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ASSESSMENT OF LECTURERS' AWARENESS AND UTILIZATION OF AI TOOLS FOR EFFECTIVE TEACHING OF RESEARCH METHODS IN THE UNIVERSITY OF CALABAR, NIGERIA.

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ABSTRACT

The integration of Artificial Intelligence (AI) tools in higher education has emerged as a transformative force, reshaping pedagogical practices across diverse disciplines. This research examined the awareness, application, challenges, and effectiveness of utilizing AI tools for teaching research methods among lecturers at the University of Calabar, Nigeria. The study was anchored on Technology Acceptance Model (TAM). The study answered 3 research questions and tested 4 hypotheses as a guide for the study. Drawing on a descriptive survey research design, data was collected from a sample of 206 lecturers (115 male; 91 female) representing 115 departments from 24 faculties that teach their students directly or anchor research methods/its equivalence for other departments in the same faculty. A structured questionnaire, in form of modified Likert four -type scale, validated for face, content and assessed for reliability through a trial test with coefficients ranging from 0.77 to 0.81, served as the primary data collection instrument. Lecturers' awareness of AI tools for research methods instruction, their active integration of AI tools, and challenges encountered were systematically explored. Data was analysed using descriptive (mean, standard deviation), and inferential (independent t-test, one-way ANOVA) statistics. Findings revealed that awareness and utilization levels varied across sexes and departments with male lecturers and science departments scoring higher mean utilization values. While results showed that academic staff generally have awareness of the use of AI in research methods, awareness levels between male and female lecturers, and among academic disciplines were not significantly different. From the findings too, lecturers generally perceived the utilization of AI tools for effective instruction to be inadequate. It was found that challenges related to technical issues, lack of skills, faculty training, restricted access, and costs persist. The study underscores the need for comprehensive faculty training programs, institutional support for technology infrastructure, and clear communication to address faculty concerns, emphasizing the importance of faculty engagement in the AI integration process. Ultimately, this research contributes to the discourse on AI-enhanced pedagogy in the Nigerian higher education context and provides practical recommendations for enhancing research methods instruction through AI tools.

KEYWORDS: Artificial intelligence (AI), research methods instruction, lecturers' awareness and utilization, higher education, Nigeria.

INTRODUCTION

The integration of artificial intelligence (AI) into various aspects of education has become increasingly prominent worldwide. In Nigeria, and particularly at the University of Calabar, educational institutions are beginning to recognize the potential benefits of AI tools in enhancing teaching, learning and assessment processes (Owan, Abang, Idika, Etta, Bassey, 2023).

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Within the last decade, AI has made significant inroads into the field of education, transforming traditional pedagogical approaches and offering new avenues for learning and instruction. AI technologies, such as machine learning algorithms and natural language processing, have empowered educators to personalize learning experiences, automate administrative tasks, and provide timely feedback to students (Baker and Inventado, 2014; Owan et al, 2023). These advancements have the potential to revolutionize teaching methods and improve learning outcomes. Other tools, including intelligent tutoring systems, chatbots, and virtual reality simulations, are fast gaining ground. They offer a wide range of capabilities, from adaptive learning that tailor content to individual students' needs (VanLehn, 2011) to automated grading and assessment (Rudner and Gagne, 2009). Such tools have been employed across various educational levels, from primary schools to higher education institutions (Holstein and McLaren, 2018).

Nigeria, as one of the largest countries in Africa, has a diverse higher education system comprising numerous universities, polytechnics and colleges of education. These institutions are tasked with providing quality education and producing skilled graduates who can contribute to the nation's development. In recent years, there has been a growing emphasis on incorporating technology into education, driven by the need to align with global trends and improve educational outcomes (Idika, Idaka and Ukpor, 2012; Federal Ministry of Education Nigeria, 2013). The University of Calabar, situated in Cross River State, Nigeria, is a prominent institution known for its commitment to academic excellence. With a diverse faculty and a wide range of innovative academic programs, the university plays a crucial role in shaping the educational landscape of the region. As part of its mission, the University of Calabar seeks to remain at the forefront of innovative teaching methods and technological advancements, therefore, calling for a need for a study like this as a critical path to the realization of educational mission of the University.

Undoubtedly, the strong pull of the forces of technological advancements along with the pervasive socio-economic uncertainties of the 21st century has continued to pose serious challenges to the effective teaching of research methods instruction in our universities. Research methodology is a course that is instituted in every faculty of the University of Calabar to equip students with the skills for effectiveness in research project writing. This is handled by lecturers in the field and who, for decades of years have relied on the traditional approach for the course instruction. This approach of teaching research methods often involves didactic lectures, where instructors primarily present theoretical concepts and research techniques in a one-way, lecture-based format. The approach tends to emphasize memorization of research methodologies, steps, and terminology, with limited interactive or practical application.

Consequently, students may gain basic understanding but may struggle to apply these methods independently in real world research project. Using conventional face -to -face methods to teach research methods in our setting with a large number of students can present several problems especially given the critical need of the course for post graduate students. Some likely issues that can arise include; limited individual attention, as lecturers may struggle to provide personalized feedback, guidance, and support for individual students. This is particularly challenging in research methods that often requires a detail understanding of each student's topic and approach.

Additionally, maintaining an engaging productive learning environment with a large group as it obtains in UNICAL can be difficult with the traditional approach to instruction, and this could lead to more distractions, disengagement, and less effective learning outcome as lecturer concerned may have to contend with classroom management issues. This can reduce students' understanding of complex research concepts and processes. Idika, Orji, Bichene and Oke (2022) noted that conventional instructional approach has also been associated with resource constraints, where physical classrooms may lack adequate resources e.g., computers, internet, data analysis software, for effective teaching of research methods. This could hinder students' ability in varying ways including ability to engage in hands-on practice with research tools, which are critical for developing competence; difficulty and irregular assessment of students' progress in large classes by lecturers with the tendency of students falling behind or lacking the understanding of key research concepts; fewer opportunities for students to build research skills through meaningful interactions, group discussions and collaborative learning, among others, in a traditional large lecture setting.

Evidently, Idika, et al (2012) noted that peer learning and collaborative problem solving can be limited in a crowded face-to-face set up, and, with the labour-intensive nature of the course as associated with large group settings, can lead to lecturer burnout. This challenging situation may hinder feedback and grading substantially required in this course, and thus affecting the quality of instruction over time. Over time, according to the authors, the face-to-face or physical setting characteristically has presented challenges associated with increased logistic problem such as effective organization of group activities, assignments, presentations, and assessments because of the large groups involved. Organizing these activities can be logistically complex, time consuming, and less efficient than in a more flexible or blended environment.

The traditional face-to-face approach has most often been associated with limited use of technology. The lack of learning facilities has been an age long problem causing a lot of challenges in advancing research system of higher education in Nigeria (Idika et al, 2010; Idika et al, 2024). In the face of the traditional approach, it becomes difficult to leverage educational technological tools which can enhance learning, such as interactive tools, online simulations and, digital resources can simplify complex topics in research methods, provide increased engagement or practice in virtual environment, particularly in a large-class setting such as we have in UNICAL. This is a contrast to what obtains in the traditional lecture method format where the teacher acting as a repertoire of knowledge, centers the lessons on himself while students are passive listeners or dormant recipients of the lesson.

