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Utilization of Technological Tools and Academic Research Productivity Among Postgraduate Business Education Students in Rivers State Universities

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Abstract
This study investigated the relationship between the utilization of technological tools and academic research productivity among postgraduate Business Education students in Rivers State universities. Specifically, the study investigated the relationship between the use of citation management systems, data analysis software, grammar checkers, and the academic research productivity of the students. The study was guided by three research questions, and three corresponding null hypotheses were tested at a 0.05 level of significance. A correlational research design was adopted for the study, conducted across Rivers State University and Ignatius Ajuru University of Education. The study population comprised 325 postgraduate Business Education students enrolled during the 2023/2024 and 2024/2025 academic sessions. A census approach was used, and no sampling was applied due to the manageable population size. Data were collected using two researcher-designed instruments: Technological Tools Utilization Questionnaire (TTUQ) and Academic Research Productivity Questionnaire (ARPQ), comprising 20 items in total. The instruments were subjected to face and content validation by three experts and had reliability coefficients of 0.86, 0.88, 0.84, and 0.89 for the respective clusters, with an overall reliability of 0.87. Data collected were analysed using Pearson's Product-Moment Correlation (PPMC) to answer the research questions and test the hypotheses. Results showed a moderate positive relationship between use of citation management systems ($r = 0.559$, $R^2 = 0.3127$, p-value=.000), use of data analysis software showed a strong correlation ($r = 0.844$, $R^2 = 0.7120$, p-value=.000), and then grammar checkers ($r = 0.563$, $R^2 = 0.3170$, p-value=.000) with research productivity. The null hypotheses were rejected in all cases. The study concluded that the effective utilization of technological tools enhances postgraduate students' research productivity by improving referencing accuracy, analytical capability, and writing quality. Based on the findings, it was recommended that training on citation tools, competency in data analysis software, and use of grammar checkers be provided to improve scholarly writing.

Keywords: Technological tools, Academic Research Productivity, Citation Management Systems, Data Analysis Software, Grammar Checkers

Introduction

Technological tools refer to digital and software-based resources that improve the efficiency, organization, and productivity of academic research. These tools include data analysis software, reference management systems, collaboration platforms, and digital libraries that simplify research tasks for postgraduate students. They support activities such as data collection, literature reviews, and manuscript preparation, helping students produce quality research work (Ogunode et al., 2021). These tools have reshaped how academic research is conducted by making time-consuming tasks, such as referencing and data management, more manageable. A good example is the use of citation management systems, which help researchers stay organized and work more efficiently when handling references. Citation management systems are software programmes that allow researchers to collect, organize, and format references for academic writing. Popular citation tools like Zotero, Mendeley, and EndNote assist in

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organizing references and inserting citations accurately. These systems help postgraduate students maintain accuracy and consistency in citation practices, which is important in academic work, especially within Business Education (Oluwafemi & Adebayo, 2020). Automating the formatting and organization of references, these tools allow students to focus more on writing and analysis. They also save time by supporting multiple citation styles, such as APA or MLA, to meet publication requirements. Managing citations, these systems support literature reviews by allowing users to tag, categorize, and annotate sources. This helps students better organize ideas and draw insights from their readings (Adewale & Ibrahim, 2022). Minimizing manual citation errors, they contribute to the overall quality and clarity of academic writing. Postgraduate Business Education students frequently use citation management tools for research proposals, dissertations, and journal submissions. For example, Mendeley offers cloud storage, making it easier for students to access their research across devices and collaborate with peers. Zotero allows smooth integration with word processors, making it easier to insert citations while writing business reports or academic papers. These tools also offer search functions to locate literature from databases like Google Scholar, helping students build comprehensive and well-supported literature reviews (Chukwuemeka & Eze, 2021). This accessibility empowers students to conduct more efficient academic research and develop stronger analytical writing skills.

