

Artificial Intelligence Data Analysis Tools Utilization and Research Writing Activities of Business Education Students in Tertiary Institutions in Cross River State

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doi: <https://doi.org/10.37745/ijvter.15/vol12n13751>

Published September 14, 2026

Citation: Undogie U.M., Azih N., Igboke S.A. (2026) Artificial Intelligence Data Analysis Tools Utilization and Research Writing Activities of Business Education Students in Tertiary Institutions in Cross River State, *International Journal of Vocational and Technical Education Research*, 12(1) pp.37-51

Abstract: *This study examined the relationship between AI data analysis tools utilization and research writing activities of Business Education students in tertiary institutions in Cross River State. The study was guided by three specific purposes, three research questions, and three hypotheses. A correlational survey research design was adopted for the study. The population of the study was one thousand, three hundred and nineteen (1319) Business Education students (1251 from Universities and 68 from Colleges of Education) in four (4) public tertiary institutions in Cross River State. The sample size of this study was 307 students (291 from Universities and 16 from Colleges of Education). The data for the study were collected using an AI Data Analysis Tools Utilization Questionnaire (AIDATUQ) and the Research Writing Activities Questionnaire (RWAQ). The instruments were face-validated by three experts and further tested for reliability. For the AIDATUQ, the Cronbach's alpha coefficient was 0.69, and for the RWAQ, the K-R20 coefficient was 0.88. Data were analyzed using Pearson product-moment correlation to answer the research questions and linear regression to test the null hypotheses at a 0.05 confidence level. The findings revealed that there is a high positive relationship between AI Data Analysis Tools and research writing activities of Business Education students in tertiary institutions in Cross River State. The relationship is statistically significant. There is a low positive relationship between AI data analysis Tools and research writing activities of Business Education students in colleges of education in Cross River State. The relationship is statistically significant. There is a low negative relationship between AI Data Analysis Tools Utilization and research writing activities of Business Education students in universities in Cross River State. The relationship is not statistically significant. It was recommended, among others, that tertiary institutions should provide Business Education students with regular practical training on the effective and responsible use of AI Data Analysis Tools for research writing, particularly in data analysis, interpretation, and presentation of research findings.*

Keywords: artificial intelligence, artificial intelligence data analysis tools, research writing activities

INTRODUCTION

Business Education is a broad discipline which constitutes a major component of technical and vocational education. Business Education appears to be an integrated study of finance, secretarial vocational disciplines. Enwedo (2025) conceived Business Education as a fundamental part of vocational education that equips individuals with skills and knowledge for gainful employment or self-employment. As a matter of fact, all vocational education programmes are geared towards providing for the beneficiaries of Business Education skills needed for employment. This element in the definition does not clearly differentiate Business Education from other vocational education disciplines. Igboke in Musa (2020) noted that Business Education covers education for office occupation, business teaching, business administration and economic understanding. It has options in accounting, entrepreneurship, marketing and Office Technology and Management (OTM). The broad nature of Business Education helps in preparing individuals for various roles in office administration, marketing, accounting, and management. It also fosters entrepreneurial attitudes and the ability to contribute to national development through informed decision-making and problem-solving as well as functioning as wise consumers of goods and services in the economy. Contextually, Business Education is an academic programme concerned with the teaching and learning of the fundamentals, theories and processes of business, designed to help recipients at various levels acquire requisite vocational knowledge, skills, experiences, ethics and attitudes needed to be successful in the field of business and in teaching business related subjects. The uniqueness of Business Education as a programme of learning lies in its ability to provide specialized and practical training for learners and about business operations. It equips its recipients with the requisite skills and competencies needed for self-reliance, job creation, and effective participation in the economy. The main objectives of Business Education as given by the National Universities Commission (2022) centred on students' practical job preparation; business teaching, developing aptitudes, understanding, awareness and improving personal qualities needed to enter into a business occupation, advance and profit in it. Others are to guide students for suitable placement in business and office employment; enhance economic understanding of the free enterprise system as well as preparing students for pedagogical and leadership positions in both public and private life. The aforementioned objectives are specifically designed to meet students' needs in various aspects.