There is no doubt that inspite of the problems of the old method, lecturers continue to cling to it because they see it as less tasking, permits a wider coverage of content within a short time which still makes it useful for instruction in large research classes in UNICAL, but this however, has scarcely produced positive learning outcomes that come with the level of effectiveness desired in research methods instruction especially in rapidly changing instructional landscapes due to technological advance. In order to overcome the challenges therefore, an approach that can incorporate AI as digital resources, smaller group discussions of online modules could help facilitate effectiveness in large research methods classes in UNICAL. As digital resources, AI tools or content encompass algorithms, data processing, machine learning models, and digital systems that perform complex tasks as are found in research methodology, generate insights for smart decision-making, and solve problems across various domains of the course. AI can serve as a resource by providing personalized learning experiences, automate administrative tasks, and assist lecturers with data-driven insights which help them focus more on student research engagement. AI tools are transformative and can enable adaptive, responsive, and intelligent systems across research methodology and other research domains.

The question now is how effective has the teaching of research methods been in UNICAL using the traditional method?

Prior to the invention of AI and before the tools became widespread, teaching research methodologies was basically carried out in UNICAL using the conventional face-to-face approach. Observably, this method faced guided mixed results with effectiveness depending heavily on teaching approaches, lecturer expertise, class size, availability of resources.

Here are some insights into the effectiveness of teaching research methods in that era: i) High lecturer expertise dependence to explain complex concepts like research design, data analysis, statistical methods, with less experienced lecturers often struggling and leading to inconsistent outcomes for students. ii) Dependence on traditional lecture-based learning, which while informative, may not always engage students effectively in practical, problem-solving, critical thinking aspects of research (the essence of action research) being to acquire these skills for proffering solutions to research problems. iii) Focus on rote-learning made visible by the absence of interactive, adaptive tools that would have engendered deep understanding. Research concepts have merely been memorized by students under the face-to-face setting and lack the practical skills to apply those concepts, reducing the overall effectiveness of their research capabilities (Idika, Joshua and Umoinyang, 2017). iv) The most significant impact of the traditional face-to-face method of instruction in research method could likely be felt in literature review and data analysis. Before AI, these activities required more manual work from students and lecturers. This face-to-face process proved time-consuming and posed a great challenge for students to sift through large amounts of information to find relevant studies or apply statistical techniques without the aid of AI-based research tools. v) Traditional face-to-face approach in UNICAL has been characterized with limited data analysis and feedback capabilities. In the absence of AI tools (Idika, Uchegbue, Adie & Orji, 2024), noted that lecturers have been confined to traditional grading and feedback methods which have been time-intensive and sometimes less insightful. The tendency of this to complicate analysis of trends in student performance or identify common misconceptions in good time for quick corrective measures among struggling students, have been challenging areas in the use of conventional methods of instruction in research methods. vi) Inadequate physical resources for teaching research (e.g., access to statistical software, computer laboratories) are experiences of using conventional face to face methods. Joshua, Nwogwugwu and Kirima (2015) noted this as constituting a challenge for lecturers to gain hands-on experience with data analysis, which is crucial for understanding and effectively teaching research methods to students in south-south, Nigeria. The lack of skills to effectively teach research analysis is identified with the wrong usage of statistical tools in education research (Ojating, 2015) and lack of informed decision towards solution to research problems (Idika, 2016; Idika et al, 2017).

In the university generally, the face-to-face approach to research methods instruction has to a great extent allowed hands on activities such as, in-class activities or interactive lessons, group exercises and personalized feedback. However, with large classes of our students, lecturers may often have found it difficult to provide individual attention or tailored feedback which could leave some students struggling to grasp the lecture materials or study facilities. Hence, limited accessibility to strategic training materials continued to be associated with the traditional approach in UNICAL and other institutions of higher learning (Orji, Idika and Ekwukoma, 2023). In some fast -developing educational chimes like Finland, Singapore, India, research has shown evidence of instructors successfully overcoming the challenges of the traditional techniques of teaching research methods using innovative teaching strategies (Idika, Ovat, Aehigbe, Udumo (2015). AI and digital resources have since transformed research methods education by enabling students to engage with complex concepts interactively and independently.

With AI tools being integrated into the teaching of research methods, the effectiveness of instruction could significantly improve more than teaching and learning experience in the face-to-face era. AI deployed in UNICAL has the potential to make teaching research methods more effective by fostering flexibility, efficiency, and instant personalized learning and feedback system based on individual student performance.AI applied to research methods instruction could increase students and provide a more supportive learning environment. The shift from the traditional techniques to AI or at most a blend of learning approaches could allow the large class or group of students to gain deeper, more research skills, and improve both their research competence and confidence to realize their individual mandate and that of the university. Starcey and Gerbic (2007), and Idika, et al (2012) explained that student learning experience and past performance can be improved when online resources are integrated with traditional forms of course delivery such as, face-to-face, lectures and tutorials. And Johnson and Aragon (2003) in Idika et al (2012) posited that students' performance is directly improved by the quality of instructional design. The effective teaching of research methods is crucial for generating questions to solve problem in research. This level of effectiveness could be the likely state of the University of Calabar research method teaching, when AI tools are deployed into the instructional strategy. The effective teaching of research methods is crucial in the era of technological advancement in the university of Calabar for reasons including, generating vast amount of data with ease for data literacy and oral skills, enhanced critical thinking essentially for handling information in a digital world, for handling digital research tools especially to conduct more complex and impactful research, aligning their skills with the demands of the current job market, for creating ethical awareness for their responsible conduct of research, and for more adaptability and innovation in fields where new technologies continue to reshape research possibilities; for global competence, enabling informed decision making on global issues. Research methods effectively handled with adequate technology will equip students with the motivation to direct much of their technological energy to research endeavors, fostering enhanced output of research among academics and higher education institutions.

The adoption of AI tools in Nigerian higher education is still in its nascent stages but holds great promise. As the digital divide narrows and technological infrastructure improves, Nigerian universities are exploring ways to harness AI for various purposes, including research and teaching. AI tools can potentially address challenges posed by the conventional, face to face, lecturer dependent methods of instruction, such as inadequate resources, overcrowded classrooms, and the need for personalized learning experiences (Ally, 2008). However, the implementation of AI in Nigerian higher education is not without obstacles. Issues related to infrastructure, faculty training, and cost-effectiveness must be addressed to fully harness the potential of AI (Ajayi, 2019; Owan et al, 2023). More importantly, faculty members' awareness and willingness to incorporate AI tools into their teaching practices play a pivotal role in the successful integration of these technologies (Ezomo, Omoruyi, and Uwadia, 2019). This is a very important aspect which this study has delved into in its effort to contribute to the solution for ineffectiveness in research methods instruction.

The effectiveness of AI tools in teaching research methods largely depends on lecturers' awareness of these tools and their willingness to utilize them in the classroom. Faculty members must understand the capabilities of AI, its potential applications, and the benefits it can offer in research methods instruction. Furthermore, Idika, Orji, Bichene and Oke (2022) had noted that lecturers' interest and motivation to explore and integrate technology tools into their curriculum and pedagogical practices are crucial factors that can shape the future of teaching research methods at the University of Calabar. In this context, this study aims to assess the level of awareness and interest among lecturers at the University of Calabar regarding the utilization of AI tools for teaching research methods. It seeks to understand whether lecturers are informed about AI, how actively they incorporate AI tools into their teaching practices, and the prevailing implementation strategies. Additionally, the study examines the challenges lecturers face when attempting to leverage AI for teaching research methods and explores potential solutions to overcome these obstacles.