Postgraduate students often encounter challenges when using citation management systems. A common issue is limited technical know-how, which can make it difficult to navigate the software or connect it with writing programmes. The cost of premium tools like EndNote can also be a barrier, leading many students to rely on free versions that may lack advanced features. In areas with unstable internet connections, access to cloud-based features is frequently interrupted, making it harder to sync or retrieve saved references (Ojo & Akinyemi, 2023). These obstacles can reduce the impact that citation tools might otherwise have on research quality and efficiency. Despite these setbacks, citation management systems can support research productivity by simplifying how references are organized and formatted. For Business Education students, they help ensure that academic writing meets the standards required for journal submissions. Proper use of these tools allows students to conduct detailed literature reviews and build stronger theoretical frameworks. The extent to which students benefit often depends on their comfort level with the software and the training opportunities provided by their institutions (Babalola & Ogunlade, 2022). To improve usage, universities should consider offering practical workshops that demonstrate how these tools integrate with writing and research tasks. Providing access to licensed software or promoting capable, open-source options like Zotero can help students avoid the limits of unpaid versions. Creating peer support groups can also promote informal learning, making it easier for students to troubleshoot problems and share tips. Improving internet access would ensure smoother use of cloud-based features, allowing students to stay productive wherever they are (Ugochukwu & Nwosu, 2023). Citation tools, data analysis software play a valuable role in the research process. These are programmes designed to help users sort, interpret, and make sense of quantitative and qualitative data. Examples include SPSS, R, Microsoft Excel, and NVivo. For postgraduate students in Business Education, such tools are essential for studies involving financial data, market research, or organizational behaviour (Afolabi & Oladipo, 2020). Using data analysis software allows students to examine complex datasets more efficiently and draw meaningful conclusions. These tools automate calculations and reduce the likelihood of errors during analysis. Programmes like SPSS and R support various statistical methods, such as regression analysis or hypothesis testing, making them especially useful for producing strong, evidence-based results. This enhances the visual impact of research reports, making data interpretation easier for both students and their academic audiences.

Different software platforms serves different purposes. SPSS is often used to analyze data in studies about consumer trends or business performance. R, which is free and highly flexible, is suitable for more advanced analyses, such as modeling economic patterns. Excel helps organize smaller datasets and perform basic statistical tasks. For qualitative studies, NVivo is a valuable tool that helps analyze interviews and other text-based data, often used in research on leadership or workplace culture (Okafor & Uche, 2021). Together, these tools support thorough and well-organized research work across a wide range of business topics. Using data analysis software can present several challenges for postgraduate students. Many students are not fully comfortable with these tools and may need structured guidance to navigate advanced features. The high cost of licensed programmes like SPSS often limits access, leading some to use free versions that may not offer the full range of functions. Unreliable electricity and internet connectivity further complicate software usage, especially for cloud-based applications. A lack of institutional support and training opportunities tends to worsen these difficulties, limiting the full potential of such tools (Eze & Chukwu, 2023). Despite these challenges, data analysis software can meaningfully enhance research productivity for postgraduate Business Education students. It simplifies data handling and supports the

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development of well-structured, accurate findings. These tools help students manage large datasets efficiently and meet academic expectations for evidence-based research. Automated functions reduce time spent on repetitive tasks, allowing students to focus on interpreting results and building strong theoretical arguments.

The value students gain from these tools depends largely on their familiarity with the software and the availability of basic infrastructure (Adedoyin & Bello, 2022). To improve outcomes, universities should offer consistent, hands-on training sessions that align with the research needs of Business Education students, focusing on commonly used programmes like SPSS and R. Institutions can invest in campus-wide licenses or recommend reliable open-source alternatives to make these tools more accessible. Ensuring stable electricity and internet services is also important to avoid disruptions during the research process. Peer mentoring initiatives can further support learning, helping students share tips and overcome technical obstacles together (Nwachukwu & Okonkwo, 2023). When used alongside grammar-checking tools, data analysis software strengthens both the analytical and written components of academic work. While analysis tools help students process and present data clearly, grammar checkers support the production of polished, well-structured reports, free from language errors.