Tertiary institutions are characterized by their unique academic activities well designed to service the academic needs of the beneficiaries. These activities are central to the educational experience and are designed to help students understand concepts, build essential skills, and prepare for their future careers (Kaviyan Matric Higher Secondary School, 2024). In the assertion of Law Insider (2025), academic activities encompass instructional or administrative operations, educational classes, recreational and competitive athletic and sports activities, recreational and competitive inter-scholastic activities, summer camps, music programmes, art programs, drama programs, food service and graduation ceremonies. Among other academic activities is research writing.

Institution type is an important consideration in this study because universities and colleges of education differ in their academic structures, research expectations, technological environments and students' exposure to research activities, which may influence the utilization of AI data analysis tools and engagement in research writing. Universities place considerable emphasis on research through undergraduate projects, postgraduate dissertations and other scholarly activities, while colleges of education also require students, particularly those undertaking final-year projects, to demonstrate research and academic writing competencies. Recent evidence indicates that AI is increasingly being applied to research, data analysis and academic writing in higher education, although students' actual use may vary according to institutional support, training and access to technology (Oladunni-Mohammad, 2024; Owan et al., 2025). Studies specifically involving Business Education students have also demonstrated the relevance of technological tools, including data-analysis software, to research productivity, while emerging evidence from colleges of education shows growing application of AI within Business Education. Therefore, including both universities and colleges of education in the present study provides a broader and more representative basis for determining how institution type relates to AI data analysis tools utilization and research writing activities among Business Education students in Cross River State. Educational research may be conceived as a systematic way of finding dependable solution to educational problems. Abonyi, Okereke, Omebe, Anugwo and Nnachi (2022) defined research as a systematic inquiry or investigation into a subject, an event, situation or condition in order to discover, or revise facts, theories and their applications. As a systematic approach, research involve the following processes: problem identification, problem definition, formulation of hypotheses, collection of data, analysis of data and making conclusion. In Business Education programme, research plays a critical role in finding reliable solution to problems, expanding knowledge and providing basis for improvement in the programme. Research writing activities could be seen as those activities researchers engage in at the process of conducting research such as literature review, data collection and analysis, editing and proofreading in order to ensure accuracy and good quality output free of plagiarism. Business Education students may carry out research writing activities in assignments, seminar and project as a requirement for course work or partial completion of a programme. Technology like Artificial Intelligence has become a veritable tool that could enhance these research activities.

Artificial Intelligence (AI) is the mimicking of the human intelligence by using programmed machine which are capable of performing tasks in the resemblance of humans. Russell, Novak, Patel, Garvey, Craig, Jackson and Miller (2023) considered AI as the simulation of human intelligence with the help of algorithms that utilize machine learning, deep learning, natural language processing, and neural networks capable of learning and emulating complex human abilities, and even self-improvement. AI can be used in education to perform various tasks. It can be used to improve the learning experience, assess students' performance, and adopt modern teaching methods and preparing students for AI-related careers (Sengsri & Khunratchasana, 2024). According to Godpower, Egbunefu and Onyemaechi (2025) AI can provide intelligent tutoring by providing personalized and adaptive feedback to students. AI has also opened new ways of improving writing skills. Kumar and Rose in Quratulain, Maqboo and Bilal (2025) explained that

