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Human Artificial Intelligence Integration and Reference Services Delivery in Academic Libraries in South-South Zone of Nigeria

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Abstract: *This study examines Human-Artificial Intelligence (AI) integration on reference service delivery in academic libraries in the South-South Zone of Nigeria. A survey research design was adopted. 384 professional librarians in public and private universities across the region were used as respondents. Data was collected using a structured questionnaire titled Human AI Integration and Reference Services Questionnaire (HAIRQ), designed on a 4-point modified Likert scale. The instrument was validated by experts in Library and Information Science and Measurement and Evaluation from University of Calabar, and reliability coefficients ranged from 0.81 to 0.94 using the Cronbach Alpha method. Data was analyzed using simple linear regression at the 0.05 level of significance. Findings revealed that Grammarly AI citation generator has a significant positive influence on the delivery of reference service ($R = .712$, Adj. $R^2 = .506$, $F = 738.612$, $p < .05$). Similarly, Quillbot AI citation generator significantly influences reference services in academic libraries ($R = .687$, Adj. $R^2 = .471$, $F = 642.020$, $p < .05$). The study concluded that human-AI integration, particularly through Grammarly and Quillbot citation generators, significantly enhances the efficiency and structure of reference services in academic libraries in the South-South Zone of Nigeria. It was recommended, among others, that academic library management institutionalize AI-supported citation tools through structured policies, training, and professional oversight mechanisms for effective service delivery.*

Keywords: human-AI integration, grammarly AI citation generator, Quillbot AI citation generator, reference services, academic libraries Nigeria.

INTRODUCTION

The rapid diffusion of Artificial Intelligence (AI) technologies has significantly reshaped information services across academic institutions worldwide. Academic libraries, as central units supporting teaching, learning, and research, are increasingly integrating AI-driven tools into their reference service operations. In the South South Zone of Nigeria, universities are progressively adopting digital innovations to enhance service efficiency, user satisfaction, and research productivity. The integration of AI in reference services represents a strategic shift from purely human-mediated interactions to collaborative systems where librarians and intelligent tools support users' information and citation needs. This transformation is particularly evident in the deployment of AI citation generators such as Grammarly and Quillbot, which are redefining how reference services are delivered and experienced.

Reference services in academic libraries traditionally involve guiding users in locating, evaluating, and properly citing information sources. However, the increasing complexity of academic writing standards and the demand for precision in referencing styles have intensified the need for automated support systems. Studies by Selvi & Eser, 2025; Rogayan 2024; indicate that AI-powered citation generators enhance accuracy, reduce manual errors, and improve efficiency in formatting references quires according to recognized styles such as APA, MLA, and Chicago reference format. However, AI integration does not replace librarians but augments their roles, allowing them to focus on advanced research consultations, information literacy instruction, and academic integrity guidance.

Similarly, AI citation generator has emerged as a widely utilized tool among students and researchers for automated referencing and writing enhancement. Beyond grammar correction, its citation feature assists users in generating properly formatted references and in-text citations. According to (Savanni, 2025; Bailey et al., 2025), Grammarly's AI-driven citation support contributes to improved writing quality and reduced referencing errors, thereby influencing the nature of reference inquiries received by librarians. Librarians are increasingly encounter users seeking clarification on the accuracy of AI-generated citations, ethical usage, and alignment with institutional guidelines. While some scholars argue that Grammarly enhances service delivery by minimizing repetitive citation formatting queries, others caution that overreliance on automated citation tools may reduce students' mastery of referencing conventions and critical evaluation skills (Perkins, 2023; Rogayan 2024). In the South-South Zone of Nigeria, empirical evidence on the specific influence of Grammarly and Quillbot, AI citation generators, on reference services remains limited. Academic libraries in the region are navigating digital transformation in contexts characterized by infrastructural variability and evolving user expectations. Assessing human AI integration in reference services is therefore essential for understanding how these tools influence service delivery, professional roles, and user outcomes. This study seeks to examine the influence of human AI integration (Grammarly AI citation generator and Quillbot AI citation generator) on reference services in academic libraries in the South-South Zone of Nigeria. These differing

perspectives underscore the need to examine its specific influence on reference services delivery within the regional academic institution in south-south Nigeria.