Data analysis software refers to computer applications used for processing and interpreting both quantitative and qualitative research data. Programmes like SPSS and R are used for statistical testing; Excel assists with data organization; NVivo supports qualitative analysis. In Business Education research, these tools are often used to explore financial data, market behaviours, and organizational practices (Afolabi & Oladipo, 2020). These tools improve research efficiency by reducing the time spent on manual calculations and lowering the risk of mistakes. For instance, SPSS and R are ideal for running regression analyses and hypothesis testing, which are common in business-focused studies. Their graphing and charting functions also help communicate findings clearly and professionally (Ibrahim & Adeyemi, 2022). Each software tool has its strengths. SPSS is frequently used for analyzing survey data related to consumer behaviour or company performance. R supports complex data modeling and is widely used in econometric studies. Excel is a useful tool for managing smaller sets of data and carrying out simple analysis, while NVivo supports qualitative research by helping users identify themes and patterns in interview transcripts or open-ended survey responses (Okafor & Uche, 2021). When used together, these tools help students explore different research questions more clearly and accurately. The use of data analysis software introduces several challenges for postgraduate students. Limited technical skills can make it difficult for some students to navigate advanced features, often requiring additional training. High licensing costs for programmes like SPSS limit access, prompting many students to depend on free alternatives that may not offer the full range of features. In areas with unstable electricity and internet service, using these tools, especially cloud-based ones, can be difficult. The absence of adequate institutional support for software training further complicates matters, limiting students' ability to make full use of data analysis tools (Eze & Chukwu, 2023). Despite these challenges, data analysis software plays an important role in improving research productivity among postgraduate Business Education students.

These tools simplify data processing and help ensure findings are accurate and well-structured. Students can manage large datasets efficiently and meet the expectations of academic research. Automating repetitive processes, the software allows students to concentrate on interpreting data and building meaningful theoretical insights. The benefits of these tools depend on the students' familiarity with the software and the availability of reliable infrastructure (Adedoyin & Bello, 2022). To support effective use, universities should provide consistent training tailored to the specific needs of Business Education students, with practical instruction in programmes like SPSS and R. Institutions can make software more accessible by investing in site licenses or recommending open-source options. Ensuring stable electricity and internet access is also important to avoid interruptions in the research process. Peer mentoring programmes can further help students by creating opportunities to share knowledge and resolve technical issues, ultimately improving research outcomes (Nwachukwu & Okonkwo, 2023). Analysis tools, grammar checkers contribute meaningfully to the research process by improving the clarity, accuracy, and presentation of written work. For postgraduate Business Education students in Rivers State universities, these tools help ensure that research findings are communicated clearly and meet academic writing standards.

Grammar checkers improve sentence clarity and accuracy and reduce editing time, supporting students in meeting academic writing standards. Examples include Grammarly, ProWritingAid, and Microsoft Editor. These programmes use intelligent algorithms to review text and offer suggestions that improve clarity and correctness. In academic writing, they help students produce refined manuscripts that align with scholarly standards (Ogunlade

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& Bello, 2022). Improving the quality of writing and reducing the time spent on editing, grammar checkers support overall research productivity. Postgraduate students can focus more on shaping their ideas and less on correcting basic errors. Real-time feedback on sentence structure, vocabulary, and tone enables students to strengthen their academic voice (Adeyemi & Ojo, 2021). These tools also enhance the readability of documents, increasing the chance of approval or publication. Postgraduate Business Education students commonly use grammar checkers while working on research proposals, literature reviews, and dissertations. Grammarly, for instance, helps improve flow and conciseness, key for communicating ideas clearly in business research. Microsoft Editor works within word processors to catch issues during the writing process. Some tools also include plagiarism detection, helping students maintain academic integrity (Oladipo et al., 2022). Making the revision process smoother, grammar checkers help students meet deadlines and submit higher-quality work more efficiently. While grammar checkers offer clear advantages, they also come with limitations for postgraduate students. Relying too heavily on these tools may hinder the development of independent writing skills, as students might accept automated suggestions without evaluating their appropriateness. Limited access to premium versions due to cost can restrict available features, leaving some students at a disadvantage.