AI-enabled writing assistants like ChatGPT, deep seek and Grammarly, offers quick feedback, grammar corrections, and content harmonization. There are various AI tools that can be leveraged on to improve academic writing. These tools are broadly divided into generative, AI Data Analyses Tools and AI-Powered Writing Assistant Tools (AI-P WATs). AI-Powered Writing Assistant Tools (AI-PWATs) are artificial intelligence-driven applications designed to support users throughout the writing process by enhancing the quality, efficiency, and accuracy of written content. These tools utilize advanced technologies such as natural language processing (NLP), machine learning, and large language models to assist with generating ideas, drafting text, correcting grammar and spelling errors, improving sentence structure, enhancing clarity and coherence, suggesting appropriate vocabulary, and refining writing style. In academic settings, AI-powered writing assistants help students and researchers produce well-organized, grammatically correct, and academically sound manuscripts while reducing the time and effort required for writing tasks. Common examples of AI-powered writing assistants include ChatGPT, Grammarly, QuillBot, Microsoft Copilot, Jasper AI, and Writesonic. AI Data Analyses Tools aides in performing academic data analysis. Although these tools provide valuable support, they are intended to complement rather than replace users' critical thinking, creativity, and subject-matter expertise, thereby promoting more effective and efficient academic writing practices.

AI Data Analyses Tools (AIDATs) assist researchers with various data analysis needs such as visual interpretation, automated reporting and predictive display. According to Alalaq (2025) AIDATs are playing an increasingly significant role in analysing data and academic content, which in turn enhances research efficiency, advances teaching methodologies, and enables the discovery of new patterns in data. Furthermore, Moss (2025) maintained that AIDATs can offer advice on the best methods or techniques to utilise, and how to conduct these techniques effectively; generate the code that is necessary to apply these methods in R, Python, or other software; interpret the output these techniques generate, and actually conduct the analyses without the need to use other software, such as R or SPSS.

AI-P WATs have been found beneficial in research activities, providing assistance that enable accuracy and efficiency of results in research works. Khalifa and Albadawy (2023) revealed that AI-P WAT have enormous benefits in research that include facilitating idea generation and research design; improving content and structuring; supporting literature review and synthesis; enhancing data management and analysis; supporting editing, review, and publishing and assisting in communication, outreach, and ethical compliance. It will be completely out of place to say Business Education students in tertiary institutions in Cross River State are not using AI tools in their assignments and research activities. Their challenge is that they know and use just few of these tools, especially ChatGPT. Experience has shown that the students are not using AI tools efficiently. Some of them copy directly from ChatGPT and in some case they may ignore specific content information like proper organization of content and referencing. However, specific studies on how AI data analysis tools relate to students' research writing activities in tertiary institutions in Cross River State are lacking, creating a research gap that needs to be filled.

Statement of the Problem

Despite the growing availability of Artificial Intelligence (AI) data analysis tools and their potential to simplify data processing, statistical analysis, interpretation and presentation of research findings, there appears to be a persistent concern about the extent to which Business Education students utilize these tools effectively in their research writing activities in tertiary institutions in Cross River State. While students are increasingly exposed to AI applications that can support research processes, some may have limited knowledge of appropriate tools, lack the skills to use them effectively, depend excessively on AI-generated outputs, or fail to critically evaluate and properly integrate the results into their research reports. This situation may affect the accuracy, efficiency, quality and credibility of students' research writing activities, particularly in areas such as data analysis, interpretation of findings, presentation of results and overall research reporting. Furthermore, differences in institutional type, particularly between universities and colleges of education, may result in variations in students' access to AI technologies, research training, institutional support and opportunities to engage in research activities. However, empirical evidence on the utilization of AI data analysis tools and its relationship with research writing activities among Business Education students in tertiary institutions in Cross River State remains limited. It is against this background that the study seeks to investigate AI data analysis tools utilization and research writing activities of Business Education students in tertiary institutions in Cross River State.

Purpose of the Study

The main aim of this study was to examine the relationship between AI data analysis tools utilization and research writing activities of Business Education students in tertiary institutions in Cross River State. Specifically, the study examined the relationship between:

1. AI data analysis tools utilization and research writing activities of Business Education students in public tertiary institutions in Cross River State.
2. AI data analysis tools utilization and research writing activities of Business Education students in College Education in Cross River State.
3. AI data analysis tools utilization and research writing activities of Business Education students in universities in Cross River State.