LITERATURE REVIEW

Several studies show considerable agreement that Grammarly AI citation generator has altered the dynamics of reference services delivery in academic libraries by automating routine citation formatting tasks. (Ros and Samuel, 2025; Rogayan, 2024). Reported that the tool enhances speed, consistency, and adherence to prescribed referencing styles, thereby reducing the frequency of basic citation correction queries directed to librarians This automation is viewed as improving operational efficiency and enabling librarians to devote greater attention to advanced research consultations and information literacy instruction. Researchers further note that students perceive Grammarly's citation support as accessible and convenient, which influences how and when they seek assistance from reference librarians (Savanni, 2025; Bailey et al., 2025).

There is also consensus that Grammarly AI citation generator contributes to improved academic writing quality when integrated responsibly into research workflows. Most research findings indicate that the tool assists users in minimizing formatting inconsistencies and aligning references with established academic standards (Idaka et al 2024; Rogayan 2024; Bailey et al., 2025). In reference services, this has shifted librarian roles toward advisory and evaluative functions rather than manual formatting correction. However, disagreement emerges regarding the depth of learning facilitated by such automation. While some scholars argue that Grammarly complements librarian guidance and reinforces academic integrity (Ros and Samuel, 2025; Anele et al., 2024; Savanni, 2025), others contend that excessive reliance on AI-generated citations may weaken students' understanding of citation principles and reduce critical engagement with source documentation (Hussain et al., 2025; Rogayan, 2024).

Therefore, divergence view appears concerning accuracy and professional implications. Studies report high levels of reliability in Grammarly-generated citations, suggesting that the tool reduces human error and enhances service delivery efficiency (Savanni, 2025). In contrast, other researchers identify inaccuracies related to metadata extraction and source categorization, which require librarian verification and correction (Ulrich et al., 2022; Ros and Samuel, 2025). This inconsistency raises questions about whether the tool ultimately reduces or redistributes librarian workload. Additionally, while some scholars argue that AI citation generators strengthen the strategic role of librarians in digital literacy and AI oversight, others caution that overdependence on automation may gradually diminish the perceived value of traditional reference expertise (Bailey et al., 2025; Rogayan, 2024).

Similarly, Quillbot AI citation generator, integrated within its paraphrasing and writing assistance features, has gained prominence among university students. Research indicates that Quillbot supports citation generation and text restructuring, thereby influencing how users interact with library reference services (Ros and Samuel, 2025; Bailey et al., 2025). Its influence extends beyond

citation formatting to issues of academic integrity, paraphrasing ethics, and source acknowledgment. However, studies report that such AI tools reduce the frequency of basic citation-related consultations, allowing librarians to allocate more time to higher-level research guidance (Rogayan 2024). Conversely, other findings reveal that AI-generated citations sometimes contain inaccuracies or incomplete metadata, which increases the burden on librarians to verify and correct outputs (Oladokun et al., 2025).

Quillbot AI citation generator is reshaping patterns of interaction in academic libraries reference services. Most scholars observed that the automation of citation formatting and integration with paraphrasing features has reduced routine inquiries related to referencing mechanics (Ros and Samuel, 2025; Rogayan 2024). This shift allows librarians to allocate more time to advanced research consultations, database navigation guidance, and information literacy instruction. Researchers further report that students perceive Quillbot's citation function as convenient and time-saving, which influences their reliance on AI tools before approaching reference librarians for assistance (Savanni, 2025; Bailey et al., 2025). These shows a shared perspective that AI citation generators are modifying the scope and delivery of reference services.

