of differences (d),

$$= \bar{d} = \frac{10 + 19 + 7 + 24 + 22 + 3 + 19 + 23 + 17 + 21}{10} = \frac{165}{10} = 16.5$$

Standard Deviation of differences (s_d):

$$s_d = \sqrt{\frac{\sum(d_i - \bar{d})^2}{n - 1}}$$

where d_i are the individual differences. Calculating each squared difference: (10-16.5)^2 = 42.25), (19-16.5)^2 = 6.25), (7-16.5)^2 = 90.25), (24-16.5)^2 = 56.25), (22-16.5)^2 = 30.25), (3-16.5)^2 = 182.25), (19-16.5)^2 = 6.25), (23-16.5)^2 = 42.25), (17-16.5)^2 = 0.25), (21-16.5)^2 = 20.25) Sum of squared differences:

$$42.25 + 6.25 + 90.25 + 56.25 + 30.25 + 182.25 + 6.25 + 42.25 + 0.25 + 20.25 = 476.5$$

Standard deviation:

$$s_d = \sqrt{\frac{476.5}{9}} = \sqrt{52.94} = 7.27$$

The t-statistic

$$t = \frac{16.5}{7.27/\sqrt{10}} = \frac{16.5}{2.3} = 7.17$$

The t-statistic is approximately 7.17. To determine if this is statistically significant, recall: for a paired t-test with 9 degrees of freedom (n-1 = 10-1 = 9) and a significance level of 0.05, the critical value from the t-distribution table is approximately 2.262. Decision rule: Since the absolute value of t-statistics of 7.17 is much greater than the critical value of 2.262, the null hypothesis (H_0) was rejected. In other words, the hypothesis that Chatbots do not affect the quality of written assignments and the understanding of Christian Religious Studies among undergraduate students at Federal College of Education, Zaria, was rejected, while the alternative hypothesis (H_1): Chatbots do affect the quality of written assignments and the understanding of Christian Religious Studies among undergraduate students at Federal College of Education, Zaria, was accepted. Thus, there is sufficient evidence to conclude that Chatbots affect the quality of written assignments and the understanding of Christian Religious Studies among undergraduate students at the Federal College of Education, Zaria.

Conclusions and Recommendations

This study provides compelling evidence for the significant impact of Chatbots on the academic experiences of undergraduate Christian Religious Studies students at the Federal College of Education, Zaria. The findings reveal a high adoption rate of Chatbot technology among students, with the majority reporting improved understanding of CRS concepts and enhanced quality of written assignments. The strong support for officially integrating Chatbots into the CRS curriculum underscores students' perception of their value in learning.

However, the research also highlights important concerns, particularly regarding the potential diminishment of critical thinking skills with increased reliance on Chatbots. This paradox - where students simultaneously report improved understanding yet express worry about declining critical thinking - presents a crucial challenge for educators and curriculum designers.

The statistical analysis further corroborates the significant effect of Chatbots on both assignment quality and subject comprehension, rejecting the null hypothesis that Chatbots have no impact. This result emphasizes the need for a nuanced approach to incorporating AI-assisted learning tools in religious studies education.

Furthermore, the Christian Religious Studies department in FCE Zaria must develop strategies to harness the benefits of Chatbots while mitigating potential drawbacks. The effort may include developing guidelines for appropriate use, redesigning assessments to emphasize critical thinking and original analysis, and training students and faculty on the effective integration of AI tools in religious studies.

Future research in this area may explore the long-term effects of Chatbot use on student learning outcomes, investigate potential differences in impact across various subtopics within CRS, and examine how chatbot usage interacts with traditional pedagogical methods in religious education.

In conclusion, while Chatbots offer promising benefits for Christian Religious Studies, their integration must be approached thoughtfully to ensure they enhance rather than detract from the core objectives of religious studies, including critical thinking, interpretation, and deep engagement with religious texts and concepts.

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