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Assessment of Lecturers' Utilization of Artificial Intelligence Tools for Effective Teaching and Research Methods in a Nigerian University.

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ABSTRACT

This research examined the application of artificial intelligence (AI) tools in teaching and research by lecturers in Nigerian Institutions. The study was guided by two research questions and tested two null hypotheses at a significance level of 0.05. A descriptive survey research design was employed, targeting a population of 546 lecturers, from which a sample of 150 was drawn using a purposive random sampling technique, representing 10% of the total lecturer population. Data was collected through a structured questionnaire, "Assessment of Lecturers' Utilization of AI Tools for Effective Teaching of Research Methods Questionnaire (ALUAITETRMQ)", which was validated by three research experts. The reliability of the instrument was assessed using the Cronbach Alpha method, yielding a reliability index of 0.81, indicating that the instrument was dependable. The research questions were analyzed using mean ratings, standard deviation, and t-test statistics. The results indicated a relatively low level of AI tool adoption among lecturers at Nigerian University for teaching and research purposes. Recommendations include the organization of workshops by the University Management, the promotion of interdisciplinary collaborations, and the potential establishment of an AI Center or Hub to provide centralized support and facilitate information dissemination.

Keywords: Artificial Intelligence, Nigerian university, Effective Teaching, Research Tools, Lecturers

Introduction

The emergence of Artificial Intelligence (AI) has initiated a transformative period of innovation across multiple sectors, particularly in education, which has been significantly affected (Kim and Lee, 2021). As educational institutions endeavor to address the varied and changing requirements of students in an increasingly dynamic environment, AI presents itself as a formidable instrument with the potential to reshape conventional educational methodologies (Wu and Chen, 2021). The impact of artificial intelligence on education is vast and complex, encompassing personalized learning experiences, intelligent tutoring systems, improved administrative efficiency, and increased student engagement. The capacity of artificial intelligence to transform education is significant, offering personalized teaching strategies, smart tutoring systems, and effective management resources that meet diverse student needs and enhance pedagogical approaches. Nevertheless, this technological progress prompts critical considerations regarding fairness, privacy, and the role of human teachers. This technological transformation raises important issues related to ethics, privacy, and equity (Ukeh et al., 2020). As we explore the influence of AI on the educational landscape, it is clear that although AI offers the potential for substantial progress and enhancements, it also requires a careful strategy to optimize its advantages while addressing potential obstacles.

In this context, the application of AI-driven tools in educational and research environments signifies the strategic and effective use of these technological innovations. This encompasses the enhancement of teaching strategies, the optimization of research methodologies, and the overall elevation of educational quality (Kim and Lee, 2021). The importance of employing these AI-driven tools cannot be overstated, as they facilitate personalization; for example, Intelligent Tutoring Systems (ITS) offer tailored learning experiences by adjusting to the unique requirements of each student. This individualized approach significantly boosts student involvement and understanding. Furthermore, these tools enhance efficiency in grading and assessment; AI-powered automated grading systems simplify the evaluation process for educators, saving time while ensuring fairness and consistency in assessments. Additionally, in the realm of research, they provide sophisticated data analytics.

A variety of AI-driven tools have been created to address the specific requirements of teaching and research within the academic environment (Wu and Chen, 2021). These tools leverage sophisticated algorithms and data processing capabilities to enhance efficiency, deliver customized learning experiences, and generate insightful data for research activities. Examples of such AI-driven tools include Intelligent Tutoring Systems (ITS), which adapt to the unique learning needs of students by providing tailored feedback and support, thereby facilitating their academic development. For educators, ITS serves as an effective resource for customizing instructional materials to meet the diverse needs of students (Chen and Patel, 2021). Additionally, Plagiarism Detection Software plays a vital role in upholding academic integrity by utilizing advanced algorithms to compare submitted works against extensive databases, thereby identifying potential instances of plagiarism and ensuring the credibility of research outputs (Johnson and Smith, 2020).