Grammar checkers may struggle with context-specific errors, particularly in technical business language, which often requires manual revision (Ibrahim & Yusuf, 2023). In areas with unstable internet access, consistent use of these tools can also be problematic. Even with these challenges, grammar checkers contribute meaningfully to the research efforts of postgraduate Business Education students by enhancing the quality and clarity of written work. Well-written manuscripts strengthen the credibility of research and increase the chances of acceptance in academic settings. These tools also reduce the time spent on editing, enabling students to focus on more analytical aspects of their work. Their usefulness relies on the students' ability to review suggestions carefully and adapt them to the context of academic writing in business studies (Uche & Agwu, 2021). To help students make the most of grammar checkers, universities should incorporate training that emphasizes thoughtful use rather than blind acceptance of suggestions. Providing access to premium versions ensures all students can benefit from full features. Institutions can also encourage peer review alongside tool use, allowing students to catch nuances that software might miss. Promoting digital literacy will empower students to use these tools more effectively to enhance their research outcomes (Akinwumi & Nwosu, 2023). The application of grammar checkers improves academic productivity among postgraduate Business Education students in Rivers State universities by ensuring written work is clear, accurate, and professionally presented. Stronger writing supports more effective communication of research findings and allows students to meet academic standards with greater ease.

Academic research productivity refers to the measurable outcomes of scholarly activity, including published papers, conference contributions, and completed research projects. It reflects both the quantity and quality of knowledge generated, shaped by factors such as access to resources, digital competence, and institutional backing (Igiri et al., 2021). Technological tools have made a strong impact on research productivity by reducing time spent on repetitive tasks, supporting collaboration, and improving access to academic resources. For instance, SPSS and Microsoft Excel allow postgraduate Business Education students to analyze complex data sets, supporting research in areas like financial analysis and management studies (Akpobasah-Amugen & Ogunbadejo, 2019). Tools like Zotero and EndNote simplify reference management, reducing errors and improving formatting. Online platforms such as Google Scholar and ResearchGate help students access current literature, collaborate with peers, and participate in scholarly discussions (Gamji et al., 2021). Students also rely on data analysis software like SPSS and R to conduct statistical evaluations, which are vital for drawing evidence-based conclusions. Digital libraries and institutional repositories provide access to current academic materials, keeping students updated on developments in business education (Amadi & Alaputa, 2021). Tools like Google Forms support data collection by simplifying the design and distribution of surveys, while platforms like Google Drive enable shared writing and storage, helping students collaborate effectively (Aiyedun et al., 2021). These digital tools not only streamline academic tasks but also enhance student engagement and teamwork in collaborative learning environments.

The use of these tools is not without challenges. Unstable internet connections can interfere with access to cloud-based platforms. Inadequate training often leads to underuse, as students may not fully understand the tools' capabilities. Cost barriers also prevent access to licensed software, pushing students toward less efficient free alternatives (Gidado et al., 2023). These hurdles limit the positive impact that technology could have on research outcomes. Despite these issues, the integration of digital tools offers significant advantages for postgraduate students. Streamlining tasks like data processing and literature review, students can focus more on critical thinking and generating new ideas. Platforms that enable collaboration expand exposure to different perspectives, adding

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value to academic work. Still, the success of these tools depends on how well students are supported through training and access to essential infrastructure (Aina et al., 2021). To help students fully benefit from technological tools, institutions should deliver regular, hands-on training focused on research-relevant applications. Investment in reliable internet and access to key software can level the playing field. Additionally, fostering peer learning and mentorship can help students become more confident and capable in using these tools, which in turn supports stronger academic contributions (Igiri et al., 2021). This study is anchored on the Technology Acceptance Model (TAM) developed by Fred Davis in 1986, which suggests that a person's decision to accept and use technology is shaped by how easy they believe it is to use and how useful they think it will be. In this context, postgraduate students' use of technological tools for research is driven by their perception of the tools' benefits and usability.