Research Questions

The following research questions guided the study:

1. What is the relationship between AI data analysis tools utilization and research activities of Business Education students in Cross River State?
2. What is the relationship between AI data analysis tools utilization and research activities of Business Education students in Colleges of Education in Cross River State?
3. What is the relationship between AI data analysis tools utilization and research activities of Business Education students in Universities in Cross River State?

Hypotheses

The following null hypotheses were formulated to guide the study and were tested at 0.05 confidence level.

1. There is no significant relationship between AI data analysis tools utilization and research writing activities of Business Education students in public tertiary institutions in Cross River State.
2. There is no significant relationship between AI data analysis tools utilization and research writing activities of Business Education students in public colleges of education in Cross River State.
3. There is no significant relationship between AI data analysis tools utilization and research writing activities of Business Education students in public universities in Cross River State.

METHODOLOGY

The researcher employed a correlational survey research design for this study. Correlational survey research design is one that seeks to establish the relationship that exists between two or more variables. The design is considered appropriate because it enabled the researcher to collect data from a sample of the population of Business Education students to analyse and make informed decisions on the relationship that exists between AI data analysis tools utilization and research writing activities of Business Education students in tertiary institutions in Cross River State. The area of the study is Cross River State. The population of the study comprise of one thousand, three hundred and nineteen (1319) Business Education students (1251 from universities and 68 from Colleges of Education) in four (4) public tertiary institutions in the study area: 326 students from University of Calabar, 877 students from University of Cross River State, 48 students from the University of Education and Entrepreneurship (UEE), Akamkpa and 68 students from the Federal College of Education, Obudu. Stratified sampling technique was used to select Business Education students from the various tertiary institutions within the study area. The sample size of 307 students (291 from universities and 16 from Colleges of Education) was determined using Taro Yamane's formula. The instruments for data collection in this study are the AI Data Analysis Tools Utilization Questionnaire (AIDATUQ) and the Research Writing Activities Questionnaire (RWAQ). The instruments were face-validated by three experts and further tested for reliability. For the AIDATUQ, the Cronbach's alpha coefficient was 0.69, and for the RWAQ, the K-R20 coefficient was 0.88. Data were collected directly from the respondents in their respective schools. Data collected from respondents were analyzed using Pearson product-moment correlation to answer the research questions. Computed r from -1 to -0.1 implied a negative relationship, computed r of 0 implied no relationship, computed r from +0.1 to + 1 implied a positive relationship. Similarly, 0.00 – 0.19 implied a very low relationship, 0.20 – 0.39 implied a low relationship, 0.40 – 0.59 implied a moderate relationship, 0.60 – 0.79 implied a high relationship, while 0.80 – 1.00 implied a very high relationship. Linear regression was used in testing the null hypotheses. The SPSS-generated p -values were used as a basis for a decision on the hypotheses. When the p -value was less than the alpha level, the null hypothesis was rejected; however, when the p -value was greater than the alpha level, the null hypothesis was not rejected

RESULTS

Research Questions

Research Question 1: What is the relationship between AI data analysis tools utilization and research activities of Business Education students in Cross River State?

Data collected on students' AI data analysis tools utilization was correlated with tertiary institution students' research writing activities in Business Education. Summary of data analysis is presented in Table 1.

Table 1: The Index of Relationship between AI Data Analyses Tools Utilization and Research Writing Activities of Business Education Students in Tertiary Institutions.

N	Computed r	r Square	Adjusted r Square	Standard Error of Estimate	Beta	Decision
307	0.767	0.588	0.586	0.26527	0.767	Positive

Result on Table 1 shows that the computed r value is 0.767, indicating a high positive relationship between AI Data Analysis Tools and research writing activities of Business Education students. This indicated that increased utilization of AI Data Analysis Tools is associated with increased participation in research writing activities. The R^2 value of 0.588 indicates that AI Data Analysis Tools account for 58.8% of the variance in research writing activities among Business Education students. This suggests that AI Data Analysis Tools utilization play a significant role in students' research writing activities. The beta (β) value of 0.767 further indicates a strong positive influence of AI Data Analysis Tools utilization on research writing activities. In all, there is a high positive relationship between AI Data Analysis Tools and research writing activities of Business Education students in tertiary institutions in Cross River State.