Furthermore, Automated Grading Systems, powered by AI, offer a streamlined approach to evaluating assignments, examinations, and coursework. These systems not only conserve time for educators but also ensure consistent and impartial assessments, promoting equity in the evaluation process (Martinez and Liu, 2020).

Ukeh *et al*. (2020) noted that, despite the acknowledged significance of various AI-based tools, it appears that lecturers at Nigerian universities have not fully adopted these technologies. Nonetheless, it is important to note that without empirical and statistical evidence, one cannot definitively conclude that the lecturers at Nigerian University are not effectively utilizing AI-based tools for teaching and research. Therefore, the primary objective of this study is to determine the extent to which lecturers at Ahmadu Bello University, Zaria, Kaduna State, Nigeria, employ AI-based tools in their teaching and research activities. This leads to the selection of the topic titled 'Utilization of Artificial Intelligence-Based Tools for Teaching and Research Among Lecturers at th. The aim of this research is to uncover the current state of AI adoption, examine the tools available for teaching and research, and identify the significant barriers that impede their widespread use.

Theoretical Framework

To elucidate the connection between lecturers' understanding of AI tools and the efficacy of teaching research methods, which is the primary focus of this study, the review employs the Technology Acceptance Model (TAM) as its theoretical framework (Samar *et al*.,2020). Developed by Davis, Bagozzi, and Warshaw in 1989, TAM asserts that the perceived ease of use and perceived usefulness of technology significantly affect individuals' intentions to adopt it. In the educational context of AI tools, lecturers' views on the simplicity of integrating AI into their teaching methodologies and the perceived benefits of AI in enhancing research methods instruction are pivotal to their willingness to embrace these technologies. The constructs of Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) are fundamental to TAM (Ukeh *et al*., 2020). PEOU denotes the degree to which an individual perceives that utilizing a specific technology is straightforward and uncomplicated, while PU relates to the extent to which an individual believes that employing a particular technology will improve their job performance or productivity. In the realm of research methods instruction, lecturers' assessments of how easily they can incorporate AI tools and the perceived advantages of AI in refining their teaching practices are critical determinants influencing their intentions to adopt these technologies. Ukeh & Nwankwo (2023) provided that, the theoretical foundation by TAM also offers a coherent framework for comprehending the relationship between lecturers' awareness of AI tools and their effectiveness in teaching research methods (Yu and Yi, 2020). For example, lecturers' awareness of the potential benefits of AI tools—such as the ability to customize learning experiences and adapt content to meet individual students' needs—may significantly affect the effectiveness with which they conduct research methods instruction and improve students' overall academic performance in the course. This theory provides valuable insights into how perceptions of ease and usefulness can shape the adoption of technology in educational settings.

Statement of the Problem

Despite the significant advantages linked to the use of artificial intelligence in educational settings, educators at Nigerian universities have not yet fully embraced AI in their teaching practices. This reluctance may stem from a lack of awareness regarding the intelligent tools, applications, and software systems available for educational purposes. Factors such as lecturers' attitudes, insufficient self-efficacy, limited technical expertise, resistance to change, and inadequate readiness to implement AI in education contribute to this situation (Pokrivcakova, 2019). Consequently, it is essential to evaluate the level of utilizing AI in teaching and for reseach method among lecturers regarding the role of artificial intelligence in education within Nigerian universities.

Furthermore, research has been undertaken to assess the utilization of AI in teaching and for research method by teachers and lecturers regarding AI tools in: e-learning, electronic resources, instructional media, virtual learning, Turnitin software, machine learning, mobile learning, nanotechnology, and internet services and resources. However, there has been a lack of studies focusing on lecturers' utilization of artificial intelligence in the educational context. Therefore, this study aims to address this gap by examining the level of utilizations of artificial intelligence among university lecturers in a Nigerian university.