The level of awareness among lecturers regarding AI tools for teaching research methods is a crucial factor that can significantly impact the effectiveness of their teaching. Research has shown that educators who are more aware of AI tools are better equipped to leverage these technologies effectively in the classroom (Ajayi, 2019; Owan et al, 2023). When lecturers possess a strong awareness of AI tools and their potential applications in research methods instruction, they are more likely to integrate these tools into their teaching practices, resulting in improved pedagogical outcomes. Empirical studies have demonstrated that effective integration of AI tools into the curriculum can enhance student engagement, improve learning outcomes, and facilitate more personalized instruction (Li and Wang, 2021). Therefore, the extent to which lecturers actively apply and implement AI tools in their courses is closely linked to the overall effectiveness of their teaching in research methods.

The challenges faced by lecturers when utilizing AI tools for teaching research methods can have a substantial impact on the effectiveness of their instructional practices. Challenges such as technical issues, ethical concerns, and the need for faculty training can impede the seamless integration of AI tools (Chen and Patel, 2021). Addressing these challenges is crucial because they can hinder the realization of the potential benefits of AI-enhanced teaching, ultimately affecting the overall effectiveness of research methods instruction, hence, this study. These insights will be further explored in the subsequent sections of the paper.

Application and Implementation of AI Tools and Effectiveness of Teaching Research Methods

As the landscape of education rapidly evolves with advancements in technology, particularly in the realm of AI, its tools constituting machines and systems that can perform tasks that typically require human intelligence, offer promising opportunities for transforming the educational process. In the field of research methods instruction, AI tools have been increasingly applied to facilitate learning, streamline processes, and enhance the overall effectiveness of teaching. Among these are;

Natural Language Processing (NLP): NLP algorithms enable the analysis of text data, making them useful for automating tasks such as literature reviews, text summarization, and sentiment analysis. In research methods instruction, NLP can assist students in conducting literature reviews more efficiently. Machine Learning for Data Analysis: AI-driven machine learning models can help students analyze complex datasets and identify patterns. This can streamline the data analysis process in research projects and enhance students' quantitative research skills. Chatbots and Virtual Assistants: AI-powered chatbots and virtual assistants offer students instant access to information and guidance. They can answer queries, provide explanations, and offer assistance, thereby increasing student engagement.

The effectiveness of AI tools in teaching research methods has been a subject of extensive research. Several studies have investigated their impact on various aspects of the learning process: Enhanced engagement: AI tools, such as intelligent tutoring systems, have been shown to enhance student engagement by providing interactive and personalized learning experiences. These tools adapt to individual student needs, ensuring that they remain engaged throughout the learning process (Smith, 2021).

Improved learning outcomes: Many studies have reported positive effects on student learning outcomes. For instance, AI-driven data analysis tools can help students gain a deeper understanding of research methods and statistical analysis, resulting in improved research skills (Chen and Wang, 2019). Efficiency and time saving: AI tools can automate repetitive tasks, such as data analysis or literature reviews, thereby saving students time and allowing them to focus on more critical aspects of their research (Kim and Lee, 2022). Personalization: AI tools can adapt to students' individual learning styles and pace, offering customized feedback and guidance; this can lead to more effective learning experiences (Martinez and Liu, 2020). Real-time Feedback: Chatbots and virtual assistants can provide students with real-time feedback and support, helping them address questions or challenges immediately (Wu & Chen, 2021).

Summarily, the application and implementation of AI tools in research methods instruction have the potential to revolutionize the way students learn and engage with research methodologies. However, challenges related to AI use need be addressed to fully harness the benefits of AI in education, hence, this study. As the educational landscape continues to evolve, educators and institutions must carefully consider how AI can be integrated effectively and ethically into research methods instruction as this will help prepare students to navigate the complex world of this course and contribute meaningfully to their respective fields.

Theoretical Framework:

There are several educational theories that could inform the research's context and guide the investigation into the subject: awareness, application, challenges, and effectiveness of utilizing AI tools for teaching research methods among lecturers at the University of Calabar, Nigeria. These theories include: constructivist learning theory, cognitive load theory, social learning theory, self-determination theory, and technology acceptance model.

However, to explain the relationship between lecturers' awareness of AI tools and the effectiveness of teaching research methods which constitute the main problem in this research, the review adopts the Technology Acceptance Model (TAM) as the theoretical framework. TAM, developed by Davis, Bagozzi, and Warshaw (1989), posits that perceived ease of use and perceived usefulness significantly influence individuals' intentions to use technology. In the context of AI tools in education, lecturers' perceptions of the ease of integrating AI into their teaching practices and the usefulness of AI for improving research methods instruction are central to their adoption of these tools (Davis, 1989).

Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) are core constructs of TAM. PEOU refers to the extent to which an individual believes that using a particular technology system is effortless and free from complications. PU, on the other hand, pertains to the degree to which an individual believes that using a specific technology will enhance their job performance or productivity (Davis, 1989). In the context of research methods instruction, lecturers' perceptions of the ease with which they can incorporate AI tools and the usefulness of AI for improving their teaching are crucial factors that shape their intentions to utilize these technologies.

Theoretical support from TAM also relevantly provides a structured framework for understanding the relationship between lecturers' awareness of AI tools and their effectiveness in teaching research methods. For instance, lecturers' awareness of what AI tools could offer- the capability to personalize learning experiences, tailor content and resources to individual students' needs and learning (Holstein and McLaren, 2018), may have a significant impact on the effectiveness with which they deliver research methods instruction and enhance students' general academic performance in the course. The theory offers insights into how perceptions of ease and usefulness can influence lecturers' decisions to integrate AI tools into their pedagogical practices for improved student achievement.

Empirical Review

The level of awareness among lecturers and the effectiveness of teaching research methods.

Smith (2021) in a cross-sectional survey aimed at assessing lecturers' awareness of AI tools and their potential applications in research methods teaching, engaged lecturers at a large university as population. Stratified sampling technique was employed to select a sample of 300 lecturers. A structured questionnaire with Likert-scale and open-ended questions was administered to the respondents. Using descriptive statistics and thematic analysis, quantitative data were analyzed using SPSS. The study found that 70% of lecturers were aware of AI tools, but only 30% had integrated them into their teaching. Perceived benefits included improved engagement and personalized learning. Barriers included lack of training and access to AI resources. The study recommended providing training and resources to enhance lecturers' awareness and utilization of AI tools. The study's strengths include a large sample size and mixed-methods approach. However, it relied on self-reported data, which may be subject to bias.

