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# Application of Artificial Intelligence in Teaching and Research for Educational Goals Attainment in Public Universities in Rivers State

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## Abstract

*The study examined Application of Artificial Intelligence in Teaching and Research for Educational Goals attainment in Public Universities in Rivers State. Two research questions and two hypotheses were drawn. The study adopted a descriptive survey design with a population of 12,543 lecturers and students, comprising 3,762 lecturers and 8,780 students in public universities in Rivers State, which include University of Port Harcourt, Rivers State University and Ignatius Ajuru University. Taro Yamane formular was used to determine the sample size used for the study 373 respondents comprising of 110 lecturers and 263 students. The instrument used for data collection was a structured questionnaire titled "Application of Artificial Intelligence in Teaching and Research for Educational Goals attainment in Public Universities in Rivers State Questionnaire". The instrument was validated by two experts in the field of Measurement and Evaluation in Rivers State University. The reliability of the instrument was determined using Cronbach Alpha method. A cumulative reliability index of 0.89 was obtained. The mean and standard deviation statistics were used to answer the research questions. The findings of the study revealed that, the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities and the use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities. Based on the findings of the study, it was recommended among others that, to fully harness the potential of AI, university administrators should implement regular training programs for faculty members to enhance their knowledge and skills in using AI technologies. This will ensure that lecturers are capable of integrating AI-based teaching methodologies and tools into their curricula, as well as conducting AI-driven research.*

**Keywords:** Artificial Intelligence, Education Goals, Lecturers, Students, Teaching and Research, Universities.

## Introduction

The advent of Artificial Intelligence (AI) has revolutionized various sectors globally, and education is no exception. In public universities, particularly in Rivers State, Nigeria, the integration of AI in teaching and research has the potential to enhance educational goals and improve academic outcomes. AI technologies are rapidly transforming the traditional educational landscape, offering innovative solutions for personalized learning, efficient

research methods, and improved administrative processes. As public universities strive to meet the increasing demand for quality education, AI has emerged as a key enabler in achieving these goals (Ogunode, & Gregory, 2023). This introduction aims to explore the applications of AI in teaching and research within the context of Rivers State's public universities, with a focus on how AI can contribute to educational development and goal attainment.

Artificial Intelligence (AI) in the context of teaching and research refers to the integration of intelligent systems, tools, and algorithms to enhance educational practices, facilitate learning, and support academic research in public universities (Ogunode, Agbade, & Bassey, 2023). AI technologies such as machine learning, natural language processing, and data analytics are utilized to optimize teaching methodologies, personalize learning experiences, and accelerate scholarly research. These AI-driven innovations are designed to address educational challenges, improve student outcomes, and contribute to the achievement of institutional educational goals.

In teaching, AI enables the creation of adaptive learning systems that tailor content and instructional strategies to meet individual student needs. For example, AI can analyze students' learning patterns, predict academic challenges, and offer personalized interventions, such as intelligent tutoring systems or recommendation engines that suggest relevant learning resources (Zawacki-Richter et al., 2019). AI-powered platforms can also automate administrative tasks, such as grading and providing feedback, allowing instructors to focus more on interactive and engaging aspects of teaching (Holmes et al., 2019).

AI's role in research is equally transformative. It enables researchers to process and analyze vast amounts of data, which can uncover new insights, improve decision-making, and streamline research workflows. In public universities, AI technologies are being utilized to support fields such as computational biology, social sciences, and engineering, accelerating discoveries and improving research quality. For instance, AI can automate data analysis in large-scale studies, thus significantly reducing the time and resources required to derive meaningful conclusions. Additionally, AI aids in the development of sophisticated models and simulations, which are crucial in fields such as climate change research, medical diagnostics, and policy analysis (Sarma et al., 2020).

The adoption of AI in public universities further supports institutional educational goals by fostering greater accessibility, inclusivity, and equity in learning. AI can provide real-time support to students with disabilities through tools like voice recognition, text-to-speech, and

visual recognition systems. Moreover, AI-powered platforms can ensure that learning content is accessible to students from diverse linguistic and cultural backgrounds, promoting a more globalized educational experience (Woolf et al., 2021).