Statement of the Problem

In an era where digital tools are widely available to support academic activities, the research productivity of postgraduate students is expected to improve in both quality and efficiency. Among postgraduate Business Education students in Rivers State universities, there are persistent concerns about the effectiveness and timeliness of their research productivity. Despite access to various technological tools designed to aid research processes, many students still struggle with organizing references, analysing data, and producing grammatically sound academic work. Tools such as citation management systems, data analysis software, and grammar checkers are intended to enhance students' research competence and productivity. Yet, there is limited understanding of how often and how effectively these tools are utilized by postgraduate Business Education students, and whether their usage directly correlates with improved research outcomes. This gap in knowledge raises important questions about how the use of these technological tools contributes to academic performance within Business Education programmes. Therefore, the problem of this study is to examine how the use of citation management systems, data analysis software, and grammar checkers is related to the academic research productivity of postgraduate Business Education students in Rivers State universities.

Aim and Objectives of the Study

The aim of the study was to investigate the utilization of technological tools and academic research productivity among postgraduate Business Education students in Rivers State universities. Specifically, the study sought to:

1. Examine the relationship between the use of citation management systems and academic research productivity among postgraduate Business Education students in Rivers State universities.
2. Investigate the relationship between the use of data analysis software and academic research productivity among postgraduate Business Education students in Rivers State universities.
3. Assess the relationship between the use of grammar checkers and academic research productivity among postgraduate Business Education students in Rivers State universities.

Research Questions

The following research questions guided the study:

1. What is the relationship between the use of citation management systems and academic research productivity among postgraduate Business Education students in Rivers State universities?
2. What is the relationship between the use of data analysis software and academic research productivity among postgraduate Business Education students in Rivers State universities?
3. What is the relationship between the use of grammar checkers and academic research productivity among postgraduate Business Education students in Rivers State universities?

Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance:

$H0_1$: There is no significant relationship between the use of citation management systems and academic research productivity among postgraduate Business Education students in Rivers State universities.

$H0_2$: There is no significant relationship between the use of data analysis software and academic research productivity among postgraduate Business Education students in Rivers State universities.

$H0_3$: There is no significant relationship between the use of grammar checkers and academic research productivity among postgraduate Business Education students in Rivers State universities.

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Materials and Methods

The study adopted the correlational research design. This design was considered appropriate because the study investigated the relationship between the utilization of technological tools (e.g., citation management systems, data analysis software, and grammar checkers) and the dependent variable (academic research productivity) of postgraduate Business Education students. The study was conducted in Rivers State universities, Nigeria. The population of the study comprised all postgraduate Business Education students in Rivers State universities during the 2023/2024 and 2024/2025 academic sessions, which amounted to 325 students as obtained from the departments of Business Education in Rivers State University and Ignatius Ajuru University of Education. A census of the entire population was used since the number was manageable; therefore, no sample and sampling techniques were applied in the study. Two researcher-designed instruments were used for data collection: Technological Tools Utilization Questionnaire (TTUQ) – a 15-item instrument, and Academic Research Productivity Questionnaire (ARPQ) – a 5-item instrument. All items across both instruments were structured on a four-point rating scale: Strongly Agree = 4 points, Agree = 3 points, Disagree = 2 points, and Strongly Disagree = 1 point. The instruments were subjected to face and content validation by three experts, two from the Department of Business Education and one from Measurement and Evaluation, Rivers State University. The experts assessed the instruments for clarity, coverage, and relevance, and their feedback was incorporated into the final versions of the instruments. To ensure reliability, the Cronbach's Alpha method was employed. Twenty (20) copies of the instruments were administered to postgraduate students at a university not included in the main study. The responses were analysed, and the Cronbach Alpha reliability coefficients were computed as follows: Cluster 1 (Citation Management Systems) = 0.86, Cluster 2 (Data Analysis Software) = 0.88, Cluster 3 (Grammar Checkers) = 0.84, and Cluster 4 (Academic Research Productivity) = 0.89. These results indicated that the instruments were reliable for use in the study. The administration of the instruments was carried out by the researcher with the assistance of one research assistant. The questionnaires were administered physically and retrieved immediately upon completion to ensure a high response rate. Out of the 325 copies distributed, 309 were correctly filled and retrieved, representing a valid return rate used for the data analysis. The collected data were analysed using Pearson's Product-Moment Correlation (PPMC) to answer the research questions and test the null hypotheses at a significance level of 0.05. The decision rule was to reject a null hypothesis if the p-value was less than 0.05 and to retain it if the p-value was greater than 0.05.