Johnson and Brown, (2020) in their study 'Enhancing Research Methods Instruction with AI: Lecturers' Awareness and Attitude', aimed to explore lecturers' awareness and attitudes toward the integration of AI in research methods instruction. Qualitative phenomenological research design was adopted for this study, and the population included research methods lecturers in a specific department. Purposive sampling was used to select 12 lecturers for in-depth interviews. Data collection instrument included semi-structured interviews. Thematic analysis was employed to identify key themes from interview transcripts. The study found that lecturers had varying levels of awareness, with some being highly informed while others were less knowledgeable. Attitude toward AI integration was generally positive, with lecturers highlighting potential benefits such as efficiency and personalization. The study recommended offering training sessions and resources to raise awareness and encourage AI adoption. The qualitative approach allowed for in-depth exploration of attitudes but had a limited sample size, potentially limiting generalizability.

The Application and Implementation of AI Tools and the Effectiveness of Teaching Research Methods.

Patel and Sharma (2019) carried out a study to identify the challenges faced by educators in implementing AI tools in research methods instruction, to explore the perceived opportunities and benefits of integrating AI into research methods teaching. The study adopted the qualitative case study design with population consisting of faculty members from diverse academic disciplines. Purposive sampling was employed to select 15 educators with varying levels of experience in AI integration. Semi-structured interviews were conducted with the educators to gather insights into their experiences, challenges, and perceptions. Thematic analysis was used to identify key challenges and opportunities in AI integration. The cross-case analysis allowed for comparisons between educators and findings showed that educators encountered challenges related to technological infrastructure, faculty training, and concerns about job displacement. However, they also recognized the potential of AI tools to enhance student engagement, automate time-consuming tasks, and provide personalized feedback.

Among recommendations made included investing in faculty training programs, addressing infrastructure gaps, and promoting a culture of innovation in education. It also emphasized the importance of clear communication to alleviate educators' concerns about job displacement. The qualitative case study design allowed for an in-depth exploration of educators' perspectives. However, the small sample size again limits generalizability.

In the same vein, Chen and Wang (2020) carried out a study with the objectives to assess the impact of AI-driven data analysis tools on students' quantitative research skills, and to examine the effectiveness of AI tools in improving students' understanding of statistical analysis in research. The study adopted the experimental research design. The population consisted of undergraduate students majoring in science and engineering disciplines. Random sampling was employed to assign 120 students to two groups: one receiving traditional instruction and the other exposed to AI-driven data analysis tools. Pre- and post-course assessments were administered to measure quantitative research skills and statistical knowledge. Additionally, a post-course survey gathered feedback on students' experiences. Quantitative data were analyzed using t-tests to compare the performance of the two groups. Survey responses were subjected to descriptive analysis. The study found that students exposed to AI-driven data analysis tools exhibited significant improvements in quantitative research skills and a deeper understanding of statistical analysis compared to those following traditional instruction. Survey feedback indicated that students appreciated the hands-on experience provided by AI tools. The study recommended the integration of AI-driven data analysis tools into research methods instruction, particularly in quantitative research courses. It emphasized the value of experiential learning in enhancing students' research skills. The experimental design allows for causal inferences, but external factors not controlled could constitute an influence on the results. Additionally, the study could benefit from a follow-up assessment to gauge long-term retention of skills.

The challenges faced in utilizing AI for teaching research methods and the effectiveness of teaching research methods.

Wang and Kim (2019) undertook an investigation with the aim to determine the effectiveness of AI-driven assessments in improving student learning outcomes, and to identify any challenges faced in implementing AI-driven assessments. The study adopted quantitative research design with population consisting of undergraduate students offering research methods courses in two universities. Random sampling was used to select 300 students. Pre and post-assessment tests were administered to measure students' learning outcomes. Additionally, a questionnaire gathered students' feedback on the challenges faced during AI-driven assessments. Descriptive statistics and t-tests were used to analyze the pre and post-assessment scores. Survey data underwent descriptive analysis. The study found that AI-driven assessments led to significant improvements in student learning outcomes. Challenges identified included technical issues during assessments. Among the recommendations was the continued use of AI-driven assessments and technical support for students. The study provides robust quantitative data but lacks faculty perspectives on the challenges faced.

In another study by Martinez and Lee (2020) on 'Student Engagement in AI-Enhanced Research Methods Instruction: A Longitudinal Analysis', the purpose was to examine the impact of AI-enhanced instruction on student engagement over time while also identifying challenges in sustaining student engagement through AI. Longitudinal research design was adopted with the population comprising undergraduate students enrolled in a multi-year research methods course. Convenience sampling was used to select 150 students. Longitudinal surveys and focus group interviews were conducted annually to assess changes in student engagement and gather feedback on challenges faced. Growth curve modeling was used to analyze longitudinal survey data. Thematic analysis was employed for focus group interview data. The study revealed a sustained increase in student engagement over the multi-year course. Challenges included maintaining students' motivation and addressing technical issues. The study recommended ongoing support for student motivation and technical trouble shooting. The design provides valuable insights into sustained engagement, but the sample size could be larger.

Statement of the Problem

The study background comprehensively highlighted the limitations of the traditional research teaching methods, which often prioritized information or lecture delivery over active student engagement and practical research skills development. The traditional approach to teaching research methods often involves didactic lectures, assessments, done face-to-face, with textbooks, and manual data collection and analysis. While these methods are valuable, they may not always engage students effectively or keep pace with the evolving research landscape and technology. AI tools, such as intelligent tutoring systems, data analysis software, and chatbots, have the potential to revolutionize to build effectiveness into the teaching of research methods by providing personalized learning experiences, automating repetitive tasks, and offering real-time feedback among others.

However, the deployment of AI is still at nascent stage at the university of Calabar, and has its peculiar challenges, but most important is the awareness of lecturers in engaging AI tools in pedagogy. Little research has been in examining the extent to which academic staff of the university of Calabar are aware of the AI tools for research methods instruction, their active integration of AI tools (utilization) and the challenges encountered in the process. It is against this back drop that the study intends to assess the awareness, application, challenges and effectiveness of utilizing AI tools for teaching research methods among lecturers at the University of Calabar, Nigeria. To address these issues effectively, it is imperative to tailor solutions to the specific context of the University of Calabar. Each institution possesses unique characteristics, including infrastructure, faculty composition, and student demographics, which can impact the implementation of AI tools. Thus, a comprehensive understanding of lecturers' awareness, utilization, and challenges is essential to inform relevant interventions. The gaps in research regarding lecturers' level of awareness, utilization, and challenges in utilizing AI tools for teaching research methods at the University of Calabar necessitate a focused investigation. This study therefore, aims to bridge these gaps by providing empirical data on the above including their gender and discipline that can guide educational policymakers, administrators, and faculty members in making informed decisions and devising strategies to harness the potential of AI for effective research methods instruction. To this end, the research outlined the following objectives;

1. To determine the level of awareness among lecturers at the University of Calabar regarding AI tools and their potential applications in teaching research methods.
2. To examine how actively lecturers at the University of Calabar are incorporating AI tools into their teaching practices, with a specific focus on research methods instruction.
3. To identify the challenges encountered by lecturers when attempting to leverage AI tools for teaching research methods.
4. To determine how male and female lecturers and the departments differ in their level of awareness and application/or utilization of AI tools for research methods instruction in university of Calabar.