The research outlined the following objectives:

1. To determine the level to which artificial intelligence tools are utilized for effective teaching

2. To determine the level to which artificial intelligence tools are utilized for research method

Research Questions

The investigation provided answers to the following questions:

1. To what level are lecturers at the Ahmadu Bello University utilized AI tools for effective teaching?

2. To what level are lecturers at the University utilized AI tools for research?

Hypotheses

The following null hypotheses guided this study and were tested at .05 level of significance:

1. Male lecturers are not significantly different from their female counterparts in their level to which artificial intelligence tools are utilized for teaching

2. There is no significant difference between the mean ratings of male and female lecturers in their level to which artificial intelligence tools are utilized for research

Research Method

The research utilized a descriptive survey methodology, which aims to depict the current attributes of individuals, groups, or situations through factual data. The Nigerian university selected for this study is the Ahmadu Bello University Zaria, Kaduna Sate. The target population comprised 546 lecturers from the institution. A sample of 150 lecturers was selected using a purposive random sampling method. Data collection was conducted via a structured questionnaire named "Assessment of Lecturers' Utilization of AI Tools for Effective Teaching of Research Methods Questionnaire (ALUAITETRMQ)". The instrument underwent face validation by three experts, yielding reliability coefficients of 0.79 and 0.83 for clusters 1 and 2, respectively, with an overall reliability index of 0.81, confirming its reliability and appropriateness for the study. Out of the 150 questionnaires distributed, 131 were completed and returned, resulting in a return rate of 92.25%. The research questions were analyzed using mean and standard deviation, with a decision rule based on the real limit of numbers. The mean ratings were assigned numerical values as follows:

Very Greater Level (VGL), Greater Level (GL), Low Level (LL), Very Low Level (VLL), VGL = 3.50-4.00; GL = 2.50-3.49; LL = 1.50-2.49; VLL = 0.00-1.49. An independent t-test was employed to evaluate the null hypotheses at a significance level of 0.05. The hypotheses were interpreted based on the significance (sig.) values derived from the SPSS output, with null hypotheses being rejected if the calculated sig. values were below 0.05, otherwise they were retained.

Data Analysis and Results Presentation

Research Question 1: To what level are lecturers at the Ahmadu Bello University utilized AI tools teaching?

Table 1: Mean ratings of lecturers on the level to which lecturers utilized artificial intelligence tools for teaching

S/N	Utilization of AI tools by Lecturers for effective teaching:	Mean	SD	Remark
1.	Tutoring Systems.	1.04	.80	VLL
2.	Adaptive Learning Platforms.	0.94	.78	VLL
3.	Virtual Reality.	0.99	.84	VLL
4.	Chatbots.	1.03	.82	VLL
5.	Natural Language Processing.	0.82	.80	VLL
6.	Intelligent Creation Tools.	1.03	.98	VLL
7.	Data Analytics.	1.11	.96	VLL
8.	Language Learning.	1.02	.94	VLL
	Cluster Mean/SD	**1.00**	**.87**	**VLL**

Table 1 indicates that the average scores of the lecturers varied between 0.82 and 1.12, with a cluster mean of 1.00 and standard deviations of 0.87. This suggests that the use of artificial intelligence tools for teaching by lecturers at Ahmadu Bello University, Zaria Kaduna State is significantly limited.

Research Question 2: To what level are lecturers at the University, utilized AI tools for research?

Table 2: Mean ratings of lecturers on the level to which lecturers utilized artificial intelligence tools for research.

S/N	Utilization of AI tools by Lecturers for research:	Mean	SD	Remark
9.	Data mining.	1.52	.86	LL
10.	Recommendation System	1.13	.93	VLL
11.	Visualization Content.	1.36	.85	VLL
12.	Literature review.	2.02	.82	LL

13.	Research automation.	1.52	.91	LL
14.	Modelling	1.03	.84	VLL
15.	Research Assistants.	1.36	.94	VLL
	Cluster Mean/SD	**1.42**	**.88**	**VLL**

Table 2 indicates that the average scores of the lecturers varied between 1.02 and 2.02, resulting in a cluster mean of 1.42 and standard deviations of 0.88. This suggests that the use of artificial intelligence tools for research by lecturers at Ahmadu Bello University, Zaria, is notably low.