There is also convergence in the literature regarding Quillbot's potential to support academic writing when used appropriately. Studies by Baikley, et al (2025) and Rogayan 2024) suggest that the tool enhances formatting consistency and assists users in adhering to standardized referencing styles. In this regard, librarians increasingly assume advisory roles which allow them focused on evaluating AI-generated citations and clarifying institutional guidelines on ethical usage. However, disagreement arises concerning the educational implications of such automation. While some scholars argue that Quillbot complements librarian expertise and strengthens research productivity (Ros and Samuel, 2025; Savanni, 2025). According to (Perkins, 2023; Rogayan, 2024) others caution that dependence on automated citation features may reduce students' mastery of citation rules and weaken their understanding of source attribution principles

Further divergence appears in discussions of accuracy and workload implications. Certain studies report that Quillbot's citation generator provides generally reliable outputs, thereby streamlining reference services (Savanni, 2025). In contrast, other researchers identify inconsistencies in metadata extraction, incomplete reference details, and misclassification of source types, which necessitate librarian verification and correction (Perkins, 2023; Ros & Samuel, 2025). These inconsistencies suggest that rather than eliminating reference workload, the tool may redistribute it toward oversight and quality control functions. Additionally, while some scholars contend that AI citation generators enhance the strategic relevance of librarians in digital literacy and AI governance, others argue that excessive normalization of automated citation systems could gradually marginalize traditional reference competencies (Bailey et al., 2025; Rogayan 2024).

Across these AI citation generators, there is general agreement that human AI integration is reshaping the operational landscape of academic library reference services. Nevertheless, debates persist regarding the balance between automation and professional oversight, the implications for

academic integrity, and the sustainability of AI-mediated service models (Alfaleh, 2026; Bailey et al., 2025). While AI tools promise improved efficiency and accuracy, their effectiveness depends largely on institutional policies, librarian competence, and user awareness. The interplay between technological innovation and professional expertise remains central to determining the quality and credibility of reference services.

The objectives of the study

The objectives of the study are:

1. To examine the influence of Grammarly AI citation generator on reference services delivery in academic libraries in the South-South Zone of Nigeria.
2. To examine the influence of Quillbot AI citation generator on reference services delivery in academic libraries in the South-South Zone of Nigeria.
3.

Research Questions

1. What is the influence of Grammarly AI citation generator on reference services delivery in academic libraries in the South-South Zone of Nigeria?
2. What is the influence of Quillbot AI citation generator on reference services delivery in academic libraries in the South-South Zone of Nigeria?

Research Hypotheses

1. There is no significant influence of Grammarly AI citation generator on reference services delivery in academic libraries in the South-South Zone of Nigeria.
2. There is no significant influence of Quillbot AI citation generator on reference services delivery in academic libraries in the South-South Zone of Nigeria.

RESEARCH METHOD

The study area is South-South Zone of Nigeria, which comprises of Akwa Ibom, Bayelsa, Cross River, Delta, Edo and Rivers states.The study adopted a survey research design to assess human AI integration on reference services delivery in public and private University libraries in the South-South Zone of Nigeria. The population of the study comprised 384 professional librarians in public and private academic libraries across the South-South Zone of Nigeria. Data were collected through a structured questionnaire from 384 professional librarians titled, Human AI Integration and Reference Services Questionnaire (HAIRQ). The instrument was designed using a modified 4-point Likert rating scale ranging from strongly agree (SA = 4) to strongly disagree (SD = 1), covering items related to Grammarly AI citation generator, Quillbot AI citation generator, and reference services delivery. The instrument was subjected to face and content

validation by experts in Library and Information Science and Measurement and Evaluation, university of Calabar. To establish reliability, the Cronbach's Alpha method was applied, producing reliability coefficients ranging from 0.81 to 0.94, indicating high internal consistency. The data collected were analyzed using simple linear regression analysis to test the hypotheses at a 0.05 level of significance.

Presentation of the results

Hypothesis 1: There is no significant influence of Grammarly AI citation generator on reference service delivery in academic libraries in the South-South Zone of Nigeria

To test hypothesis one, which stated that there is no significant influence of Grammarly AI citation generator on reference services delivery in academic libraries in the South-South Zone of Nigeria, a simple linear regression analysis was conducted. In this analysis, the independent variable was Grammarly AI citation generator, while the dependent variable was reference services delivery in academic libraries. Both variables were measured on a continuous scale. As presented in Table 1.