Research Questions

1) To what extent are lecturers at the University of Calabar aware of AI tools and their potential applications in teaching research methods?
2) How actively are these lecturers incorporating AI tools into their teaching practices, and what are the prevailing implementation strategies?
3) What challenges do lecturers encounter when attempting to leverage AI tools for teaching research methods?
4) What is the difference between male and female lecturers in their awareness of AI tools for research methods instruction?
5) How do departments differ in their awareness of AI tools for research methods instruction?
6) How do male lecturers differ from their female counterparts in their application/utilization of AI tools for effective teaching of research methods?
7) What difference exist among departments in their application of AI tools for research methods instruction?

Hypothesis 1:

Male lecturers are not significantly different from their female counterparts in their level of awareness of AI tools for research methods instruction.

Hypothesis 2:

There is no significant difference among departments in their awareness level of AI tools for research methods instruction.

Hypothesis 3:

There is no significant difference between male and female lecturers in their application or utilization of AI tools for research methods instruction.

Hypothesis 4:

Departments do not differ significantly in their application of AI tools for research methods instruction in UNICAL.

METHOD

Research Design:

This study employed a descriptive survey research design to systematically investigate the awareness, application, challenges, and effectiveness of AI tools for teaching research methods among lecturers of different sexes and departments at the University of Calabar. This approach was to enable the research produce answers to the research questions and the hypotheses postulated.

Research Area:

This study was conducted within the University of Calabar, Nigeria, focusing on male and female lecturers from various departments who were involved in teaching research methods or its equivalence.

Population of the Study:

The population of the study consisted of lecturers in all the faculties in University of Calabar who teach research methods or its equivalence in terms of the course curriculum content (as different faculties have different names for the same or similar course). This numbers 24 faculties, 115 departments and 206 academic staff in University of Calabar (Source: Registry, University of Calabar, 2024.)

Sampling Technique:

The stratified random sampling technique was used for this study even though the population is that of a census population. The study area was divided into 24 strata according to the number of faculties in the school.

In each faculty the number of research lecturers per department was ascertained in order to determine the number of respondents to use. A total of 206 lecturers were sampled. Thus, purposive sampling was also adopted since only those with the required attributes were selected for the study.

The Sample:

The selected sample of 206 lecturers represented the study's participants; this was drawn from different academic departments through stratified random sampling technique.

Instrumentation:

A structured questionnaire was used as the primary data collection instrument. This was divided into section A and B. While section A measured the bio data of the lecturers (sex, faculty and department), the B was further divided into 3 parts- each having 10 items which were used to measure the levels of awareness among lecturers, application and implementation of AI tools, and challenges faced in utilizing AI tools

for teaching research methods/equivalent. This B part of the Questionnaire was a modified 4 Likert type scale constructed by the researchers with response options as: Very much aware (4), Aware (3), Not much aware (2) Not aware (1) for B1; For B2 and C Parts, the options were as follow: Adequately Incorporated (4), Incorporated (3), Not Adequately Incorporated (2), Not Incorporated (1). The reverse of the points was the case for all negative items.

Validity of the Instrument:

The questionnaire underwent a thorough validation process by expert reviewers to ensure its face and content validity.

Reliability of the Instrument:

The reliability of the questionnaire was established through a pilot test; and Cronbach alpha reliability method was used to assess the internal consistency achieving reliability coefficients which ranged between 0.77 and 0.81.

Data Collection Procedure:

Data collection involved distributing the validated questionnaire to the selected sample of 206 lecturers; this was done through the help of informed 5 assistant researchers within one week, and the return of the instrument met with no attrition.

Procedures for Data Analysis:

Quantitative data obtained from the questionnaire responses was analyzed using appropriate statistical techniques, including descriptive (mean and standard deviation), and inferential statistics (independent t-test and one-way analysis of variance).

PRESENTATION OF RESULTS

Research question one

What is the level of academic staff awareness of the use of AI in research method?

To answer this research question, item by item analysis were carried out using means and standard deviations and the result is presented in Table 1. The basis for the remarks was the comparison of the criterion mean (X=2.5) with the sample or obtained mean. If the sample or calculated or obtained mean is greater than 2.5, then, it implies that the staff have awareness of the application of AI in research methods The results in Table 1 revealed that lecturers handling research in the institution have awareness of the use of AI in research methods. However, it was only item 4 that was defective in that lecturers agreed that they have not attended workshops that are related to AI in education.

Research question two

How actively are these lecturers incorporating AI tools into their teaching and research practices?

To answer this question, item by item analysis were carried out using means and standard deviations and the result is presented in Table 2. The basis for the remarks was the comparison of the criterion mean (X=2.5) with the sample or obtained mean. If the sample or calculated or obtained mean is greater than 2.5, then, it implies that the staff have incorporated AI tools in research practices. The results in Table 2 revealed showed that lecturers handling research in the institution have not adequately incorporated AI tools in research practices. However, it was found that item, 5, 6, 8, 9 were defective in that the lecturers agreed that they have both used AI tools to execute any of those activities. Thus, it was concluded that incorporation of AI tools in research in the institution is very low.

Research question three.

What challenges do lecturers encounter when attempting to leverage AI tools for teaching research methods.

To answer this question, item by item analysis were carried out using means and standard deviations and the result is presented in Table 3. The basis for the remarks was the comparison of the criterion mean (X=2.5) with the sample or obtained mean. If the sample or calculated or obtained mean is greater than 2.5, then, it implies that the staff have challenges using AI tools in research practices.

The results in Table 3 revealed that lecturers handling research in the institutions have challenges in utilizing AI tools for teaching and handling issues in research practices. However, it was found that only in few items including items 3 and 7 were areas that they were not having issues with AI tools execution. Thus, it was concluded that there are areas of challenges that lecturers are faced with in utilizing AI tools for research practices.

Table 1: Item by item analysis of the level of academic staff awareness of the use of AI in research methods instruction.

S/N	Items	N	OB	CR	SD	Remarks
1	I am aware of the existence of AI tools for teaching research methods.	206	2.89	2.5	.7363	Aware of AI
2	I have a basic understanding of how AI tools can be used in research methods instruction.	206	2.60	2.5	.1092	Aware of AI
3	I can name at least two AI tools commonly used in research methods teaching.	206	3.00	2.5	.3421	Aware of AI
4	I have attended workshops or training sessions related to AI tools in education.	206	2.42	2.5	.8021	Not aware of AI
5	I follow developments in educational technology, including AI applications.	206	2.76	2.5	.1092	Aware of AI
6	I feel I have knowledge to incorporate AI tools into my teaching of research methods.	206	2.88	2.5	.4520	Aware of AI
7	I believe that AI can enhance the effectiveness of research methods instruction.	206	2.99	2.5	.7720	Aware of AI
8	I am open to experimenting with AI tools in my teaching.	206	3.12	2.5	.5441	Aware of AI
9	I actively seek information on AI tools that can aid research methods instruction.	206	2.76	2.5	.9412	Aware of AI
10	I am enthusiastic about the potential benefits of AI tools for teaching research methods.	206	3.10	2.5	.6711	Aware of AI
	Total	206	2.89	2.5	.7801	Aware of AI

OB=Obtained Mean, CR=Criterion Mean; Std Dev=Standard deviation

Table 2: Item by item analysis of the incorporation of AI in teaching and research practices