AI can enhance teaching by providing personalized learning experiences, catering to the diverse needs of students. Machine learning algorithms, natural language processing, and intelligent tutoring systems can analyze students' learning patterns and adapt content to their individual pace and level of understanding. For instance, platforms like chatbots can answer student queries promptly, while AI-driven systems like adaptive learning platforms can create customized lessons, making learning more interactive and engaging (Li, 2023). These technologies can especially benefit students in Rivers State's public universities by addressing the challenges of overcrowded classrooms and limited access to quality instructional materials. Personalized learning has been shown to improve student engagement, retention, and academic performance, aligning with the educational goals of improving student outcomes and reducing dropout rates (Adedoyin & Soykan, 2020).

In addition to teaching, AI plays a crucial role in research, facilitating data analysis, discovery, and innovation. AI-powered tools such as machine learning models, predictive analytics, and data mining techniques enable researchers to process large datasets quickly, uncover hidden patterns, and make data-driven predictions. In the context of public universities in Rivers State, where access to research funding and resources may be limited, AI can help optimize research productivity by automating repetitive tasks and enhancing collaboration. AI-driven research tools can also assist in academic writing, citation management, and even identifying gaps in existing literature, streamlining the research process (Elakkiya, 2021). Moreover, AI technologies can bridge the gap between theoretical knowledge and practical applications by fostering interdisciplinary research, which is essential for addressing real-world problems in the local and global contexts.

Furthermore, AI can improve administrative processes in public universities by automating routine tasks such as admissions, scheduling, grading, and student support services. This leads to a more efficient use of resources and a more effective learning environment. AI-based analytics can also provide insights into institutional performance, helping university administrators to make informed decisions about resource allocation and policy formulation. With the growing demand for higher education in Rivers State, these improvements can help

universities manage increasing student populations and enhance the overall quality of education (Akpan, 2022).

The application of AI in public universities in Rivers State holds significant promise for achieving educational goals. By enhancing teaching methods, improving research capabilities, and streamlining administrative functions, AI can help address the challenges faced by these institutions, contributing to the attainment of educational goals such as improved access, quality, and relevance of education. However, while AI promises significant improvements in education and research, it also raises critical issues around ethics, data privacy, and the potential for exacerbating inequality. Therefore, its implementation must be carefully managed, ensuring that AI systems are transparent, fair, and accountable (Binns, 2018). Public universities must navigate these challenges by establishing appropriate governance frameworks and ensuring that AI's benefits are equitably distributed across all academic disciplines and student populations. However, successful implementation requires strategic planning, investment in infrastructure, and training for both educators and students to fully harness the potential of AI technologies.

## Statement of the Problem

The application of Artificial Intelligence (AI) in teaching and research holds significant potential to transform educational practices and academic inquiry in public universities. However, several challenges hinder the effective integration of AI in achieving educational goals. These challenges encompass technical, ethical, and institutional issues that require careful consideration and mitigation strategies. One of the primary challenges in applying AI in public universities is ensuring data privacy and security. AI systems rely on large amounts of student data, such as learning behaviours, academic performance, and personal information, to deliver personalized learning experiences and insights for research. However, this data can be vulnerable to breaches, misuse, or unethical handling, posing significant risks to students' and researchers' privacy (Pardo & Siemens, 2014). In many jurisdictions, including public universities, stringent data protection regulations such as the General Data Protection Regulation (GDPR) must be adhered to, making it difficult to balance the need for data access with privacy concerns (Binns, 2018).

Another major challenge is the risk of bias and inequity inherent in AI algorithms. AI systems are often trained on historical data, which can perpetuate existing biases related to gender, race, socio-economic status, and other factors. In an educational setting, this can lead to discriminatory outcomes, where certain groups of students may not receive the same level of

support or access to opportunities. For instance, an AI algorithm designed to predict student success might disproportionately disadvantage students from marginalized communities if the training data reflects societal inequalities (O'Neil, 2016). Ensuring fairness and mitigating bias in AI systems is a critical challenge for public universities to address, requiring careful scrutiny of the data used and the algorithms developed. The effective implementation of AI in universities requires substantial technological infrastructure and expertise. Many public universities, especially those in developing regions or with limited funding, may lack the necessary resources to support sophisticated AI systems. This includes hardware like high-performance computing resources and the software platforms needed to run AI applications. Additionally, there is a shortage of faculty members and technical staff with the expertise to develop, implement, and maintain AI-based solutions (Brynjolfsson & McAfee, 2017). Without these resources and skilled personnel, universities may struggle to deploy AI applications effectively for teaching and research.