Research Question 2: What is the relationship between AI data analysis tools utilization and research activities of Business Education students in Colleges of Education in Cross River State? Data collected on students' AI data analysis tools utilization was correlated with Colleges of Education students' research writing activities in Business Education. Summary of data analysis is presented in Table 2.

Table 2: The Index of Relationship between AI Data Analyses Tools Utilization and Research Writing Activities of Business Education Students in Colleges of Education.

N	Computed r	r Square	Adjusted r Square	Standard Error of Estimate	Beta	Decision
307	0.149	0.022	0.019	0.52782	0.149	Positive

Result on Table 2 shows that the computed r value is 0.149, indicating a low positive relationship between AI data analysis tools utilization and research writing activities of Business Education students in colleges of Education. This indicates that increased utilization of AI data analysis is associated with a slight increase in research writing activities. The R^2 value of 0.022 indicates that AI data analysis utilization account for only 2.2% of the variance in research writing activities among Business Education students in colleges of education. This suggests that AI data analysis tools utilization contribute minimally to students' research writing activities. The beta (β) value of 0.149 further indicates a weak positive influence of AI data analysis Tools on research writing activities. In all, there is a low positive relationship between AI data analysis Tools and research writing activities of Business Education students in colleges of education in Cross River State.

Research Question 3: What is the relationship between AI data analysis tools utilization and research activities of Business Education students in Universities in Cross River State?

Data collected on students' AI data analysis tools utilization was correlated with students' research writing activities in Business Education in universities. A summary of the results is presented in Table 3.

Table 3: The Index of Relationship between AI Data Analysis Tools Utilization and Research Writing Activities of Business Education Students in Universities.

N	Computed r	r Square	Adjusted r Square	Standard Error of Estimate	Beta	Decision
307	-0.057	0.003	0.000	0.40706	-0.057	Negative

Result on Table 3 shows that the computed r value is -0.057, indicating a very low negative relationship between AI Data Analyses Tools utilization and research writing activities of Business Education students in universities. This indicates that increased utilization of AI Data Analyses Tools is associated with a slight decrease in research writing activities, although the relationship is extremely weak. The R^2 value of 0.003 indicates that AI Data Analyses Tools utilization account for only 0.3% of the variance in research writing activities among Business Education students in universities. This suggests that AI Data Analyses Tools Utilization contribute negligibly to students' research writing activities. The beta (β) value of -0.057 further indicates a very weak negative influence of AI Data Analyses Tools Utilization on research writing activities. In all,

there is a low negative relationship between AI Data Analyses Tools Utilization and research writing activities of Business Education students in universities in Cross River State.

Hypotheses

H01: There is no significant relationship between AI data analyses tools utilization and research writing activities of Business Education students in public tertiary institutions in Cross River State.

Table 4: Test of Significance of Relationship Between AI Data Analyses Tools and Research Writing Activities of Business Education Students in Tertiary Institutions.

Computed r	r Square	Adjusted r Square	Standard Error of Estimate	Beta	t-val	p-val	Decision
0.767	0.588	0.586	0.26527	0.767	20.843	0.000	Significant

The result in Table 4 shows that there is a significant relationship between AI Data Analysis Tools and research writing activities of Business Education students in tertiary institutions. This is because the p-value (0.000) is less than the alpha level (0.05). Based on the decision rule, the null hypothesis which states that there is no significant relationship between AI Data Analysis Tools and research writing activities of Business Education students in tertiary institutions in Cross River State, it is rejected.