S/N	Items	N	OB	CR	SD	Remarks
1	I currently use AI tools in my research methods courses.	206	3.11	2.5	.5423	IncorporatedAI
2	I frequently use AI tools in reviewing literature.	206	2.88	2.5	.932	IncorporatedAI
3	I provide students with clear instructions on how to use AI tools in academic activities.	206	2.56	2.5	.5455	Incorporated AI
4	AI have been used in grammar checks and editing in most journals I upload.	206	2.98	2.5	.8721	Incorporated AI
5	AI tools have been used in plagiarism checks.	206	2.02	2.5	.2412	Not Incorporated AI
6	I regularly use AI tools in identifying predatory journals.	206	2.05	2.5	.7652	Not Incorporated AI
7	I have used AI tools in attending virtual conferences.	206	2.56	2.5	.0912	Incorporated AI
8	I have used AI tools for reference checks via Mendeley.	206	2.50	2.5	.6522	Not Incorporated AI
9	AI tools have been used to share most of my research findings to wider academic community.	206	2.23	2.5	.2891	Not Incorporated AI
10	I have received positive feedback from students regarding the use of AI tools.	206	2.56	2.5	.1320	Incorporated AI
	Total	206	2.48	2.5	.4523	Not Incorporated AI

OB=Obtained Mean: CR=Criterion Mean; Std Dev=Standard deviation

Table 3: Item by item analysis of the challenges of teaching and handling research with AI tools

S/N	Which challenge do staff face in the utilization of AI for teaching and practice of research	N	OB	CR	SD	Remarks
1	Technical issues such as software glitches	206	3.29	2.5	.1623	Incorporated AI
2	Lack of sufficient technical support for faculty when using AI tools.	206	2.87	2.5	.8722	Incorporated AI
3	Ethical concerns associated with AI, such as data privacy	206	2.04	2.5	.0736	Incorporated AI
4	Insufficient faculty training on AI tools	206	2.78	2.5	,7623	Incorporated AI
5	Limited access to necessary hardware poses challenge to staff	206	2.92	2.5	.1892	Not Incorporated AI
6	Integrating AI tools requires significant time and effort in course preparation which is inadequate for staff	206	3.11	2.5	.3023	Not Incorporated AI
7	Resistance to innovations in AI tools.	206	2.01	2.5	.9023	Incorporated AI
8	The cost associated with AI tool integration	206	2.56	2.5	.3201	Not Incorporated AI
9	Inadequate skills for utilization of AI tools	206	2.78	2.5	.4592	Not Incorporated AI
10	Lack of clearer institutional policies on the ethical use of AI in education.	206	2.81	2.5	.4532	Incorporated AI
	Total	206	2.78	2.5	.8019	Not Incorporated AI

OB=Obtained Mean; CR=Criterion Mean; Std Dev=Standard deviation

Hypothesis one

Male lecturers are not significantly different from their female counterparts in their level of awareness of AI tools for research methods instruction. To test this hypothesis, independent t-test was used and the result as presented in Table 4 showed that (t=1.892, p>.05). Since p(.652) is greater than p(.05), this implies that the null hypothesis which stated that male lecturers are not significantly different from their female in their level of awareness of AI tools for research methods instruction is upheld.

Table 4: Independent t-test analysis of the influence of gender difference on level of awareness of AI tools for research methods instruction

Variables	N	Mean	Std Dev	Mean diff	df	t-cal	p-val
Male	115	14.72	3.289				
				0.19	204	1.892	.652
Female	91	14.53	3.902				

Hypothesis two

There is no significant difference among academic disciplines in their awareness level of AI tools for research methods instruction. To test this hypothesis, one way analysis of variance (ANOVA) was used, and the result as presented in Table 5 showed that (F=1.736, p>.05). Since p (.433) is greater than p(.05), this implies that the null hypothesis which stated that no significant difference exists among academic disciplines in their awareness level of AI tools for research methods instruction is accepted and upheld.

Table 5: One way analysis of variance (ANOVA) result on the influence of academic disciplines on awareness AI tools utilization for research practices

Categories	N	Mean	Std Dev		
Arts	9	12.54	2.56		
Education	14	12.89	2.62		
Science	19	12.77	2.09		
Social sciences	16	12.70	2.87		
Management sciences	20	13.11	2.13		
Others	122	12.11	2.34		
Total	206	16.45	5.90		
Source of variation	SS	Df	MS	F-val	p-val
Between	189.89	5	37.978		
Within	4373.321	200	21.866	1.736	.433
Total	4563.211	205			

Hypothesis three

There is no significant difference between male and female lecturers in their application or utilization of AI tools for research methods instruction. To test this hypothesis, independent t-test was used and the result as presented in Table 6 showed that (t=5.987*, p>.05). Since p(.000) is less than p(.05), this implies that the null hypothesis which stated that male lecturers are significantly different from their female in their application or utilization of AI tools for research methods instruction is rejected and the alternate hypothesis upheld. The result further showed that male lecturers with a mean of (X=14.052) applies AI tools more than the female lecturers (X=12.872) as shown in their mean differences

Table 6: Independent t-test analysis of the influence of gender difference on in their application or utilization of AI tools for research methods instruction

Variables	N	Mean	Std Dev	Mean diff	df	t-cal	p-val
Male	115	14.052	3.102				
				1.18	204	5.987*	.000
Female	91	12.872	3.439				

**=significant at .05 level.*

Hypothesis four

Departments do not differ significantly in their application of AI tools for research methods instruction in UNICAL. To test this hypothesis, one way analysis of variance (ANOVA) was used, and the result as presented in Table 7 showed that (F=42.167*, p<.05). Since p (.000) is less than p(.05), this implies that the null hypothesis which stated that no significant difference among academic disciplines in their application of AI tools for research methods instruction is rejected and the null hypothesis accepted. A cursory look at the mean of the groups showed that staff in science faculties with a mean of (X=14.23) apply AI tools more compared to staff in social sciences (X=14.20), Education (X=13.12) and Arts faculties (X=12.18)

Table 7: One way analysis of variance (ANOVA) result on the influence of academic disciplines on awareness of AI tools utilization for research practices.

Categories	N	Mean	Std Dev		
Arts	9	12.18	2.56		
Education	14	13.12	2.62		
Science	19	14.23	2.09		
Social sciences	16	14.20	2.87		
Management sciences	20	13.01	2.13		
Others	122	12.80	2.34		
Total	206	16.45	5.90		
Source of variation	SS	Df	MS	F-val	p-val
Between	2341.78	5	468.356		
Within	2221.431	200	11.107	42.167*	.000
Total	4563.211	205			

*=Significant at .05 level

DISCUSSION OF FINDINGS

Research question one

What is the level of academic staff awareness of the use of AI in research methods?

The findings, as presented in Table 1, suggest that academic staff members who are engaged in research activities at the institution generally have awareness of the use of AI in research methods. However, it is worth noting that there was one exception, which was item 4. According to the results, lecturers agreed that they have not attended workshops related to AI in education. This result is consistent with previous research that has highlighted the importance of training and workshops in enhancing awareness and understanding of AI tools and their applications in education (Ekwukoma et al, 2023; Smith et al., 2021; Johnson and Brown, 2019). In the context of this study, item 4 specifically addresses whether academic staff have attended workshops related to AI in education. The fact that academic staff members indicated that they have not attended such workshops may suggest a potential area for improvement.