Hypothesis 1: Male lecturers are not significantly different from their female counterparts in their level to which artificial intelligence tools are utilized for teaching

Table 3: Summary of t-test analysis of the mean ratings of male and female lecturers on the level to which artificial intelligence tools are utilized for teaching

Group	**n**	**x**	**SD**	**df**	**Pvalue**	**Decision**
						Not to reject
Lecturers	131	1.00	.87	129	.085	

According to the data presented in Table 2, with 129 degrees of freedom, the p-value was .085, which surpasses the established significance threshold of 0.05 for this research. Consequently, the null hypothesis was upheld, indicating that there was no statistically significant difference in the average ratings of lecturers regarding the degree of utilization of artificial intelligence-based tools in teaching.

Hypothesis 2: There is no significant difference between the mean ratings of male and female lecturers in their level to which artificial intelligence tools are utilized for research

Table 4: Summary of t-test analysis of the mean ratings of lecturers on the level to which artificial intelligence tools are utilized for research

Group	**n**	**x**	**SD**	**df**	**Pvalue**	**Decision**
						Not to reject
Lecturers	131	1.42	.88	129	.084	

According to the results shown in Table 4, it is evident that with 129 degrees of freedom, the p-value was .084, which surpasses the established significance threshold of 0.05 for this research. As a result, the null hypothesis remains unchallenged, suggesting that no statistically significant difference was identified in the average ratings of lecturers concerning the use of artificial intelligence tools for research.

Discussion

The results of the research indicated that the level of utilization of artificial intelligence tools for instructional purposes among departments, faculties, located in Ahmadu Bello University Zaria, Kaduna state, is significantly limited. This observation sheds light on the current landscape of technology integration in educational practices at the institution, highlighting the necessity for further investigation and the development of strategies aimed at improving the incorporation of AI tools in the teaching process. This finding aligns with the conclusions drawn by (Guan and Jiang, 2020) who noted that the application of artificial intelligence tools in educational settings remains at a notably low level.

The results of the study indicated that the use of artificial intelligence tools for research among department, faculty members at the Nigerian University is significantly limited. To improve the adoption of AI tools for research purposes, a comprehensive strategy that includes education, training, enhancement of infrastructure, and institutional backing may be necessary. Fostering an innovative culture and supplying essential resources could facilitate the incorporation of AI into academic research. This finding aligns with the observations made by (Okechukwu and Ukeh, 2022) who noted that the application of artificial intelligence tools in research remains at a notably low level.

Conclusion

The results of this research reveal a significant lack of utilization of artificial intelligence tools for educational and research activities among departments and faculties members at Ahmadu Bello University Zaria, Kaduna state. This finding highlights a possible deficiency in the integration and acceptance of such technologies within the academic setting. It may be necessary to undertake additional initiatives to foster the effective use of artificial intelligence in order to improve teaching and research methodologies in these institutions. Furthermore, the adoption of AI tools in educational and research contexts signifies a major transformation in higher education. Faculty members, recognizing the advantages of AI, are utilizing these technologies to enrich the educational experience and optimize research workflows. As technological advancements persist, continuous investigation and collaboration will be

essential to fully harness the advantages of AI in the realm of education. Artificial Intelligence enhances individualized and group learning experiences and ensures equitable access to diverse forms of high-quality education, transcending traditional barriers. It also fosters distance, open, online, and digital educational modalities. In the foreseeable future, AI is poised to support a genuinely lifelong learning framework for individuals and group of people globally. While AI cannot supplant human educators, it can significantly contribute to the teaching and learning processes

Recommendations

It is imperative for government and school administrators to acknowledge the necessity of equipping higher education institutions with up-to-date and suitable AI tools to improve the quality of teaching and learning.

Students should be encouraged to engage in collaborative research to increase their familiarity with and application of AI tools, thereby enhancing their research capabilities.

Universities management should obtain institutional licenses for AI tools to guarantee access for members of department and faculties students

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