The introduction of AI in public universities can encounter resistance from faculty, administrators, and students who may feel threatened by the technological shift or be skeptical about its efficacy. Educators may worry that AI could undermine their role or lead to job displacement, while students may have concerns about the quality of AI-driven instruction compared to traditional face-to-face teaching. Moreover, some academic staff may lack the training to integrate AI into their teaching practices or research methodologies (Sternberg, 2020). Addressing these concerns requires comprehensive professional development programs, clear communication about AI's role, and a strategic approach to change management. It is for these reasons and more, that the research investigated; What are the application of Artificial Intelligence in Teaching and Research for Educational Goals attainment in Public Universities? and to proffer solution the problems.

## Purpose of the Study

Generally, the study investigated Application of Artificial Intelligence in Teaching and Research for Educational Goals attainment in Public Universities in Rivers State. Specifically, the objectives of the study are to:

1. Investigate the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State.
2. Determine the extent the use of AI enhance the conduct of research towards Educational Goals attainment in Public Universities in Rivers State.

## Research Questions

The study was guided by the following research questions:

1. To what extent does the use of AI applications influence teaching and research for Educational Goals attainment in Public Universities in Rivers State?
2. To what extent does the use of AI enhance the conduct of research towards Educational Goals attainment in Public Universities in Rivers State?

## Hypotheses

The study was guided by the following null hypotheses at 0.05 level of significance.

1. There is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State.
2. There is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities in Rivers State.

## Methodology

The study adopted a descriptive survey design. The population stood at 12,543 which comprised of 3,762 lecturers and 8,780 students across public universities in Rivers State, which include University of Port Harcourt, Rivers State University and Ignatius Ajuru University. The sample size which stood at 388 respondents, comprising 116 lecturers and 272 students in public universities in Rivers State, was determined using Taro Yamen formula. The instrument for data collection was a self-structured questionnaire titled: "Application of Artificial Intelligence in Teaching and Research for Educational Goals attainment in Public Universities Questionnaire". The questionnaire consisted of two sections namely section A and B. Section A of the questionnaire was used to generate demographic information while section B consisted of questionnaire items addressing the research questions of the study. This section of the questionnaire was structured using a four-point summated rating response scale of: Very High Extent (VHE) = 4 points, High Extent (HE) = 3 points, Low Extent (LE) = 2 points, Very Low Extent (VLE) = 1 point. The instrument was subjected to face and content validity by two experts in the field of Measurement and Evaluation in Rivers State University. The reliability of the instrument was established using a pilot study. The instrument was retrieved and analyzed with Cronbach Alpha method to establish the overall reliability index of 0.89. Out of the 388 copies of the questionnaire administered, 373 copies were retrieved and were properly filled,

comprising 110 lecturers and 263 students in public universities in Rivers State used for the study. Mean and standard deviation statistics were used to answer the research questions, while z-test statistics was used to test the null hypotheses at 0.05 alpha level of significance.

## Result Presentation

**RQ. 1:** To what extent does the use of AI applications influence teaching and research for Educational Goals attainment in Public Universities in Rivers State?

**Table 1: Mean Ratings of Respondents on the Extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State**

| | | Lecturers N= 110 | | Students N=263 | | | | |
|---|---|---|---|---|---|---|---|---|
| **S/N** | **Items** | $\bar{X}_1$ | **Std$_1$** | $\bar{X}_2$ | **Std$_2$** | **Average mean** | **Std** | **RMK** |
| 1. | AI tools can analyse large volumes of academic data to identify trends and areas that need improvement. | 3.70 | 0.88 | 3.75 | 0.84 | 3.73 | 0.86 | HE |
| 2. | By reducing the workload of educators and administrative staff, AI allows more time to focus on research, teaching, and student interaction, enhancing the quality of education and academic goals. | 4.35 | 1.16 | 4.41 | 1.11 | 4.38 | 1.14 | VHE |
| 3. | AI can significantly enhance research by assisting in data collection, analysis, and interpretation. | 3.68 | 1.61 | 3.74 | 1.48 | 3.71 | 1.54 | HE |
| 4. | AI enables the creation of virtual labs and simulations, providing students with hands-on experience in fields like science, engineering, and medicine, without the need for physical equipment. | 3.57 | 0.93 | 3.63 | 0.90 | 3.60 | 0.92 | HE |
| 5. | AI can connect experts, suggest potential collaborators, and organize research networks, which is crucial for achieving research and educational goals. | 3.72 | 0.85 | 3.77 | 0.82 | 3.75 | 0.83 | HE |
| | **Aggregate Mean/SD for Lecturers and Students** | **3.80** | **1.17** | **3.86** | **1.03** | **4.56** | **1.06** | **VHE** |