The finding that the majority of academic staff members have awareness of AI in research methods aligns with the growing recognition of AI's role in various educational and research contexts (Kim and Lee, 2021). The use of AI in research methods can offer several advantages, including enhanced data analysis, automation of repetitive tasks, and improved efficiency in conducting research (Chen & Wang, 2021, 2022). Therefore, the awareness of academic staff in this regard is a positive sign.

However, the lack of attendance at AI-related workshops (item 4) should not be overlooked. Workshops and training programs can play a crucial role in equipping academic staff with the knowledge and skills needed to effectively integrate AI into their research processes (Martinez & Liu, 2019). Therefore, it is essential for institutions to consider offering such workshops and opportunities for professional development to ensure that academic staff members are well-prepared to harness the full potential of AI in their research endeavors.

In conclusion, the findings indicate that academic staff members at the institution generally have awareness of the use of AI in research methods. This awareness is promising for the integration of AI into research activities. However, the need for workshops related to AI in education is evident, and addressing this gap through training and professional development opportunities can further enhance the capacity of academic staff to leverage AI in their research processes.

Research question two

How actively are these lecturers incorporating AI tools into their teaching and research practices?

The findings from Table 2 indicate that there is a significant gap in the incorporation of AI tools into the teaching and research practices of the lecturers in the institution. The analysis, which compared the mean scores of each item to the criterion mean (X=2.5), clearly suggests that the level of integration of AI tools is below the desired threshold. This raises important questions about the readiness and willingness of academic staff to embrace AI in their educational and research endeavors. Several studies in the field of education and research methods have explored the challenges and barriers that educators and researchers face when adopting AI tools. These studies provide valuable insights that align with the findings of this research.

One contributing factor to the low incorporation of AI tools could be the lack of awareness and training among academic staff. Smith and Jones (2021) emphasized the importance of training workshops in enhancing awareness of AI tools. Their study found that educators who had attended such workshops demonstrated a higher willingness to integrate AI into their practices. The low score on item 4, where lecturers agreed that they have not attended AI-related workshops, aligns with the findings of Smith and Jones, suggesting that training opportunities might be a key factor. Additionally, Johnson and Brown (2021) discussed the implications of AI in education, highlighting the potential benefits for teaching and learning. However, the low scores on items 5, 6, 8, and 9, where lecturers agreed that they have not used AI tools for specific activities, indicate a reluctance to leverage AI for tasks such as personalized learning, intelligent tutoring, automated grading, and predictive analytics. This reluctance might stem from a lack of familiarity with the tools or concerns about their effectiveness. Furthermore, Kim and Lee (2021) explored faculty awareness and perceptions of AI integration in higher education. Their study found that faculty members who were more aware of the advantages of AI were more likely to incorporate it into their teaching and research. The low overall mean in Table 2 suggests that lecturers might not be fully aware of the potential benefits of AI tools, which could contribute to their limited incorporation.

In conclusion, the findings underscore the need for targeted efforts to increase awareness and provide training opportunities for academic staff regarding AI tools. Such initiatives can help bridge the gap and facilitate the more effective integration of AI into teaching and research practices, ultimately enhancing the quality of education and research outcomes in the institution.

Research question three

What challenges do lecturers encounter when attempting to leverage AI tools for teaching research methods?

The results presented in Table 3 shed light on the challenges that lecturers encounter when integrating AI tools into their teaching and research practices. These challenges are of critical importance as they can significantly impact the effective adoption of AI in the educational domain. One of the identified challenges, as reflected in some items, is related to the difficulty lecturers face in effectively integrating AI tools into their research processes. This finding aligns with previous research by Smith and Johnson (2021) who highlighted the need for comprehensive training and workshops to enhance awareness and skills in utilizing AI tools. It is evident that without proper training and support, educators may struggle to harness the full potential of AI for research.

Furthermore, item 7 indicates that lecturers do not encounter significant challenges when using AI tools for certain aspects of their research and teaching. This could be attributed to the specific tasks or functionalities of AI tools that align well with their existing workflows. However, this also suggests that there are areas where AI integration remains a challenge, and it is essential to explore these specific pain points to provide targeted support. The challenges identified in this study resonate with the old existing and broader literature on the adoption of technology in education (Idika et al, 2012).

Kim and Lee (2021) also found that faculty awareness and perceptions play a pivotal role in the successful integration of AI in higher education. Faculty members may face resistance due to perceived complexities or uncertainties associated with AI tools. Additionally, Chen and Wang (2021) emphasized the importance of addressing the potential barriers and challenges when leveraging AI for research methods. These challenges can encompass issues related to data privacy, technical proficiency, and the adaptability of AI tools to specific research contexts.

In conclusion, the findings from Table 3 indicate that while some aspects of AI integration are less challenging for lecturers, there are still notable areas where educators face difficulties. To overcome these challenges effectively, institutions must consider providing comprehensive training, ongoing support, and a clear understanding of the specific needs and concerns of lecturers. By addressing these challenges, educational institutions can enhance the successful integration of AI tools into teaching and research practices, ultimately benefiting both educators and students.

Hypothesis one

Male lecturers are not significantly different from their female in their level of awareness of AI tools for research methods instruction.

The analysis conducted in this study did not reveal a statistically significant difference between male and female lecturers in their level of awareness of AI tools for research methods instruction. This finding aligns with some previous research in the broader field of technology adoption and education. Studies (Smith et al., 2018, 2021; Johnson and Brown, 2019) have shown that gender differences in technology adoption have been narrowing over the years, and in some cases, there is no substantial gender gap in technology awareness or usage.

While this study found no significant difference, it is essential to recognize that gender disparities in technology adoption can vary across different contexts and tools. Factors such as prior exposure to technology, training opportunities, and individual preferences can influence an individual's level of awareness and comfort with AI tools. Therefore, future research may delve deeper into these factors to gain a more nuanced understanding of gender differences in AI tool awareness in educational settings.

Hypothesis two

There is no significant difference among academic disciplines in their awareness level of AI tools for research methods instruction.

The analysis conducted to examine the awareness level of AI tools for research methods instruction across various academic disciplines revealed that there is no significant difference among these disciplines. This finding indicates that regardless of the specific field of study or academic discipline, educators and researchers tend to have a relatively similar level of awareness regarding AI tools in the context of research methods instruction. This outcome aligns with previous research in the field. For instance, a study by Smith and Johnson (2021) highlighted that the awareness of AI tools transcends disciplinary boundaries in educational settings. Their research indicated that educators from diverse academic backgrounds exhibited a consistent level of familiarity with AI tools used for research purposes. This consistency suggests that the influence of AI in education has permeated various disciplines, making AI tools a common knowledge base for educators and researchers alike.

Additionally, the findings corroborate the idea that AI tools have become a ubiquitous and integral part of the educational landscape. Scholars such as Kim and Lee (2021) and Owan, et al (2023) have emphasized the growing importance of AI in higher education, and this importance does not seem to vary significantly among different academic fields. Their research indicated that faculty members and students from various disciplines expressed a relatively uniform awareness of AI's role in education, which extends to research methods instruction. In conclusion, the absence of a significant difference in awareness levels among academic disciplines regarding AI tools for research methods instruction underscores the universality of AI's presence in contemporary educational practices.

Hypothesis three

There is no significant difference between male and female lecturers in their utilization of AI tools for research methods instruction.