Results

Research Question 1: What is the relationship between the use of citation management systems and academic research productivity among postgraduate Business Education students in Rivers State universities?

$H0_1$: There is no significant relationship between the use of citation management systems and academic research productivity among postgraduate Business Education students in Rivers State universities.

Table 1: Summary of Pearson's Product Moment correlation on the relationship between the use of citation management systems and academic research productivity among postgraduate Business Education students in Rivers State universities.

		Use of Citation Management Systems	Academic Research Productivity
Use of Citation Management Systems	Pearson Correlation	1	0.559
	Sig. (2-tailed)		0.000
Academic Research Productivity	Pearson Correlation	0.559	1
	Sig. (2-tailed)	0.000	
	N	309	309

The result from Table 1 showed the summary of Pearson's Product Moment Correlation on the relationship between the use of citation management systems and academic research productivity among postgraduate Business Education students in Rivers State universities. The result showed that the relationship between the use of citation management systems and academic research productivity among postgraduate Business Education students in Rivers State universities was positive and moderate (r=0.559). The R-squared value of 0.3127 showed

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that the use of citation management systems contributed about 31.27% to the observed variance in academic research productivity. The p-value (.000) showed that there is a significant relationship between the use of citation management systems and academic research productivity among postgraduate Business Education students in Rivers State universities. The hypothesis ($H0_1$) was rejected at the .05 level of significance.

Research Question 2: What is the relationship between the use of data analysis software and academic research productivity among postgraduate Business Education students in Rivers State universities?

$H0_2$: There is no significant relationship between the use of data analysis software and academic research productivity among postgraduate Business Education students in Rivers State universities.

Table 2: Summary of Pearson's Product Moment correlation on the relationship between the use of data analysis software and academic research productivity among postgraduate Business Education students in Rivers State universities.

		Use of Data Analysis Software	Academic Research Productivity
Use of Data Analysis Software	Pearson Correlation	1	0.844
	Sig. (2-tailed)		0.000
Academic Research Productivity	Pearson Correlation	0.844	1
	Sig. (2-tailed)	0.000	
	N	309	309

The result from Table 2 showed the summary of Pearson's Product Moment Correlation on the relationship between the use of data analysis software and academic research productivity among postgraduate Business Education students in Rivers State universities. The result showed that the relationship between the use of data analysis software and academic research productivity among postgraduate Business Education students in Rivers State universities was positive and strong (r=0.844). The R-squared value of 0.7120 showed that the use of data analysis software contributed about 71.20% to the observed variance in academic research productivity. The p-value (.000) showed that there is a significant relationship between the use of data analysis software and academic research productivity among postgraduate Business Education students in Rivers State universities. The hypothesis ($H0_2$) was rejected at the .05 level of significance.

Research Question 3: What is the relationship between the use of grammar checkers and academic research productivity among postgraduate Business Education students in Rivers State universities?

$H0_3$: There is no significant relationship between the use of grammar checkers and academic research productivity among postgraduate Business Education students in Rivers State universities.

Table 3: Summary of Pearson's Product Moment correlation on the relationship between the use of grammar checkers and academic research productivity among postgraduate Business Education students in Rivers State universities.

		Use of Grammar Checkers	Academic Research Productivity
Use of Grammar Checkers	Pearson Correlation	1	0.563
	Sig. (2-tailed)		0.000
Academic Research Productivity	Pearson Correlation	0.563	1
	Sig. (2-tailed)	0.000	
	N	309	309

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The result from Table 3 showed the summary of Pearson's Product Moment Correlation on the relationship between the use of grammar checkers and academic research productivity among postgraduate Business Education students in Rivers State universities. The result showed that the relationship between the use of grammar checkers and academic research productivity among postgraduate Business Education students in Rivers State universities was positive and moderate (r=0.563). The R-squared value of 0.3170 showed that the use of grammar checkers contributed about 31.70% to the observed variance in academic research productivity. The p-value (.000) showed that there is a significant relationship between the use of grammar checkers and academic research productivity among postgraduate Business Education students in Rivers State universities. The hypothesis ($H0_3$) was rejected at the .05 level of significance.