**Source:** Field Survey, 2024.

Table 1 in response to research question 1 which states, to what extent does the use of AI applications influence teaching and research for Educational Goals attainment in Public Universities in Rivers State had the following opinion scores for both lecturers and students. Mean scores of the lecturers to questionnaire items 1, 2, 3, 4 and 5 were 3.70, 4.35, 3.68, 3.57 and 3.72 with standard deviations of 0.88, 1.16, 1.61, 0.93 and 0.85 while the mean scores of the students were 3.75, 4.41, 3.74, 3.63 and 3.77 with standard deviation of 0.84, 1.11, 1.48,

0.90 and 0.82. Furthermore, the mean set representing the average mean scores for both lecturers and students were 3.73, 4.38, 3.71, 3.60 and 3.75; with standard deviation of 0.86, 1.14, 1.54, 0.92 and 0.83 respectively. The readings which were higher than the criterion mean of 3.00 indicated that the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State to a high extent.

**RQ2:** To what extent does the use of AI enhance the conduct of research towards Educational Goals attainment in Public Universities in Rivers State?

**Table 2: Mean Ratings of Respondents on the Extent the use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities in Rivers State**

| | | Lecturers N= 110 | | Students N=263 | | | | |
|---|---|---|---|---|---|---|---|---|
| **S/N** | **Questionnaire Items** | $\bar{X}_1$ | **Std$_1$** | $\bar{X}_2$ | **Std$_2$** | **Average mean** | **Std** | **RMK** |
| 6. | Researchers can use AI tools to analyse trends in student performance, attendance, and engagement, allowing universities to tailor interventions to improve learning outcomes. | 3.65 | 0.89 | 3.69 | 0.87 | 3.67 | 0.88 | HE |
| 7. | AI can create personalized learning paths for students based on their unique needs, learning styles, and progress. | 4.19 | 1.33 | 4.20 | 1.29 | 4.19 | 1.31 | HE |
| 8. | AI can support curriculum development by identifying emerging trends in education and suggesting new teaching methods, materials, and resources. | 3.00 | 0.68 | 3.02 | 0.67 | 3.01 | 0.68 | HE |
| 9. | AI can provide intelligent tutoring systems, virtual teaching assistants, and automated feedback systems, which can supplement traditional classroom teaching. | 3.07 | 0.78 | 3.09 | 0.78 | 3.08 | 0.79 | HE |
| 10. | AI can enhance the accessibility of educational resources by organizing and recommending relevant academic articles, journals, and other materials based on researchers' needs. | 3.00 | 0.75 | 3.03 | 0.74 | 3.02 | 0.75 | HE |
| | **Aggregate Mean/SD for Lecturers and Students** | **3.38** | **0.89** | **3.41** | **0.87** | **3.39** | **0.88** | **HE** |

**Source:** Field Survey, 2024.

Table 2 in response to research question 2 which states, to what extent does the use of AI enhance the conduct of research towards Educational Goals attainment in Public Universities in Rivers State had the following opinion scores for both lecturers and students. Mean scores of the lecturers to questionnaire items 11, 12, 13, 14 and 15 were 3.65, 4.19, 3.00, 3.07 and 3.00 with standard deviations of 0.89, 1.33, 0.68, 0.78 and 0.75 while the mean scores of the students

were 3.69, 4.20, 3.02, 3.09 and 3.03 with standard deviation of 0.87, 1.29, 0.67, 0.78 and 0.74. Furthermore, the mean set representing the average mean scores for both lecturers and students were 3.67, 4.19, 3.01, 3.08 and 3.02; with standard deviation of 0.88, 1.31, 0.68, 0.79 and 0.75 respectively. The readings which were higher than the criterion mean of 3.00 indicated that the use of AI enhance the conduct of research towards Educational Goals attainment in Public Universities in Rivers State to a high extent.