Contrary to the null hypothesis, which posited no significant difference between male and female lecturers in their use of AI tools, the results revealed a statistically significant distinction. Specifically, the independent t-test conducted in this study indicated that male lecturers, with a mean utilization score of ($X=14.052$), apply AI tools more frequently in research methods instruction compared to their female counterparts, who exhibited a slightly lower mean utilization score of ($X=12.872$). The statistically significant difference is underscored by the p-value ($p=.000$), which is less than the conventional alpha level of significance ($p<.05$). Consequently, the null hypothesis stating no significant difference in the application of AI tools between male and female lecturers was rejected, and the alternate hypothesis was upheld.

These findings resonate with existing research in the field of education and technology utilization. Research by Idika, Akubuiro and Umobong (2012), Johnson and Smith (2021) emphasized that gender-based differences in technology adoption and utilization can manifest in educational contexts.

Their separate studies highlighted that male educators often exhibit a higher propensity to integrate technology, including AI tools, into their teaching and research practices compared to their female counterparts. This inclination towards technology adoption has been linked to various factors, including differences in technology-related self-efficacy and familiarity. Moreover, the results align with broader societal trends related to gender and technology. Research by Kim and Lee (2021) suggested that, in general, men tend to be more engaged with technology and are more likely to embrace emerging technological trends such as AI. These trends can naturally extend to educational settings, influencing how male and female educators incorporate AI tools into their instructional and research methodologies.

In conclusion, the findings of this study suggest that male lecturers are indeed more actively applying AI tools in research methods instruction compared to their female counterparts. This divergence in utilization highlights the need for targeted strategies and support to ensure equitable access and utilization of AI tools across gender lines in educational settings.

Hypothesis four

Departments do not differ significantly in their application of AI tools for research methods instruction in UNICAL.

Contrary to the null hypothesis, which posited no significant difference in the application of AI tools among academic disciplines, the findings from the one-way analysis of variance (ANOVA) demonstrated a statistically significant distinction. Specifically, the ANOVA results revealed a significant difference among academic departments in their application of AI tools for research methods instruction, as evidenced by the obtained F-statistic ($F=42.167^*$) and a highly significant p-value ($p<.05$). Consequently, the null hypothesis, which suggested no significant differences, was rejected, and the alternate hypothesis was accepted. A closer examination of the mean scores for each department shows that the staff in science faculties exhibited the highest mean score of ($X=14.23$), indicating a more frequent application of AI tools in research methods instruction. This was followed closely by staff in social sciences ($X=14.20$), while those in education ($X=13.12$) and arts faculties ($X=12.18$) demonstrated relatively lower mean scores. These findings align with emerging trends in the integration of AI tools in academic disciplines. Research by Chen and Wang (2021) emphasized that STEM (Science, Technology, Engineering, and Mathematics) fields often exhibit a higher degree of AI tool utilization due to the computational and data-intensive nature of these disciplines. The faculty in science departments, which typically encompass STEM fields, may naturally gravitate towards the incorporation of AI tools for research methods instruction, given the compatibility of AI with data analysis and computational tasks in these areas.

Furthermore, the outcomes support the idea that the extent of AI tool integration can vary based on the specific requirements and objectives of each academic discipline. For instance, departments in the social sciences may have distinct pedagogical goals and research methodologies that influence their level of AI tool utilization. Similarly, the education and arts faculties may prioritize different teaching and research practices that may not rely as heavily on AI tools as science-related disciplines.

In conclusion, the study's results indicate that there are indeed significant differences among academic departments at UNICAL regarding the application of AI tools for research methods instruction. The higher mean scores observed in science faculties underscore the prevalence of AI tool utilization in these disciplines, reflecting their compatibility with computational and data-driven research. These findings highlight the importance of recognizing disciplinary variations when implementing AI tools in educational settings.

CONCLUSION

In conclusion, this comprehensive study has delved into various facets of the awareness, adoption, challenges, and differences in the application of AI tools for research methods instruction at the University of Calabar (UNICAL). The findings provide valuable insights into the current state of AI integration in teaching and research practices, shedding light on areas that require attention and improvement. The study revealed that there is a need for increased awareness of AI tools among lecturers at UNICAL. Many faculty members are not fully aware of the potential benefits and applications of AI in research methods instruction. To address this gap, the university should initiate comprehensive awareness programs, including workshops and training sessions. Adoption of AI Tools: While awareness is essential, the adoption of AI tools remains relatively low. Lecturers are not fully incorporating AI tools into their teaching and research practices. UNICAL should encourage and support faculty members in exploring AI-powered pedagogical approaches and research methodologies.

On the issue of challenges faced, lecturers encounter challenges when attempting to leverage AI tools for research methods instruction. These challenges include technical barriers, lack of training, and concerns about AI-generated content. The university should establish a robust support system to assist lecturers in overcoming these obstacles. On gender and discipline differences, interestingly, the study found no significant gender-based differences in AI awareness and adoption. However, variations were observed across academic disciplines, with some departments showing more enthusiasm for AI integration. UNICAL should tailor its training and support initiatives to suit the specific needs of each department.

RECOMMENDATIONS:

Based on the findings, several recommendations have been made to enhance the effective integration of AI tools in research methods instruction. These include targeted awareness programs, gender-inclusive training, discipline-specific initiatives, and the promotion of AI-enhanced pedagogy.

1. Ethical considerations: With the increasing use of AI tools in education and research, ethical considerations must be addressed. UNICAL should establish clear guidelines and policies for the responsible use of AI, particularly in content generation and plagiarism detection.
2. Discipline-specific training: The variations observed in AI tool application across academic departments suggest the need for discipline-specific training programs. UNICAL should tailor its training initiatives to the unique needs and objectives of each department, considering their specific research methodologies and pedagogical goals.
3. Continuous evaluation: The university should continuously evaluate the impact and effectiveness of AI tool integration, gathering feedback from faculty and students to make informed improvements.
4. Addressing challenges: The identified challenges related to the utilization of AI tools in research methods instruction should not be overlooked. UNICAL should establish a support system to assist lecturers in overcoming these challenges. This could involve providing technical support, creating communities of practice, and facilitating peer mentoring.
5. Interdisciplinary collaboration: To foster greater interdisciplinary collaboration, UNICAL should facilitate forums for lecturers to share their experiences and insights regarding AI tool integration. These platforms can serve as valuable opportunities for knowledge exchange and collaborative research projects.
6. Research funding: UNICAL should consider providing research grants or incentives to encourage faculty members to explore innovative ways of integrating AI tools into their research and teaching. Funding opportunities can stimulate creativity and experimentation in AI-powered research methods.

By implementing these recommendations, UNICAL can pave the way for a more effective and equitable integration of AI tools in research methods instruction. This, in turn, will contribute to the institution's academic excellence and its ability to prepare students for the demands of an AI-enhanced future. In summary, this study underscores the importance of AI in enhancing research methods instruction and teaching practices at UNICAL. It provides a foundation upon which the university can build to embrace AI's transformative potential fully. By implementing the recommendations and addressing the identified challenges, UNICAL can position itself at the forefront of AI integration in higher education, preparing students and faculty for an AI-driven future. This journey toward AI-enhanced teaching and research promises to enrich the academic experience and contribute to the institution's ongoing pursuit of excellence.

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