Discussion

The results in Table 1 show a moderate positive relationship (r = 0.559) between the use of citation management systems (CMS) and academic research productivity among postgraduate Business Education students in universities. The R-squared value of 0.3127 means that about 31.27 percent of the changes in research productivity can be linked to the use of CMS. Since the p-value is .000, the result is statistically significant, leading to the rejection of the null hypothesis ($H0_1$) at the 0.05 level. This finding highlights the helpful role CMS tools play in supporting students' research productivity. Adeyemi et al. (2020) also found a strong link between students' awareness and use of tools like EndNote and Mendeley. This aligns with the current findings, suggesting that the adoption of citation management systems (CMS) contributes substantially to research productivity. Effiong and Akwang (2024) highlighted that proficiency in information literacy skills, including the effective use of citation management systems (CMS), was a significant predictor of research productivity. This supports the current study's findings, emphasizing the importance of citation management systems (CMS) in facilitating efficient research practices.

The findings from Table 2 reveal a strong positive correlation (r = 0.844) between the use of data analysis software and academic research productivity among postgraduate Business Education students in Rivers State universities. The R-squared value of 0.7120 indicates that approximately 71.20% of the variance in academic research productivity can be attributed to the use of data analysis software. Since the p-value is .000, the relationship is statistically significant, which leads to the rejection of the null hypothesis ($H0_2$) at the 0.05 level. These findings point to the helpful role of data analysis software in supporting research productivity among postgraduate students. Adeniran et al. (2024) noted that using data analytics tools helps with making better decisions, using resources wisely, and achieving academic success. By using these tools, institutions can gain useful research insights, plan ahead more effectively, and encourage collaboration, which can lead to stronger research outcomes and wider impact. This aligns with the current study's findings, suggesting that the use of data analysis software significantly contributes to academic research productivity.

The results from Table 3 show a moderate positive relationship (r = 0.563) between the use of grammar checkers and academic research productivity among postgraduate Business Education students. The R-squared value of 0.3170 indicates that about 31.70 percent of the difference in research productivity can be linked to the use of grammar checkers. Since the p-value is .000, the relationship is statistically significant, which led to the rejection of the null hypothesis ($H0_3$) at the 0.05 level. These findings highlight the helpful role grammar checkers play in improving students' research work. According to Eyong (2023), grammar checkers helped students write clearer and more accurate sentences, which improved the quality of their academic work and reduced the amount of corrections needed by supervisors. Lipalam et al. (2023) also observed that grammar checkers gave instant feedback, helping students notice and fix their mistakes. This encouraged them to take control of their learning and improve their writing, which led to better research outcomes.

Conclusion

The results of this study showed that the use of technological tools is strongly linked to academic research productivity among postgraduate Business Education students. Citation management systems and grammar checkers were both found to have a moderate positive connection with research productivity, explaining 31.27% and 31.70% of the changes seen. Data analysis software showed a stronger link, accounting for 71.20% of the variation in research performance. In all three cases, the null hypotheses were rejected at the 0.05 significance level, showing that proper use of citation tools, data software, and grammar checkers helps improve research work among postgraduate students. These findings highlight the value of including such digital tools in postgraduate training to support better academic performance and productivity.

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Recommendations

Based on the findings and conclusion of the study, it was recommended that:

1. Universities should integrate training on citation management systems (e.g., Mendeley, Zotero) into research methodology courses.
2. Students should demonstrate proficiency in tools like SPSS or NVivo through practical assignments.
3. Supervisors should promote the consistent use of grammar checkers to enhance writing clarity and academic quality.

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