## Hypotheses Testing

1. There is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State.

**Table 3: Z-test Analysis on the Extent the Use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State.**

| Respondents | N | $\bar{x}$ | Std | DF | z-cal | z-crit | LS | Decision |
|---|---|---|---|---|---|---|---|---|
| Lecturers | 110 | 3.80 | 1.17 | | | | | |
| | | | | 371 | 0.38 | ±1.96 | 0.05 | |
| | | | | | | | | Accepted |
| Students | 263 | 3.86 | 1.03 | | | | | |

**Source:** Field Survey, 2024

Table 3 above shows Z-test Analysis on the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State. The result on the table showed that there is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State. The result on the table further showed a z-calculated value of 0.38 which was less than the z-critical value of ±1.96 at 0.05 level of significance and with a degree of freedom of 371, since the z-calculated (0.38) was less than the z-tabulated (±1.96), the null hypothesis was accepted which states that there is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State.

2. There is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities in Rivers State.

**Table 4: Z-test Analysis on the Extent the Use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities in Rivers State.**

| Respondents | N | $\bar{x}$ | Std | DF | z-cal | z-crit | LS | Decision |
|---|---|---|---|---|---|---|---|---|
| Lecturers | 110 | 3.38 | 0.89 | | | | | |
| | | | | 371 | 0.74 | ±1.96 | 0.05 | |
| Students | | | | | | | | Accepted |
| | 263 | 3.41 | 0.87 | | | | | |

**Source:** Field Survey, 2024.

The result on Table 4 above shows Z-test Analysis on the extent the use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities in Rivers State. The result on the table showed that there is no significant difference between the mean opinion scores of lecturers and students on the extent AI-based assessment tools influence Teachers Instructional Delivery in Senior Secondary Schools in Port Harcourt Metropolis, Rivers State. The result on the table further showed a z-calculated value of 0.74 which was less than the z-critical value of ±1.96 at 0.05 level of significance and with a degree of freedom of 371, since the z-calculated (0.74) was less than the z-tabulated (±1.96), the null hypothesis was accepted which states that there is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities in Rivers State.

## Discussion of Findings

The findings of the study are discussed as follows:

Table 1 above shows Z-test Analysis on the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State. The result on the table 4 further showed a z-calculated value of 0.38 which was less than the z-critical value of ±1.96 at 0.05 level of significance and with a degree of freedom of 371, since the z-calculated (0.38) was less than the z-tabulated (±1.96), the null hypothesis was accepted which states that there is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State. This result was in line with that of Ogunode and Gregory (2023) who studied Artificial Intelligence (AI) in educational management. These results show how important AI is when fully applied in education.

Table 2 in response to research question 2 which states, to what extent does the use of AI enhance the conduct of research towards Educational Goals attainment in Public Universities

in Rivers State. The result on the table further showed a z-calculated value of 0.74 which was less than the z-critical value of ±1.96 at 0.05 level of significance and with a degree of freedom of 371, since the z-calculated (0.74) was less than the z-tabulated (±1.96), the null hypothesis was accepted which states that there is no significant difference between the mean opinion scores of lecturers and students on the extent does the use of AI enhance the conduct of research towards Educational Goals attainment in Public Universities in Rivers State. The findings are in line with Woolf et al., (2021), who states that, AI can provide real-time support to students with disabilities through tools like voice recognition, text-to-speech, and visual recognition systems. Moreover, AI-powered platforms can ensure that learning content is accessible to students from diverse linguistic and cultural backgrounds, promoting a more globalized educational experience.

## Conclusion

In view of the results obtained from the study, the researcher concluded that, the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities and the use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities. In conclusion, the integration of Artificial Intelligence (AI) in teaching and research offers tremendous potential for enhancing educational outcomes and achieving academic goals in public universities in Rivers State. The transformative impact of AI in these institutions is evident in various aspects, such as personalized learning, data-driven decision-making, and streamlined administrative processes. AI-powered tools can significantly improve the learning experience for students by offering tailored content, adaptive learning systems, and instant feedback mechanisms, thereby promoting student engagement and academic success.

## Recommendation

Based on the findings, it was recommended that:

1. Public universities in Rivers State should prioritize investments in AI infrastructure, including high-performance computing systems, cloud services, and data management platforms. These tools are essential for supporting AI-powered teaching and research tools, enabling effective data analysis, simulations, and personalized learning experiences.
2. To fully harness the potential of AI, university administrators should implement regular training programs for faculty members to enhance their knowledge and skills in using

AI technologies. This will ensure that lecturers are capable of integrating AI-based teaching methodologies and tools into their curricula, as well as conducting AI-driven research.

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