H02: There is no significant relationship between AI data analyses tools utilization and research writing activities of Business Education students in public colleges of education in Cross River State.

The index of relationship obtained between AI data analyses tools utilization and research writing activities of Business Education students in colleges of education was subjected to test of significance at 0.05 alpha levels using simple linear regression. Summary of result is presented in Table 5.

Table 5: Test of Significance of Relationship Between AI Data Analyses Tools and Research Writing Activities of Business Education Students in Colleges of Education.

Computed r	r Square	Adjusted r Square	Standard Error of Estimate	Beta	t-val	p-val	Decision
0.149	0.022	0.019	0.52782	0.149	2.627	0.009	Significant

The result in Table 5 reveals that there is a significant relationship between AI data analyses tools utilization and research writing activities of Business Education students in colleges of education. This is because the p-value (0.009) is less than the alpha level (0.05). Therefore, based on the decision rule, the null hypothesis which states that there is no significant relationship between AI data analyses tools utilization and research writing activities of Business Education students in colleges of education in Cross River State, is rejected.

HO₃: There is no significant relationship between AI data analysis tools utilization and research writing activities of Business Education students in public universities in Cross River State. The index of relationship obtained between AI data analyses tools utilization and research writing activities of Business Education students in universities was subjected to test of significance at 0.05 alpha levels using simple linear regression. Summary of result is presented in Table 6.

Table 6: Test of Significance of Relationship Between AI Data Analyses Tools and Research Writing Activities of Business Education Students in Universities.

Computed r	r Square	Adjusted r Square	Standard Error of Estimate	Beta	t-val	p-val	Decision
-0.057	0.003	0.000	0.40706	-0.057	-.991	.322	Not Significant

The result in Table 6 shows that there is no significant relationship between AI data analysis tools utilization and research writing activities of Business Education students in universities. This is because the alpha level (0.05) is less than the p-value (0.322). Based on the decision rule, the null hypothesis which states that there is no significant relationship between AI data analysis tools utilization and research writing activities of Business Education students in universities in Cross River State, is not rejected.

FINDINGS

1. There is a high positive relationship between AI Data Analysis Tools and research writing activities of Business Education students in tertiary institutions in Cross River State. The relationship is statistically significant
2. There is a low positive relationship between AI data analysis Tools and research writing activities of Business Education students in colleges of education in Cross River State. The relationship is statistically significant.
3. There is a low negative relationship between AI Data Analysis Tools Utilization and research writing activities of Business Education students in universities in Cross River State. The relationship is not statistically significant.

DISCUSSION OF FINDINGS

AI Data Analysis Tools Utilization and Research Writing Activities of Business Education Students in Tertiary Institutions

The finding that AI Data Analysis Tools utilization has a high positive and statistically significant relationship with research writing activities of Business Education students in tertiary institutions in Cross River State indicates that students who make greater use of AI data analysis tools tend to engage more effectively in research writing activities. This finding agrees with Akinwalere and Akinrinola (2025), who found that Nigerian university students used AI tools for research-related tasks, including data analysis and writing assistance, with perceived benefits in research productivity and efficiency. It is also consistent with Owan et al. (2025), who reported that Nigerian students recognized AI as useful for explaining research concepts, supporting academic writing and facilitating data analysis, although actual utilization was constrained by training, infrastructure and ethical concerns. Similarly, Nzekwe and Ofuonye (2025), in a study of Business Education students in colleges of education, found that AI tools enhanced the quality, speed and structure of project writing. However, the finding contrasts with evidence from a 2024 study of AI in essay-based assessment, which found that students who used permitted AI tools for a research essay did not perform better than those who did not, suggesting that AI availability or use alone may not automatically improve academic outcomes. The present finding therefore suggests that, when appropriately utilized, AI data analysis tools can complement students' research competencies by facilitating data processing, interpretation and presentation, thereby supporting broader research writing activities.