TABLE 1: Simple regression analysis of the influence of Grammarly AI citation generator on reference services delivery in academic libraries

Source of variation	SS	Df	MS	F-ratio	Sig.
Regression	3268.607	2	3268.607		
Residual	3177.391	420	4.425	738.612*	.000
Total	6445.999	421			
Model	B	Std error	Beta	t	Sig.
Constant	9.283	.484		19.160	.000
Grammarly AI citation generator	.612	.023	.712	27.177	.000

*Significant at .05 level, R = .712, R^2 = .507, Adjusted R^2 = .506

The results revealed a correlation coefficient of R = .712, indicating a strong positive relationship between Grammarly AI citation generator and reference services delivery. The adjusted R-squared value (Adj. R^2 = .506) shows that 50.6 percent of the variation in reference services delivery can be explained by Grammarly AI citation generator. The analysis of variance produced an F value of 738.612 with a significance level of p = .000, which is less than the 0.05 level of significance. This indicates that the regression model is statistically significant. Consequently, the null hypothesis is rejected. Therefore, there is a significant influence of Grammarly AI citation generator on reference services delivery in academic libraries in the South South Zone of Nigeria. The identified equation to understand this relationship was that reference services delivery in academic libraries is equal to 9.283 + .612 (Grammarly AI citation generator).

Research hypothesis 2: There is no significant influence of Quillbot AI citation generator on reference service in academic libraries in the South-South Zone of Nigeria

To test hypothesis two, which stated that there is no significant influence of Quillbot AI citation generator on reference services in academic libraries in the South-South Zone of Nigeria, a simple linear regression analysis was conducted. In this analysis, the independent variable was Quillbot AI citation generator, while the dependent variable was reference services in academic libraries. Both variables were measured on a continuous scale. As presented in Table 2.

TABLE 2: Simple regression analysis of the influence of Quillbot AI citation generator on reference services in academic libraries

Source of variation	SS	df	MS	F-ratio	Sig.
Regression	3042.941	2	3042.941		
Residual	3403.057	420	4.740	642.020*	.000
Total	6445.999	421			
Model	B	Std error	Beta	t	Sig.
Constant	9.408	.514		18.291	.000
Quillbot AI citation generator	.603	.024	.687	25.338	.000

*Significant at .05 level, R = .687, R^2 = .472, Adjusted R^2 = .471

The results revealed a correlation coefficient of R = .687, indicating a strong positive relationship between Quillbot AI citation generator and reference services in academic libraries. This implies that as the use of Quillbot AI citation generator increases, the effectiveness of reference services also increases. The adjusted R-squared value (Adj. R^2 = .471) indicates that 47.1 percent of the variation in reference services can be explained by Quillbot AI citation generator. The analysis of variance produced an F value of 642.020 with a significance level of p = .000. Since the p value is less than the 0.05 level of significance, the regression model is statistically significant. Therefore, the null hypothesis is rejected. This means that Quillbot AI citation generator has a statistically significant influence on reference services in academic libraries in the South-South Zone of Nigeria. The identified equation to understand this relationship was that reference services in academic libraries is equal to 9.408 + .603 (Quillbot AI citation generator).

DISCUSSION OF FINDINGS

The findings of the study revealed that there is a significant influence of Grammarly AI citation generator on reference services delivery in academic libraries in the South-South Zone of Nigeria. This indicates that increased utilization of Grammarly's AI-driven citation features contributes positively to the efficiency, accuracy, and responsiveness of reference services. The result suggests that as librarians and users adopt Grammarly for automated citation formatting and error detection, reference services shift from routine correction of referencing errors to more advanced research support and advisory roles. The statistical significance implies that Grammarly AI citation generator meaningfully enhances the operational dynamics of reference service delivery within the academic library context.