AI Data Analysis Tools Utilization and Research Writing Activities of Business Education Students in Colleges of Education

The finding that there is a low positive but statistically significant relationship between AI Data Analysis Tools utilization and research writing activities of Business Education students in colleges of education suggests that AI utilization contributes positively to research writing, but its contribution is relatively modest. This may be associated with differences in students' technical

competence, access to digital resources, research experience and institutional support. The finding agrees with Nzekwe and Ofuonye (2025), who found that AI tools supported the quality, speed and structure of project writing among Business Education students in colleges of education, but also identified inadequate technical know-how, over-dependence and ethical concerns as impediments to effective use. It also agrees with Owan et al. (2025), whose study showed that although students generally accepted AI for research purposes, actual use was relatively limited because of inadequate training and infrastructural constraints. Conversely, the finding differs from the broader positive effects reported by Akinwalere and Akinrinola (2025), where students perceived AI tools as useful for improving research productivity and academic writing. The weaker relationship found in the present study may therefore indicate that merely having access to AI data analysis tools is insufficient; students need appropriate AI literacy, research skills and institutional guidance to translate AI-assisted analysis into substantial improvements in research writing.

AI Data Analysis Tools Utilization and Research Writing Activities of Business Education Students in Universities

The finding that there is a low negative and statistically non-significant relationship between AI Data Analysis Tools utilization and research writing activities of Business Education students in universities indicates that greater utilization of AI data analysis tools was not associated with improved research writing activities in a statistically meaningful way. Since the relationship was not significant, the negative direction should not be interpreted to mean that AI data analysis tools negatively affect students' research writing; rather, it suggests that AI utilization alone may not be sufficient to explain variations in students' research writing activities. This finding is consistent with the caution raised by Nwagbara (2025), whose study of Nigerian university students found that although AI facilitated data analysis and writing support, concerns about over-dependence, academic integrity and inadequate institutional guidance remained. It also finds support in Funsho and Hassan (2025), who reported that overreliance on AI could encourage cognitive offloading and diminish students' critical thinking, creativity and capacity to produce quality academic discourse. Similarly, the 2024 essay-assessment study found no performance advantage among students who used permitted AI tools, suggesting that AI use does not automatically translate into better academic work. On the other hand, the finding contrasts with Akinwalere and Akinrinola (2025), who reported positive perceptions of AI for research productivity, writing assistance and data analysis among Nigerian university students. The divergence may be explained by differences in the type of AI tools examined, students' level of proficiency, the quality of supervision and institutional policies governing AI use.

CONCLUSION

The study concludes that the utilization of AI Data Analysis Tools is significantly associated with the research writing activities of Business Education students in tertiary institutions in Cross River State. However, the strength and direction of the relationship vary by institution type, with a stronger positive relationship observed generally and among colleges of education, but a weak, non-significant negative relationship among university students. This suggests that effective

integration of AI Data Analysis Tools, supported by appropriate digital skills, research competence, institutional guidance and responsible use, is important for enhancing students' research writing activities.

Recommendations

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

1. Tertiary institutions should provide Business Education students with regular practical training on the effective and responsible use of AI Data Analysis Tools for research writing, particularly in data analysis, interpretation and presentation of research findings.
2. Colleges of education should strengthen students' practical competencies in AI Data Analysis Tools through workshops, guided research exercises and curriculum integration, since the findings revealed a significant positive relationship between AI tool utilization and research writing activities among the students.
3. Universities should provide stronger institutional guidance and research supervision on the appropriate use of AI Data Analysis Tools, given that the relationship between AI tool utilization and research writing activities among university students was low, negative and not statistically significant.
4. Business Education lecturers and research supervisors should guide students to use AI Data Analysis Tools as complementary aids rather than substitutes for independent thinking, statistical competence, critical evaluation and sound research judgment.
5. Tertiary institutions should improve access to relevant digital infrastructure, reliable internet connectivity and appropriate AI-enabled research resources to enable students to utilize AI Data Analysis Tools effectively in their research writing activities.

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