A possible explanation for this result can be grounded in the Technology Acceptance Model and the Diffusion of Innovation theory, which posit that perceived usefulness and ease of use significantly influence the adoption of new technologies in professional settings. Grammarly's automated citation functionality reduces cognitive load, minimizes formatting errors, and accelerates academic writing processes, thereby increasing its perceived utility among both students and librarians. From a socio-technical systems perspective, human AI integration strengthens service systems when technological tools complement rather than replace professional expertise. In this case, Grammarly functions as an assistive technology that augments librarians' efficiency and allows them to focus on higher-order intellectual support, aligning with constructivist views that technology can scaffold learning and information management processes.

The finding is consistent with the work of Adewojo et al. (2026) who found that AI writing assistants significantly improved academic support services by reducing routine editorial queries in university libraries. Similarly, Ahmed et al. (2023) reported that AI-based citation and writing tools enhanced service turnaround time and improved user satisfaction in digital reference environments. In another study, Strobl et al. (2019) observed that automated writing and citation applications positively influenced academic support services by promoting formatting accuracy and efficiency. Also, Matsieli and Mutula (2025) supported by saying that AI-supported writing technologies strengthen library-mediated academic assistance when integrated with professional oversight. These studies collectively support the present finding that Grammarly AI citation generator has a statistically significant influence on reference services delivery in academic libraries.

The findings of the study further revealed that Quillbot AI citation generator has a statistically significant influence on reference services in academic libraries in the South-South Zone of Nigeria. This result indicates that the integration of Quillbot's AI-driven citation and paraphrasing features contributes meaningfully to the quality, speed, and structure of reference interactions. The implication is that as students increasingly utilize Quillbot for citation generation and text refinement, the nature of inquiries presented at reference units shifts from basic formatting assistance to higher-level guidance on source evaluation, citation verification, and ethical AI usage. The statistical significance confirms that Quillbot plays a measurable role in shaping reference service delivery patterns within academic libraries.

A plausible explanation for this result can be anchored in the Unified Theory of Acceptance and Use of Technology, which posits that performance expectancy and facilitating conditions drive technology adoption in institutional settings. Quillbot's citation automation reduces manual referencing effort and enhances perceived efficiency, thereby encouraging widespread usage among students and researchers. From the perspective of task technology fit theory, the alignment between Quillbot's citation functions and the academic task of referencing strengthens service outcomes when integrated with librarian oversight. Additionally, socio-constructivist learning theory suggests that AI-supported tools can scaffold academic writing processes, enabling users to refine citations while still relying on librarians for validation and deeper scholarly engagement.

This finding aligns with previous findings, Li and Coates (2025) reported that AI-assisted writing and citation systems significantly improved academic support services and reduced repetitive consultation requests in university libraries. Matsieli and Mutula, (2025) also found that generative AI tools influenced the structure of academic assistance by shifting librarian roles toward ethical guidance and verification of AI outputs. Likewise, AlAfnan (2025) observed that AI writing technologies enhanced the responsiveness of academic support units while increasing the need for oversight in citation accuracy. Furthermore, Akwang and Ebiwolate (2024) concluded that AI-powered academic writing applications have substantial implications for information services, particularly in supporting citation management and scholarly communication processes. These studies provide empirical support for the present finding that Quillbot AI citation generator significantly influences reference services in academic libraries.

CONCLUSION

The study concluded that human AI integration significantly influences reference services in academic libraries in the South-South Zone of Nigeria. Specifically, Grammarly AI citation generator and Quillbot AI citation generator were found to have a statistically significant influence on reference services delivery, enhancing efficiency and reshaping librarian user interactions. The findings affirm that AI-driven citation tools are becoming integral components of contemporary academic reference service systems in the region.

Recommendations

1. Since Grammarly AI citation generator has a significant influence on reference services delivery, university library management, and university administrations in the South-South Zone of Nigeria, the university libraries should formally integrate Grammarly into reference service operations by providing institutional subscriptions, organizing regular training workshops for librarians and students, and developing clear guidelines for its ethical and effective use.
2. Given that Quillbot AI citation generator has a statistically significant influence on reference services, the National Universities Commission, in collaboration with academic library boards and professional bodies such as the Nigerian Library Association, should establish policy frameworks and capacity building programs to regulate, standardize, and optimize the use of Quillbot in academic libraries across the South-South Zone of Nigeria.

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